
Japan Association for Planning and Public Management

14th FUTURE LEADERS CONFERENCE

Feb. 29, 2020

The University of Electro-Communications

Japan Association for Planning and Public Management
14th FUTURE LEADERS CONFERENCE
Feb. 29, 2020
The University of Electro-Communications

CONFERENCE COMMITTEE

CHAIR

Professor Kayoko YAMAMOTO
(The University of Electro-Communications)

MEMBER

Project Researcher Asako IWAMI
(Hosei University)
Junior Associate Professor Ayano TAKEUCHI
(Toho University)
Researcher Keiichi SHIRAKAWA
(Land Institute of Japan)
Assistant Professor Satoru ONO
(Ritsumeikan University)
Associate Professor Yuki SHIBATA
(Toho University)

Contents

Paper Session A : Public & Education

- A1 - Research on explanatory factors to determine efficiency of water suppliers in Japan using panel data: focusing on the merger effect on DEA efficiency .
..... 01
*Akira Toyama (Tokyo Institute of Technology)
Tatsuro Sakano (Tokyo Institute of Technology)
- A2 - Trends and Issues of “Creative Music Making” in the Music Education of Japan
An Examination Based on the Courses of Music Study in Elementary Schools
..... 05
*Asuna Watanabe (University of Electro Communications)
Kayoko Yamamoto (University of Electro Communications)
- A3 - Problems and Solutions for “School Districts” 07
Katsuya Masami (Tokushima Bunri University)

Paper Session B : Comunity & Industry

B1 - A research on the effect of economic diversity on regional productivity using growth accounting data from R-JIP2017..... 09

*Masaki Shimizu (Tokyo Institute of Technology)

Tatsuro Sakano (Tokyo Institute of Technology)

B2 - Lifelong Leaning 13

Ami Ogino (Tokushima Bunri University)

B3 - Possibility of AI Customer Service in Movie Theater..... 17

Shion Sasaki (Tokushima Bunri University)

Research on explanatory factors to determine efficiency of water suppliers in Japan using panel data: focusing on the merger effect on DEA efficiency

(Presenter*) *Akira TOYAMA (Tokyo Institute of Technology)
Tatsuro SAKANO (Tokyo Institute of Technology)

1. Introduction

Water industry in Japan is currently facing several challenges. The facilities constructed at the time of expanding urbanized areas are now deteriorating. For most water enterprises, the income is decreasing due to population decline so that they face financial problems such as debt operation and difficulty to allocate enough budget for facility renewal. Particularly small- and medium-sized ones, these problems are serious. It is necessary to improve efficiency in order to maintain the water industry.

In 2018, the concession method has been introduced to the water industry in Japan by the revision of the Water Supply Law, which aims to increase the efficiency of the water industry. The rationale behind the revision is that firstly the changing ownership from public to private raises incentives to seek efficiency and secondly the new law induces mergers of water suppliers thus enabling them to take advantage of economy of scale. According to the reviews of existing studies done by Abbot and Cohen (2009), there are not strong evidences to show that ownership structure affects the efficiency of water supplier because the effects of changing ownership structure depend on the level of regulative constraints set on the target industry. In Japan, although the operative environment is deregulated by new law, there remains strict constraints on key decisions such as price determination. In such an environment, economy of scale is expected to play crucial role in increasing efficiency regardless of ownership types.

There are empirical studies on the efficiency of Japanese water suppliers (Nakayama, 2000, 2002; Harada, 2004; Nakayama, 2015). Nakayama (2002) checked scale economy and found the similar result as of Abbot and Cohen (ibid.). Scale economy works up to the suppliers operating less than 100 thousand subscribers. It disappears beyond that operation scale. If there is an optimal scale as shown by the previous studies, the mergers under the optimal level is desirable but the ones beyond that should be avoided. However, their analysis used only cross section data and did not compare directly the efficiency change after mergers for each supplier.

In this study, firstly, we calculate the efficiency of all the retail water suppliers in Japan for 10 years from 2007 to 2016 using DEA and examine the general trends of efficiency change for these ten years. Secondly, we identify the suppliers which experienced merger during this period and detect the changes in efficiency after merger for each supplier. By comparing the efficiency change of merger experienced suppliers with the general trend of efficiency change for 10 years, we evaluate the effect of mergers.

2. Method

2.1 Data envelopment analysis (DEA)

Productivity and Efficiency are similar but different concepts related to economy of scale. Productivity is defined as the ratio of output to input. The productivities are usually measured by estimating production functions or cost functions. By comparing the parameter of these functions, we can assess the productivities for each enterprise. It is also possible to know whether scale economy works or not from the shape of the functions in the industry. However, this approach does not assume inefficiency of enterprises. Therefore, the estimated functions may have possibility to underestimate technologically potential productivity. To define efficiency or inefficiency we need to know frontier production function which show the potential productivity made possible by the existing technology. Efficiency is measured

by distance between the enterprise's productivity and its potential one which is shown by the frontier production function. Stochastic frontier analysis (SFA) and Data envelopment analysis (DEA) are the commonly used techniques to measure efficiency (Abbot and Cohen, 2009).

If we define productivity and efficiency in the way above mentioned, we notice that checking the existence of scale economy is more complex task than simply estimating coefficients of scale variables on productivity or efficiency as dependent variables. As we mentioned above, conventional productivity analysis by estimating production function may have possibility of under estimation concerning scale impact. On the other hand, when we use efficiency as dependent variable the possibility of over estimation appears because efficiency is measured by the distance from the frontier production function not from the optimal productivity point on the frontier. This problem can be solved using DEA.

