

Akio, Ito; Abe, Hideaki

## Conference Paper

The strategic implications of formation of regional industrial cluster by pluralistic approaches of the regional employment analysis and the competitive development model

42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany

### Provided in Cooperation with:

European Regional Science Association (ERSA)

*Suggested Citation:* Akio, Ito; Abe, Hideaki (2002) : The strategic implications of formation of regional industrial cluster by pluralistic approaches of the regional employment analysis and the competitive development model, 42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/115557>

#### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

#### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# **The Strategic Implications of Formation of Regional Industrial Cluster by Pluralistic Approaches of the Regional Employment Analysis and the Competitive Development Model**

**Akio Ito & Hideaki Abe**

*Professor, Faculty of Commerce, Hokkai-Gakuen Kitami University, Japan*

**Hokko 235, Kitami, Hokkaido 090-8555 JAPAN**

**Tel: +81-157-22-2721 Fax: +81-157-22-2729**

**Email: [a.itou@hokkai-k-u.ac.jp](mailto:a.itou@hokkai-k-u.ac.jp)**

**[Abe@hokkai-k-u.ac.jp](mailto:Abe@hokkai-k-u.ac.jp)**

## **Abstract**

The purpose of this study is to consider the strategic implications of formation of regional industrial cluster, especially Kitami region in Japan. As the analytical method, we used the pluralistic approaches of regional economics and management economics. This study lead to the below strategic implications.

First, it is confirmed that to find the target industry in the region as the driving force is very important at the first stage of the formation of regional industrial cluster. Second, it should promote the development of regional industries by the development stages. Third, it is necessary to support by various organizations (including local government) and institutions in the region and, to create the new institutions for the formation of the regional industrial cluster.

## **1.Introduction**

### **1.1 Background and Purpose of Study**

At present, Japanese enterprises faces with many difficult problems; the big competition among enterprises by the progress of globalization, the weakness of support institution by the enlargement of public deficit in Japan. In this situation, the employment policy is sought for not only the employment adjustment on short term is necessary but also the regional industrial strategy on middle term that accompanies with the creation of new companies in necessary. The concentration of all regional forces is indispensable on the formation of regional industrial strategy.

The aim of this paper is to examine the strategic implications on the formation of regional industrial cluster in Japan. It is synonymous with how to evaluate and plan the formation of regional industrial cluster on local areas which innovative capacity is less than industrial accumulated districts like big cities.

Essentially, it can not treat with this subject using a simple approach such that there are many kinds of factors in this subject. Accordingly, in this study, we investigate it using pluralistic approaches mixed with regional

economics and the theory of management strategy.

Furthermore, the analytical object area is Kitami area (Kitami City and its peripheral area) at Hokkaido region in Japan that wrestle with the formation of regional industrial cluster strategy at present.

## 1.2 Methodology

There are two ways of considering the strategic implications towards the formation of regional industrial cluster: analyzing from the static point of view and analyzing from the dynamic point of view. However, there are the difficulty of specification of methodology and the shortage of data as the limitations of their analyses. That is to say, the former has the question of selection of study approaches, the latter has the question of data availability.

Considering these points, this study investigate the present capability for formation of regional industrial cluster by the regional employment growth analysis and, the political implications of the developing pattern towards the formation of regional industrial cluster by the competitive development model.

## 2. The Regional Employment Analysis

### 2.1 Analytical framework

Here, we use the location quotient for considering the property of regional employment and the shift-hare analysis for considering the regional employment growth as analytical methods. These methods are shown in Appendix-1) and 2). The time span of analytical period was set up 20 years between 1975 and 1995 from the data availability for the avoidance of oil shock's influence. Furthermore, though the analytical object area is Kitami city and the peripheral area, we also consider the Kushiro City and the peripheral area and Obihiro City and the peripheral area in East Hokkaido, Japan from the comparative point of view.

### 2.2 Analytical Results<sup>1)</sup>

#### **Analysis of the property of employment structure the location quotient *LQ* analysis**

The analytical results of *LQ* analysis are shown in Table 1a, Table 1b and Table 2. Furthermore, executed analyses are the following two types. The year that executed the analyses are 1975 and 1995.

*LQ* analysis-1(*LQ*(1)): The location quotient that objected all industries using the large classification by industry.

*LQ* analysis-2(*LQ*(2)): The location quotient that objected manufacturing industry using the medium classification by industry.

#### *LQ* analysis - *LQ*

The following results were obtained from the *LQ* analysis-1 as the implications for the formation of regional industrial cluster.

The industries that the specialization coefficient is high in Kitami are forest industry and construction industry. This suggests these industries agglomerate in the region and, there are potentials for the formation of regional industrial cluster. Moreover, the degree of specialization of manufacturing industry in Kitami is low as same as Kusiro City and Obihiro City. This suggests that the necessity of to select the target industry, to supply capital and to input human investment for the formation of regional manufacturing cluster in Kitami.