The details of DEA are written in Tone (1993). To put it briefly, DEA is a method of evaluating efficiency, which determines efficiency by comparing productivity (input/output) with the enterprise with the highest productivity. The group of enterprises with the highest productivity is called the production frontier. DEA has two models: CRS (constant return to scale), and VRS (variable return to scale). In CRS, efficiency is expressed as the product of enterprise specific technical efficiency (ETE) and scale efficiency. VRS is a model that eliminates the effect of scale on efficiency, so the efficiency value measured by VRS indicates ETE. The ratio of the efficiencies of these models can be interpreted as scale efficiency.

In addition to that, by using VRS, it is possible to divide the production space, defined as a subset of the cartesian product of inputs and outputs, into three areas, IRS (increasing return to scale), CRS (constant return to scale), and DRS (decreasing return to scale). Economy of scale will work only for the enterprises positioned in IRS area.

2.2 Data and variables

Table 1 shows the number of retail water suppliers analyzed in this study. The data are collected from the "Local Government Enterprise Yearbook (Chihou Koei Kigyou Nenkan)" published on the Ministry of Internal Affairs and Communications website for the fiscal year 2007-2016.

Table 1 The number of Suppliers

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Suppliers	1325	1316	1289	1284	1281	1281	1279	1276	1273	1263

For calculating efficiency, one input and three output variables below are used.

Output Y : annual total volume of water sold (yen)

Input X₁ (labor): the number of workers (person)

X₂ (capital): tangible fixed assets (yen)

X₃ (other input): sum of variable cost (yen)

3. Result

3.1 Trend of efficiency change from 2007 to 2016

The average of efficiencies for all suppliers is calculated year by year. Table 2 shows the result. Although there are fluctuations, there seems to exist increasing trend. It increased slightly as year went on. Harada (2004) showed that the CRS efficiency for a single year in 2001 was 0.367 and the VRS was 0.428, suggesting that there is a time trend of efficiency improvement.

Comparing the efficiency by the organizational status, the efficiencies of prefecture and Ordinance-

designated city are higher than those of Cities, Towns and Villages. This indicates scale economy existed.

Table 2 Average efficiency

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CRS	0.393	0.405	0.418	0.423	0.438	0.416	0.410	0.432	0.443	0.434
VRS	0.484	0.491	0.493	0.506	0.517	0.501	0.497	0.508	0.517	0.523

3.2 Effect of merger

During 2007 to 2016, there were 48 cases of merger in which 105 suppliers experience merger. When examining the change in the efficiency value before and after merger, the rate of the CRS efficiency change was 1.153 on average and the change rate of the VRS efficiency was 1.333 on average. The average annual rate of change in efficiency for all suppliers for these ten years was 1.018 for CRS and 1.014 for VRS. There were positive effects on efficiency both for CRS and VRS.

It can be intuitively imagined that the scale efficiency is improved by merger, but the results show that the VRS efficiency value (enterprise specific technical efficiency) excluding the effect of the scale efficiency is also improved by merger. This may be due to the effect of management formalization corresponding to the scale expansion. For example, when the number of employees increases, the management of managers is less likely to be distributed to all employees than when the number of employees is small, and the managerial efficiency cannot be realized without management formalization. Therefore, it is thought that inefficient management will be eliminated to some extent by merger.

Table 4 shows the domains where merger occurred and the difference of efficiency change rate. 70 % of merger experience suppliers are positioned in IRS domain. Considering scale efficiency is to be worked in this domain, this result shows most of merger were conducted as rational decisions. Actually, CRS efficiencies are larger than 1 for all the mergers in this domain. However, not all of VRS efficiencies in this domain are larger than 1, which implies scale of IRS domains is not large enough for managerial improvement. In fact, the largest change of VRS efficiency were observed in the suppliers whose after-merger position were in DRS domain.

Table 3 Annual change rate of efficiency

	CRS	VRS
All suppliers	1.018	1.014
After Merger experieced	1.153	1.333

Table 4 Efficiency Change by merger domain

	number of suppliers	CRS	VRS
irs-irs	11	1.179	0.923
irs-crs	8	1.094	0.875
irs-drs	45	1.256	1.561
drs-irs	0	-	-
drs-crs	1	0.944	0.921
drs-drs	38	1.069	1.302
crs-irs	0	-	-
crs-crs	0	-	-
crs-drs	2	0.640	1.142

4. Conclusion

In this paper, the following results were obtained by DEA on time series data of Japanese water supplier.

(1) A slight positive yearly trend effect was confirmed.

(2) The improvement of the efficiency by merger was higher than the trend effect of the whole water industry. This reveals that there is an economy of scale in the Japanese water industry. It is possible to increase efficiency by merger.

(3) However, the scale efficiency works only for the suppliers in IRS domains. Even so, managerial efficiency is considered to work in DRS domains. Therefore, the merger in the DRS domain is not always decreasing efficiency.

In this study, we did not include other explanatory factors other than merger. Theoretically speaking, economy of density, economy of scope, and impacts of different regulatory environment and governance structure should be explored.

<References>

- 1) Abbott M., Cohen B. (2009) "Productivity and efficiency in the water industry" *Utilities Policy* 17, pp. 233-244
- 2) Mizutani F., Urakami T. (2001) "Identifying network density and scale economies for Japanese water supply organizations" *Paper in Regional Science* Vol.80, pp.211-230
- 3) Phillips M. A. (2013) "Inefficiency in Japanese water utility firms: A stochastic frontier approach" *Journal of Regulatory Economics* Vol.44 No.2, pp.197-214
- 4) 関西社会経済研究所 (2011) 「地方公営企業の効率性に関する研究」
- 5) 齋藤博康 (2014) 「英国水法変遷史」 *月刊下水道* Vol.37 No.12, pp.39-44
- 6) 総務省自治財政局公営企業経営室(2019) 「水道事業の課題と取組について」
http://www.soumu.go.jp/main_content/000618172.pdf
- 7) 高田しのぶ (1997) 「水道事業の経営効率に関する研究—DEAによるアプローチ—」 筑波大学大学院農学研究科修士論文
- 8) 刀根薫 (1993) 「経営効率性の測定と改善—包絡分析法 DEAによる—」 *日科技連*
- 9) 中山徳良 (2000) 「水道事業における技術非効率性の計測と原因」 *公益事業研究* 第 52 巻 第 2 号, pp.91-96
- 10) 中山徳良 (2002) 「水道事業の費用構造-可変費用関数によるアプローチ-」 *公益事業研究* 第 54 巻 第 2 号, pp.83-89
- 11) 中山徳良 (2015) 『日本の水道事業の技術効率性に影響を与える要因の分析』 *オイノミカ* 第 52 巻 第 1 号, 101-112
- 12) 原田禎夫 (2004) 「水道事業の効率性分析」 *経済学論叢(同志社大学経済学会)* 第 55 巻 第 4 号, pp.565-598
- 13) 吉川丈, 磯合良輔, 矢根遥佳, 矢根眞二 (2012) 「確率的生産フロンティアと環境変数: 技術効率性効果フロンティアモデルの上水道事業への適用」 *桃山学院大学経済経営論集(桃山学院大学総合研究所)* 第 53 巻 第 4 号, pp.59-97.

Trends and Issues of “Creative Music Making” in the Music Education of Japan: An Examination Based on the Courses of Music Study in Elementary Schools

*Asuna WATANABE (University of Electro-Communications)
Kayoko YAMAMOTO (University of Electro-Communications)

1. Introduction

The courses of music study (COMS) introduced “Creative Music Making” (CMM) based on the theory established by John F. Paynter in the U.K into Japanese school music education in 1989. CMM is a system for total music learning through the experience of music-making and appreciation, and it enables students to cultivate their better understanding of modern music and creativity. However, many of music teachers get confused in trying to put CMM into practice, and they frequently interpret and assess its aim and goal in a wrong manner. One of the reasons for this, Takasu (1994) [1] pointed out that the concept of “creativity” in the COMS is not incontrovertible. However, according to Sakai (2010) [2], the studies on the above issue have decreased since the 2000s onwards, and the current situation related to CMM is not sufficiently clarified. Tanimoto (2017) [3] only shows that “music-making” practice is still under 15% of school music education in recent years. Because “music-making” practice in the COMS should be continuously promoted, first of all, it is essential to clarify the causes to confuse music teachers as previously noted. Based on the above background, this study aims to disclose the current trends and issues of CMM especially in elementary schools.

2. Method

First, this study grasps the background of CMM introduced into the COMS after the World War II in Japan reviewing the related literatures. Next, this study clarifies the development of CMM conducting word analysis of the above COMS by referring the database of courses of study [4]. Based on these results, this study describes the relationships between the goals of the COMS and CMM.

3. Results and Discussion

3.1 Background of CMM introduced into the COMS

In 1947, the COMS declared promoting music education as the cultivation of students’ aesthetic sentiments in its preface, and it sets the following six goals to foster and acquire; (1) rich human nature, (2) invention, (3) expression, (4) score-reading, (5) music-appreciation, (6) musical knowledge and skills. In 1958, the COMS made much account of children-centered education and reconsidered artistic creativity in music education. The COMS presented common-songs to provide music education based on children’s daily life, and composed two learning contents such as “expression” including singing, playing the instruments and composition, and “appreciation”. In 1968, the COMS included “foundation” into the learning contents to aim at cultivating children’s musical abilities step by step. “Foundation” is the learning content which is common to “expression” and “appreciation”. Though the COMS emphasized the teaching of “foundation” related to “expression” and “appreciation”, most of music teachers separately taught these to students.

Since the 1970s, the policy of Japanese music education has changed to promote flexible education, due to the full contents of school education. In elementary schools, music classes were reduced, and it is necessary for music teachers to think out new ideas to improve music education. Therefore, the COMS reconsidered the learning contents and promoted a system for total music learning. In 1977, the COMS eliminated “foundation”, and clearly showed each subject-goal in one sentence. A new phrase which meant “a love of music in human nature” was included into the above the subject-goal for music. The

COMS changed the direction from developing musical skills to fostering children's mind to get close to the music. The COMS aimed at promoting music classes focused on children-centered education and developing their abilities (motivation, thinking, judgment and expression). As a result, in 1989, CMM as a system for total music learning, which is highly suitable with the above idea, was introduced into the COMS.

3.2 Development of CMM in the COMS

CMM was indicated as "creating and expressing the music" in the COMS for elementary schools. It meant that children had to put originality and ingenuity into creating their original music in addition to the expression of existing musical works. The practice depended on children's sound-making, and it was far from the essence of CMM. In 2008, the COMS expressed the concept of CMM as "music-making" in Japanese, and added "common-items" to learning contents. "Music-making" was indicated to create sounds and music based on children's ideas and creativity without the expression of existing musical works. "Common-items" is positioned in the COMS to support "appreciation" and "expression" including singing, playing the instruments and music-making. In 2017, the goal of each subject was set according to the following three qualities and abilities; (1) knowledge and skills, (2) thinking, judgment and expression, etc., and (3) humanity, etc. The COMS defined the teaching contents by relating the goals with the qualities and abilities. The COMS separated music-making into two activities such as "playing with music and improvisational musical expression" and "making sounds into music". The COMS specifically showed the process from goal to teaching contents and evaluation, by clearly showing children's musical knowledge and skills which were necessary for these two activities.