Next, the industries that the specialization coefficient is high in Abashiri district as Kitami's peripheral area are agriculture, forestry and fishing industry. This suggests these industries agglomerate in the region and, there

are potentials for the formation of regional industrial cluster. Moreover, this suggests there is a potential in the alliance between these industries and the agglomerated industries in Kitami City too.

b)LQ analysis-2:LQ(2)

The implications of the formation of regional industrial cluster were derived from the results of LQ analysis-2 are shown in below;

The industries that the specialization coefficient is high in Kitami are 1)Electrical apparatus industry, 2)Food & tobacco industry and 3)Wood products industry. The increase rate of Electrical apparatus industry is higher than other manufacturing industries and, it suggests that this industry agglomerate in the region. Accordingly, this industry is regarded as a very important industry for the formation of regional industrial cluster in the region.

The specialization coefficient of Food & tobacco industry is high and, this consists with the fact that there is the agglomeration of agricultural industry and fishery industry in this area are showed by LQ analysis -1. However, as the increasing rate of this industries is low, it seems that the potential for development is not high. We must think over those points on the formation of regional industrial cluster in the region. The specialization coefficient of Wood products industry is high, however, the coefficient shows declining tendency in the analytical period. This suggests that the potential of this industry is insufficient on the formation of regional industrial cluster.

**2)The analysis of regional employment growth(shift-share analysis)**

We analyzed below 2 models using the equations (2) (5) of shift-share analysis(see Appendix-2) .

Shift-share analysis-1(Model(a)): The analysis that objected the employment growth of all industries using the large classification by industry.

Shift-share analysis-2(Model(b)): The analysis that objected the employment growth of manufacturing industries using the medium classification by industry.

a) Shift-share analysis-1(Model(a))

The result of shift-share analysis-1 is shown in Table 3. From this, the regional employment growth in Kitami is 31.07(Kushiro City is 3.89, Obihiro City is 36.31). This means the two thirds of regional employment growth was explained by national growth(the growth due to industry mix is 7.04, the growth due to other factors is 3.25). This shows the regional employment growth is little higher than national growth. Therefore, this suggests Kitami region must evolve the regional industrial structure using the formation of regional industrial cluster. Moreover, the regional employment growth of Abashiri district that is peripheral area is -8.74(Kushiro district is 2.15, Tokachi district is -1.69). This shows the decline of current industries in the region. Therefore, from now, this region has to reform the industrial structure through the formation of regional industrial cluster.

b)Shift-share analysis-2(Model(b))

The result of shift-share analysis-2 is shown in Table 4. From this, the employment growth of manufacturing industry in Kitami is 23.84(Kushiro City is -18.15, Obihiro City is 19.31). This means the regional employment growth is large higher than national growth. Especially, the growth due to industry mix is high(16.72). This suggests the evolution of manufacturing industry in Kitami has proceeded in this period. Therefore, it is necessary to consider that whether does such manufacturing industry is adequate as the core industry of regional industrial

cluster or should it think other new industry as the core industry of regional industrial cluster.

### **3.Comparative Analysis of Competitive Development Model**

#### **3.1 Selection of models**

It is important to analyze the strategic implications concerning about the formation of regional industrial cluster through the approach of competitive development model. In this study, we compare to between Porter' model(Porter 1992) and Narula' model(Narula 1993) as the comparative model of competitive development model. The reasons that we select these models are 1)Porter's model is regarded as most theoretical cluster model, 2)Narula' model is the dynamic model included the accumulated process of technique in the model.<sup>2)</sup> Furthermore, the comparison of both models is shown in Figure 1.

#### **3.2 Extraction of finding by comparative analysis**

In both models, there are differences on the division of development process and the specification of technique. However, we can find out the common useful findings of the formation of regional industrial cluster through the common features of both models. Most important finding is to rise up the power of regional industries by development stages.

That is to say, in he first stage of the formation of regional industrial cluster, the regional industries are lack of the various power of the resource, technique and capital etc.. Accordingly, the regional industries have to lift up those power through the absorption of technique & know-how, the support by government. Moreover, the region must recognize that if the competitive development will realize, it does not continue the state permanently and it usually occurs the decline of competitive power(in Figure 3., this is shown by the arrow of feedback). The reason is the enterprises in competitive situation usually act dynamically.

### **4.The Strategic Implications**

From the previous considerations, we consider the strategic implications for the formation of regional industrial cluster.

Firstly, it is important to make the plan of regional industrial cluster strategically in early stage of planning. When the strategic region is intend to formulate, usually the power of industries in the region is not strong. Accordingly, it is necessary to set up the plan of formation of regional industrial cluster to concentrate the various powers in the region. Furthermore, then, it is necessary to consider the current industrial agglomeration, the possibility of industrial development, the linkage effect among regional industries, the power of employment absorption, and the possibility of acquisition of competitive power etc. from the point of view of total industrial environment.

Secondly, it is important that the development of regional industries has to proceed by development stages. Namely, as I have mentioned before, the region which is intend to the formation of regional industrial cluster is not strong the various power of resource, technique, capital etc.. Accordingly, it has to actualize the accumulative development of technique, the increasing return of production, network externality, the agglomerate effect by the promotion of alliance between industries and academic institutions, the alliance among enterprises in the region, the absorption of technique, the acquisition of human resources and the attraction of enterprises from other regions. The region must realize the evolution of industrial structure through such effort. Thirdly, it is necessary to positively act the various regional institution, organization, human resources(including local government).