4. Conclusion

The above series of the COMS set each subject-goal and general learning contents, and these were improved every ten years. Japanese music education has been promoted as the cultivation of students' aesthetic sentiments which reflected militaristic education. However, the learning contents were biased to develop children's musical skills and abilities, and the COMS faced a problem of "creativity". The COMS expanded the interpretation of expression to creativity, and aimed at children-centered class. Though the COMS revised the learning contents and its structure, the above problem was not solved. Therefore, the COMS adopted CMM to solve the above problem, and that caused other issues related to the interpretation of its theory as a result. It is necessary to more concretely describe the learning contents related to CMM, and clearly display the appropriate teaching contents in the COMS.

Additionally, chronologically looking at the changes in the series of the COMS, though CMM is still promoted and its contents are more specific. CMM was not sufficiently put into practice yet, because the meaning of a system for total music learning as its essence is still not clear to most of music teachers. Therefore, it is necessary to analyze the examples of CMM practice, and clarify whether it can be put into practice in an effective and efficient manner.

<References>

- [1] Takasu, Hajime (1994). Souzouteki Ongakugakusyuu ni okeru "Souzousei Ikusei no Saikou:Souzousei Ikuseini kansuru J.F.Paynter no Kennkai wo toshite (Reconsideration of "Creative Music Making" - through the opinion by J.F. Paynter about raising creativity), Onngaku Kyouikugaku (Japanese Journal of Music Education Research), vol.24 (2), pp. 25-36.
- [2] Sakai, Megumi (2010). "Ongaku-Dukuri" no Kyouikuteki Konkyo ni kannsuru Kenkyuu: Yoisa no Kai no Jissenn wo tegakari ni Oto wo kikukoto ni tuiteno Bigakuteki Kousatu wo humaete (*A study on the Educational Grounds of "music-making":The Aesthetic Considerations about listening to sounds based on the practice of Yoisa-no-kai Society*). Tokyo University of the Arts, Doctoral Dissertation.
- [3] Tanimoto, Naomi (2017). "Kyouushi no Htsuwa Bunseki kara Miru'Ongaku-dukuri' no atarashi Igi" (*The New Role of Creative Music Making from the Viewpoint of Teachers' Utterances: Compared with Singing and Playing Instruments*). Research bulletin, Toin University of Yokohama, vol.37, pp.21-28.
- [4] National Institute for Educational Policy Research. (2019). *Database of courses of study*; Retrieved 4th, February, 2020, from <https://www.nier.go.jp/guideline/>

Problems and Solutions for “School Districts”

Katsuya Masami (Tokushima Bunri University)

1. Introduction

In recent years, children's academic ability has declined. In addition, schools in mountainous areas have lost liveliness due to the declining birthrate. I think we have to research “school district” to solve these two problems.

In the Meiji era in Japan, the history of “school districts” began with the primary purpose of equalizing high school education level. Tokushima prefecture started in 1873. It was first this system was adopted nationwide in Japan, but now it is adopted only 23 prefectures. Preceding studies of this system evaluate that prefectures abolished this system are advanced prefectures. I will report only the case of Tokushima prefecture.

Tokushima prefecture has adopted the current “three” school district system since 1972. The southern part of the prefecture is “first school district”, the northwestern part is “the second” and the central part is “the third”. However, examinees living in towns or villages no high school are allowed schools located in “the third” district. The main problem at this system is that competition of examinee rate. In Tokushima Prefecture, every year the ratio for high school entrance examinations is settled to one, and the competition rate is almost eliminated. Eliminating the competitive rate will lead to a decline in overall academic ability. Furthermore, examinees are gathered in the center of the prefecture, and the number of examinees at mountain high schools is decreasing. These are the issues that continue to adopt the school district system. The hope of junior high student for enroll in the desired high school come true. It is important life goals equalization of chance educational.

2. Method

First, I checked high school enrollment rate was checked using data by Ministry of Education, Culture, Sports, Science and Technology. I try to find out the primary goals of equal education opportunities the district system have been met.

Next, we used the census to investigate the number of households in Tokushima. Examine how the number of households in near Tokushima city area is changing, although the population of Tokushima Prefecture is declining.

Finally, I used data from Tokushima prefectures that abolished the school district system and looked at what happened afterwards and try examine to refer to other prefectures efforts to better school district system.

3. Result

According to the Ministry of Education, Culture, Sports, Science and Technology now, high school enrollment rate in Japan is 98%. It is also at a high level compared to foreign countries. However, almost “no examination” problem is magnification in Tokushima.

According to the census, the number of households in Tokushima Prefecture is increase at the center area. In particular, the number of households in the area where students can go to the third school district has increased significantly.

Finally, according to a report by Shimane Prefecture, the school district system was abolished, schools have been reported to be revitalized and attractive, in Hiroshima, Yamaguchi and Tottori prefectures.

4. Conclusion

There are three points of my presentation.

First is that the purpose of education is different. In the past, high school enrollment rate was low, but not low now. The enrollment rate is almost 100%, and the purpose of the district system has been achieved. So this system should be abolished. I think the school district system has been abolished and it is better to use market principles to increase competitiveness in the future. Because using market principles, schools try to be more attractive to attract examinees. In addition, examinees become more competitive.

Second, the change in the number of households in Tokushima Prefecture. The central area is mainly the third school district, the meaning of the school district system will be lost.

Third, in the prefectures that abolished the school district system, high school revitalization and specialization were seen. Hiroshima, Yamaguchi and Tottori prefecture also had the same problem with school districts as Tokushima. But these prefecture solved the problem by abolishing the school district system. In particular, Tottori Prefecture is similar to Tokushima Prefecture, so it will be helpful.

I think that it is better to abolish the school district system.

<References>

<https://core.ac.uk/download/pdf/41081761.pdf>

https://www.mext.go.jp/component/a_menu/education/detail/_icsFiles/afieldfile/2011/09/27/1299178_01.pdf

www.pref.tokushima.jp/_files/.../h27kokuchosokuhou.pdf

https://www.pref.shimane.lg.jp/gakkokikaku/saihen/kongonokenritukoukounoarikatakentouiinkai/index.data/09_siryu6.pdf

A research on the effect of economic diversity on regional productivity using growth accounting data from R-JIP2017

* Masaki Shimizu (Tokyo Institute of Technology)
Tatsuro Sakano (Tokyo Institute of Technology)

1. Introduction

In recent years, in Japan, the urban policy called compact city has attracted attention due to population decline and aging society. In the discussion about compact cities in Japan, it is heavily concerned with measures against population decline and aging, but according to Kutsuzawa (2017), it has the effect of improving sustainability and productivity. This research focuses on the effect of productivity improvement.

Kutsuzawa focuses on the theory of agglomeration economy to explain this effect. It is argued that there are two types of agglomeration economies: localization economies and urbanization economies (Rosenthal, 2006). Both economies are understood as two types of external economies of scale. Localization economies refer to the phenomenon that the productivity of the entire industry increases when companies of the same industry cluster in a city/region, and urbanization economies refer to the phenomenon that the productivity of the entire industry increases when companies cluster in larger city/region.

Theoretically, it has been argued that agglomeration of the same industry causes localization economies for three sources of externalities: knowledge spillovers, input sharing and labor pooling (Marshall, 1920). Nakamura (1985) estimates that a doubling of industry scale leads to 4.5% increase in productivity. On the other hand, in urbanization economies, he argues that Marshall's externalities work across over the industries. Jacobs (1969) argues if main source of crossover externalities reside in knowledge spillover, diversity of economic activities is the main source of innovation. The increase in size of a city/region occur the increase in productivity of every individual company in an entire city/region by diverse industrial activities. Therefore, urbanization economies can be translated into economies of diversity. Rosenthal & Strange (2004) estimates that doubling city size seems to increase productivity by 3~8%.

However, there is not always a consensus on whether localization economies and urbanization economies have the higher effect of productivity enhancement. Tran (2011) argues that localization brings about higher growth rate in short terms but urbanization does stable growth in longer terms from the states level comparison in the U.S. Hollar (2006) argues localization (scale) works better in small district while urbanization (diversity) does in metropolitan region. On the other hand, van Oort (2004) argues that the network relationship among cities is also important. It can be said that existing research cannot explain sufficiently the complex patterns.

The purpose of this research is to clarify which economies work at Prefectural Level in Japan, localization economies or urbanization economies. The prefectures are medium scale between the small scale, where localization economies are expected to work, and the metropolitan area, where the urbanization economics are expected to work by Hollar (2006), and this is one of the typical cases where it is not enough to theoretically explain how the special network relationship in Japan affects. In addition, to clarify the mechanism of the effects of agglomeration in the spatial area controlled by the prefectures responsible for regional economic policy is considered to contribute to spatial economic policy planning.

2. Method

First, in localization economies, it is expected that the higher the concentration of the same industry in the same area, the higher the productivity of that industry. In existing research, the number of offices and employees are often used as the degree of local agglomeration, but in this study, the total added value of the industry is used. Because these three variables are highly correlated and agglomeration effects extend the effect of scale on producer-specific production to regional externalities, it is natural that it complements the scale on output. In localization economies, if all industries have a positive effect and the economic size of the entire region increases with a constant industrial diversity distribution, localization economies appear in all industries, so the labor productivity of the entire region should improve. This suggests that the greater the total added value of each prefecture, the higher the labor productivity of that prefecture.

Next, diversity of industrial activities is expected to have a positive correlation with the total added value of the prefecture. It is expected that the larger prefectures are more urbanized and their economies are more diversified. Since the effect of scale can include the effect of diversity, regression analysis is performed using entropy calculated based on relative proportion of added value by industry as an independent variable to separate the effects. Then, the effects of diversity confounded by the effects of scale can be separately evaluated. In urbanization economies, entropy is expected to have a positive effect on labor productivity by prefecture. In that case, the explanatory power should be superior to the model using only scale as the independent variable, and the explanatory power of the scale should decrease. This tendency also holds when the labor productivity growth rate is used as the dependent variable. Furthermore, if urbanization economies are due to knowledge spillover, the effect of entropy is considered to have a stronger effect on TFP among labor productivity.

As analysis method based on the above discussion, OLS estimation of the following three models performed, and the model fitness and the estimated values of $\alpha_1 \alpha_2 \beta_1 \beta_2$ are compared.

$$\begin{aligned} \text{Model 1: } Y_r &= \alpha_1 S_r + \gamma_1 + \varepsilon_r \\ \text{Model 2: } Y_r &= \beta_1 D_r + \gamma_2 + \varepsilon_r, \\ \text{Model 3: } Y_r &= \alpha_2 S_r + \beta_2 D_r + \gamma_3 + \varepsilon_r. \end{aligned}$$

Here, dependent variables Y_r are labor productivity in prefecture r and labor productivity growth rate in prefecture r , TFP growth rate of prefecture r . Independent variables are S_r , real added value of prefecture r and D_r , diversity of economic activities in prefecture r .

As a measurement D_r , we use entropy. If p_{ir} is the ratio of the total added value of the i industry in r prefecture, the entropy index is given by Eq. (1). When it is close to 0, it is an area that specializes in a certain industry only, and when it is close to $\log N$, it is an area that has diversity.

$$-\sum_{i=1}^N p_{ir} \log p_{ir} = -\sum_{i=1}^N \frac{x_{ir}}{x_r} \log \frac{x_{ir}}{x_r} \quad (1)$$

To measure productivity by prefecture, a growth accounting analysis was used following Tokui's (2018, p29) formula. The formula for growth accounting is summarized in the form of Eq. (2), where Y_{rt} , TFP is A_{rt} , capital is K_{rt} , and labor is L_{rt} in r prefectures at year t .

$$\Delta \log Y_{rt} = \Delta \log A_{rt} + \alpha \Delta \log K_{rt} + (1 - \alpha) \Delta \log L_{rt} \quad (2)$$

By putting that V_{irt} is the real added value, V'_{irt} is the nominal added value, H_{irt} is the man-hour, and the nominal value added share is $S^V_{irt} = V'_{irt}/V_{rt}$. Therefore, the labor productivity growth rate by prefecture can be obtained from Eq. (3). The TFP growth rate by prefecture can be obtained from Eq. (4).

$$\Delta \log Y_{rt} = \sum_{i=1}^{23} \frac{1}{2} (S^V_{irt} + S^V_{irt-1}) \Delta \log V_{irt} - \sum_{i=1}^{23} \frac{1}{2} (S^V_{irt} + S^V_{irt-1}) \Delta \log H_{irt} \quad (3)$$

$$\Delta \log A_{rt} = \sum_{i=1}^{23} \frac{1}{2} (S_{irt}^V + S_{irt-1}^V) \Delta \log A_{irt} \quad (4)$$

For this analysis, the R-JIP2017 database created and published by the Research Institute of Economy, Trade and Industry was used. This database is composed of (calendar year) annual data such as measurement results of real and nominal added value and capital and labor input considering the differences in quality, inter-prefectural disparities in total factor productivity levels by industry, total factor productivity growth rate by prefecture and industry in order to measure total factor productivity by 47 prefectures (Okinawa prefecture since 1972) x 23 industries. The data period is from 1970 to 2012.

Figure 1 shows the national average labor productivity growth rate. Before the economic bubble burst in 1991, labor productivity growth averaged 4%, even when fluctuating between 1% and 8%. Since then, it has fallen to around 2% on average and the runout has been reduced to about 1%. This trend has continued until financial crisis in 2009. It is known that the economic growth rate tends to decrease as the mature economy. Mizobata (2018) called the catch-up period from 1970 to 1990 and the frontier period from 2000 to 2010. In the subsequent analyses, we will check if there are any structural change occurred from the catch-up to the frontier period.

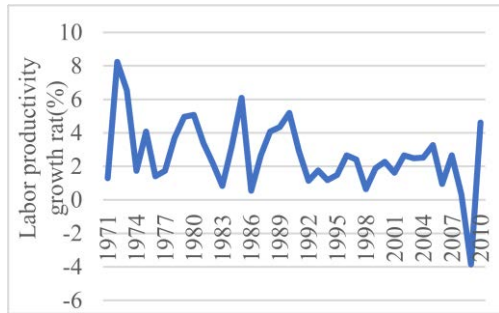


Fig 1. Growth rate (national average)

Table 1. Labor productivity (1970~2010)

	Model 1		Model 2		Model 3	
	B	p-value	B	p-value	B	p-value
constant	-6.052	0.000	-0.284	0.733	-7.218	0.000
S_r	0.702	0.000	—	—	0.619	0.000
D_r	—	—	1.264	0.000	0.887	0.001
	R2	Adj R2	R2	Adj R2	R2	Adj R2
	0.494	0.482	0.245	0.228	0.608	0.590

3. Result

Table 1 shows the results of OSL estimation for three models, with labor productivity of prefecture as the dependent variable and the logarithm of real added value and entropy measured by proportion of industrial activities as independent variables.

The adjusted R-squared was the highest for Model 3 with both independent variables, and that of Model 1 with only real added value comes to second, that of Model 2 with only entropy was the lowest. The regression coefficient of all models had statistically significant positive effects, and the regression coefficient of Model 3 was lower than the regression coefficients of Model 1 and Model 2. These facts indicate that scale and diversity are positively correlated with each other, but they have independent effects on labor productivity. Table 2 shows the results of comparing the estimates for the entire period with those for the catch-up period and the frontier period in Model 3, which had the highest explanatory power. The adjusted R-squared in the frontier period is lower than that in the catch-up period, but the regression coefficient is positive in both periods, and the mechanism of agglomeration economy operates in the same way even after the economy becomes matured.

Similar analyses were performed using labor productivity growth and TFP growth as the dependent variables. These results are shown in Tables 3 and 4. It was found that the adjusted R-squared of the models of both variables were lower than those of the labor productivity model, and the adjusted R-squared, which was relatively high in catch-up period, became almost zero in frontier period, there are no independent variables with significant effects in frontier period. Therefore, it is considered that the growth rate is easily

influenced by factors such as economic fluctuations other than scale and diversity. In addition, all signs of the regression coefficients with significant effects are positive, also TFP growth rate had significant effects on both the real added value and entropy, whereas labor productivity growth rate had significant effects on only the real added value.

Table 2. Labor productivity

	1970~2010		1970~1990		2000~2010	
	B	p-value	B	p-value	B	p-value
constant	-7.218	0.000	-5.679	0.000	-8.917	0.000
S_r	0.619	0.000	0.507	0.000	0.803	0.000
D_r	0.887	0.001	0.579	0.021	1.042	0.008
	R2	Adj R2	R2	Adj R2	R2	Adj R2
	0.608	0.590	0.520	0.498	0.471	0.447

Table 3. Labor productivity growth rate

	1970~2010		1970~1990		2000~2010	
	B	p-value	B	p-value	B	p-value
constant	-0.594	0.762	-6.024	0.023	5.698	0.144
S_r	0.090	0.556	0.358	0.113	-0.299	0.273
D_r	0.845	0.035	2.037	0.000	-0.048	0.945
	R2	Adj R2	R2	Adj R2	R2	Adj R2
	0.120	0.080	0.380	0.352	0.027	-0.017

4. Conclusion

The results showed that both independent variables had significant positive effects independent of labor productivity. The same effect was confirmed during catch-up period and frontier period, when economic structure was considered to have changed significantly. This shows that both economies of scale corresponding to localization economies and economies of diversity corresponding to urbanization economies work.

However, it is confirmed that the effects of agglomeration economies on productivity growth rate disappears in the frontier period. To compare with the research that labor productivity growth rate in other mature countries is supported by TFP growth rate, it is thought that there are common obstructive factors of TFP growth rate in all prefectures of Japan. It is considered if these obstructive factors are removed, agglomeration economy may be set in motion in Frontier period as in the Catch-up period.

Table 4. TFP growth rate

	1970~2010		1970~1990		2000~2010	
	B	p-value	B	p-value	B	p-value
constant	-5.630	0.007	-12.35	0.000	4.589	0.242
S_r	0.371	0.021	0.738	0.002	-0.309	0.262
D_r	0.745	0.065	1.872	0.001	0.010	0.988
	R2	Adj R2	R2	Adj R2	R2	Adj R2
	0.217	0.181	0.472	0.448	0.028	-0.016

<References>

- 1) Hollar, M. 2006, Industrial Diversity and Agglomeration Economies, U.S. Department of Housing and Urban Development Working Paper #REP06-03
- 2) Jacobs, Jane. 1969, The Economy of Cities, Random House.
- 3) Marshall, Alfred. 1920, Principles of Economics, London: Macmillan
- 4) Nakamura, Ryohei. 1985, Agglomeration economies in urban manufacturing industries: A case of Japanese cities, Journal of Urban Economics. Rosenthal, Stuart, and Baum-Snow, Nathaniel. vol 17. p108-124
- 5) Rosenthal, Stuart S, and Strange, William C. 2004, Evidence on the Nature and Sources of Agglomeration Economies, Handbook of Regional and Urban Economics, Henderson, V. and Thisse, J.F.
- 6) Tran, H.P.D. 2011, Industrial Diversity and Economic Performance: A Spatial Analysis, Ph. D Dissertation, University of Nebraska
- 7) van Oort, F.G. 2004, Urban Growth and Innovation, Routledge, N.Y.
- 8) 沓澤隆司, 2017, コンパクトシティと都市居住の経済分析, 日本評論社, 195p
- 9) 徳井丞次, 2018, 日本の地域別生産性と格差 R-JIP データベースによる産業別分析, 東京大学出版会, 263p.
- 10) 溝端幹雄, 2018 ”日本の労働生産性に関する地域的接近 医療・福祉への資源偏在と大規模事業所の地域間生産性格差に課題”, 大和総研グループ

Lifelong Learning

* Ami Ogino (Tokushimabunri University)

1. Introduction

In Japan, the 21st century has passed 20 years in recent years there is a problem lack of human resources is occurred. Needless to say, this problem is due to a declining birthrate and a declining population.

In the sector of the industry, the field of work is fixed. For example, most fields require specialized skills such as service sales, nursing care for the elderly people, and nursery staff. As a countermeasure against this problem, Japanese government considers increasing and introducing foreign workers.

However, in this paper, as a countermeasure for this problem, I consider a system of "lifelong learning" effectively utilizes existing human resources.

2. Method

The most suitable environment for achieving "lifelong learning" is "university". In general, universities generally go on next to high school, but by using "lifelong learning", even working adults, housewives, and the elderly people join can university education.

The book "Can a University Become a Base of Community Knowledge?", "Chapter 5: Opening a University Aiming at the Fusion of Student Education and Adult Education", Uno Frontier University, Professor of the Faculty of Human Sociology, Shiraishi (2016). There is a table that compares the characteristics of each type of fusion created by him.

This table summarizes how universities have worked on adult education. For each type of open class, the comparison is made between the presence or No/Yes of an entrance examination, the content of the program, the subject of the seminar, and the opening of classes at night and on holidays. What can be said from this table is that each university can approach the working people.

Then, it is thought that "lifelong learning" can be realized by university by using "recurrent education". But there are challenges.

2-1 Comparison by type of fusion

	Entrance examination	Program contents	Subject of seminar	Night / Holiday classes
Working people entrance examination	For working people	For general students	Students and members of society	None
Long-term student system	For working people	Mainly for general students	In principle, individual correspondence	Only some
Liberal arts students	For working people	Mainly for general students	Specialized for working adults	None With exception
Open lecture	None	For general members of society	None	Yes
High school cooperation class	None	High school students and University students	None	None
Night class	None	For working people	None	Yes
Senior college	None	Senior and University students	Specialized for seniors	None

Source: Can a University Become a Knowledge Base for a Community? Chapter 5 P.67 Table 5-1

Shiraishi (2016) points out the following. ①Because there is a maximum of 10 years of enrollment, if the curriculum, is changed, university must leave the subjects for the students who learn subject the old curriculum, until the students graduate or drop out. (2) There are students who are forced to drop out of university due to childcare or nursing care. (3) Even if students request full-time work during the day time and start courses at night on request, there will be variations in desired subjects, and the number of students will gradually decrease. Student's getter popular universities. (5) The morale of the adult students who enter the school has declined. For example, there are some students who do not want to study at university and try to utilize only the status of students.(pp.67-68)

In addition, I think that there may be a problem that low-income members of society cannot join University.

However, there are many working adults and elderly people who want to study again in university. Actually, a job change webpage "Middle Job Change" is conducting market research targeting middle age class. As a result, 90% of the respondents answered that they would like to learn again. (2019

survey)

The reasons for this are getting ability language foreign, taking and business knowledge, and to get professional qualifications. I believe that there is a certain demand for university studying, so it is necessary to have a system that makes it easier to attend. As a solution, I make two proposals. The first is to provide a scholarship for students for working low income students. This is limited to for adult student open to join classes with entrance examinations, but I believe that setting up a special scholarship system can help increasing their motivation.

The second is "online courses." This is a proposal for an open class without an entrance exam. Students who take online courses join university lectures. Each university has a portal site. Open portal site for online students can register and take lectures online. Of course, it is ideal to join the class, but students who cannot take time even for childcare, nursing care, and working adults, and students whose commuting distance is clearly long, can take online classes in their spare time. By preparing a page, the student can ask questions, he/she may be able to deepen your understanding. Also, even if the curriculum is changed, the burden of management will be reduced only by keeping the old curriculum on the Internet.

3. Result

By carrying out these and the suggested solutions, the amount of university students increase, and the elimination lack of specialized human resources occupations that are specialized. Professionals customize their own timetables. However, when going online, there is a concern that morals will decline, but the Internet will also be by using the working people can Internet able to manage it. For example, it is easy to understand if the assignment of the report after attendance and the attendance history are confirmed.

Unless the curriculum was changed drastic, recording lecture content to the system in the university. Lecture need not make new presentation in every times. It is good point efficiency.

4. Conclusion

In Japan today, it is said that the aging of the population is declining and the number of human resources, but it is not without human resources. I think that there may be a shortage of people because there are people who do not have qualifications because they lack qualifications and knowledge. A university is the place of learning the university can eliminate.

Universities are under influence the declining birthrate and aging population. The number of university students is decreasing year by year, and there are some universities where the university management is severe. I think that in the 21st century, which is said to be the age of 100 years of life, the demand for "lifelong learning", especially "recurrent education", will increase in the future. I conclude that liberalizing a university could create new supply and demand.

<References>

* Masahiro Kagawa, Mari Suzuki, Hidekazu Sasaki, 2008, "Understand lifelong learning" Minerva Publishing

* Shiraishi(2016) "Chapter 5: Opening a University Aiming at the Fusion of Student Education and Adult Education" Takamichi Uesugi, Masahiro Kagawa, Yasuo Kawamura," Can a University Become a Knowledge Base for a Community?", Minerva Publishing, p.61-74

* HUFFPOST, "90% of adults want to learn again. But there is no money or time. What is the issue of "Recurrent Education"? (Investigation result)"

https://www.huffingtonpost.jp/enjapan/manabinaoshi_a_23433836/

Released on May 21, 2018, Viewed on February 8, 2020

Possibility of AI Customer Service in Movie Theater

(Presenter) Shion Sasaki (Tokushima Bunri University)

1. Introduction

Recently, subscription services such as VOD (Video On Demand) have begun to spread. The strength of being able to watch movies wherever you want them when you like them would be as shocking to movie theaters as the spread of DVDs in the 1980s.

It is feared that the percentage of people who watch movies in movie theaters will decrease more than before, but in fact data show that the percentage of VOD users who watch movies in movie theaters tends to be higher. I think that this fact may lead to a good relationship between the movie theater and VOD.

In this study, we focus on the recommendation function using AI, which is one of the major features of VOD, and consider what effects can be obtained by introducing it to movie theaters. (In this study, we consider the movie theater to be a “cinema complex”.)

2. Method

Most cinema complexes now have automatic ticket vending machines. And since the theater side recommends the use of automatic ticket vending machines to the customer, the operating rate is expected to be high. By equipping this machine with AI technology, it is possible to analyze facial expressions of users.

In addition, if member information or the like which is arbitrarily registered in advance is used, a more accurate proposal can be made based on the viewing history so far. Cooperation between movie theaters and VOD service companies has already begun, and if the member of VOD rental system can get coupons used at linked movie theaters so VOD system get members viewing history and using movie that own history. We can use data or deciding recommendation movie program.

3. Result

Consider what effects these introductions can provide. The ticketing window at movie theater can be completely abolished and the number of staff can be reduced. It is possible to aim at the tendency of the appreciation work for local area, and it is easy to make accurate predictions at each movie theater by data. Until now, sales and sales of advance tickets were used to predict mobilization in theaters. The accuracy of this information will realize.

The customer can prevent a mismatch after viewing by selecting a movie that suits them from the contents that they have seen so far with AI. The recommendation by AI could make you like movies of a genre you didn't care about. Above all, the theater side can operate efficiently so that it can spend time in places where it has not been able to handle it. Humans can serve customers according to the needs of each spectator, but we believe that it is possible to reduce the burden by using AI.

4. Conclusion

Movie theaters has excellent environmental facilities for 3D and 4D screening and the pursuit of visual beauty with IMAX.

However, in order to respond to the level of visitors and away from movie theaters, it is necessary to provide not only these facilities but also services. The purpose of this research is to consider how to maintain a movie theater without using people efficiently.

<References>

Uema Soichiro, (2009), “An essay on the favorable impacts of cinecom in Japan in the 1990s: picturedom and tourism”, *The journal of applied sociology* 51, 167-174

Komuro Tatsuaki, (2009), “Current State and Competitive Advantage of Motion Picture Businesses”, *Kinjo Gakuin University Journal of Humanities and Social Sciences* 13, 15-28

Hokama Takaya & Choi Minyoung, (2016), “Warner Mycal cinemas : The First Cinema Complex in Japan”, *Okinawa University JOURNAL OF LAW & ECONOMICS* 25, 79-97

Kondo Kazuto, (2015), “Communicative Space in / about Movie Theaters: On the Logic of the Mode of Exhibition during the 1920's in Japan”, *Eizōgaku No.95*, The Japan Society of Image Arts and Sciences, 5-22

Saito Morihiko, (2009), *Eigakan no Nyūjyō Ryōkin wa naze 1800 yen nanoka?* [Why is the admission fee for a movie theater 1800 yen?], DIAMOND, Inc.

“Survey on Movie viewing in movie theaters” 3th July 2019, NTT COM RESERCH, 2 Feb 2020.
< <http://research.nttcoms.com/database/data/002133/> >