Especially, in the early stage of the formation of regional industrial cluster, as I mentioned before, the support of local government is indispensable. Accordingly, local government should effort to support & cooperate concerning about the aspect of capital, the mediation among the organizations of industries, academic and public, the supply of various information and the support of alliance among enterprises.

## 5. Conclusion

In this study, we analyzed the strategic implications of the formation of regional industrial cluster using two approaches is composed with the regional employment analysis and the comparison of competitive development model. These results lead to the above findings for the formation of regional industrial cluster in Japan. Though there remains many subjects in this study, we would like to further study about it from now.

## Appendices

### Appendix -1)The location quotient(LQ)analysis

The location quotient analysis is specified below equations as the method that analyzed the property of regional employment structure<sup>3</sup> .

$$LQ_i^J = (E_i^J / E^J) / (E_i / E) \quad (1)$$

where  $LQ$  is the location quotient,

$E_i^J$  is employment in activity  $i$  in a given region  $J$

$E_i$  is employment in activity  $i$  in the region,

$E^J$  is total employment in region  $J$ ,

$E$  is total employment in the region.

Namely, the location quotient is simply a ratio of employment shares: regional industry  $i$ 's share of total regional employment over national industry  $i$ 's share of total national employment.

### Appendix -2)the shift-share analysis

Shift-share analysis is specified as the method that analyzed regional employment growth in below.<sup>4</sup>

$$g_r = (g_r - g_m) + (g_m - g_n) + g_n \quad (2)$$

Namely, shift-share analysis explains the regional employment growth by 3 component as equation . Here,

$g_n$  is the region's 'share' of national growth. The faster it, the faster the region can be expected to grow.  $(g_{rn} - g_n)$  is the structural component. It is difference between the rate at which we expect the region to grow and the national growth rate.  $(g_r - g_{rn})$  is simply that part of region's growth that remains unexplained.

The definition of three employment growth rate that three composed these three component is below.

Regional growth rate  $g_r$

$$g_r = [(\sum_i^t e_i - \sum_i^0 e_i) / \sum_i^0 e_i] \bar{\tau} 100 \quad (3)$$

where,  $e_i$  is regional employment in industry  $i$

$\sum e_i$  is sum of employment in all industries in the region,

$t$  is final year of study period,

$0$  is initial year of study period.

National growth rate  $g_n$

$$g_n = [(\sum_i^t E_i - \sum_i^0 E_i) / \sum_i^0 E_i] \bar{\tau} 100 \quad (4)$$

where,  $E_i$  is national employment in industry  $i$ ,

$\sum E_i$  is sum of employment in all industries in the nation.

Regional growth at national growth rates per industry  $m$

$$g_{rm} = [ \{ \sum_i [e_i^t (E_i^t / E_i^0)] - \sum_i e_i^0 \} / \sum_i e_i^0 ] \bar{\tau} 100 \quad (5)$$

Furthermore, shift-share has severe warnings; eg. The problem of interpretation the remains component etc. However, it has proved to be a popular technique for analyzing regional disparities in employment growth.<sup>5</sup> Rigby and Anderson(1993) consider the study that take in productivity in shift-share analysis. However, as the regions that analyzed in this study does not make the amount of production by industry, we could not examine the applied study. It is necessary to promote the further construction of the regional data from now.

## Notes

On the location quotient, see Isard et al.(1998, pp.24-26).

On the definition and specification of shift-share analysis, see Armstrong, Harvey and Jim Taylor(1993, pp.144-147).

On the explanation of weak points of shift-share analysis, see Armstrong, Harvey and Jim Taylor(1993, pp. 149-152).

Ito(2001a) analyze the employment analysis including the consideration about the composition and transition of labor.

Penttinen(1994) refers to the 9 critical opinions about the Porter's diamond. On detail, see Ito(2001b).

## References

- Armstrong, Harvey and Jim Taylor(1993) *Regional Economics and Policy*, Harvester Wheatsheaf.
- Isard, Walter., Iwan J. Azis, Mathew P. Drennan, Ronald E. Miller, Sidney Saltzman, Erik Thorbecke(1998) *Methods of Interregional and Regional Analysis*, Ashgate, 24-30.
- Narura, Rajneesh(1993) "Technology, International Business and Porter's Diamond", *Management International Review, Special Issue*, 33, 85-107.
- Penttinen, Risto(1994) "Summary of the Critique on Porter's Diamond Model: Porter's Diamond Model modified to suit the Finnish Paper and Board Machine Industry", *ETLA Discussion Papers*, No.462, ETLA, Helsinki.
- Rigby, David L. and William P. Anderson(1993) "Employment Change, Growth and Productivity in Canadian Manufacturing: an Extension and Application of Shift-Share Analysis", *Canadian Journal of Regional Science*, Vol.41, No.1, 69-88.
- Ito, Akio(2001a), An Analysis of Regional Employment Properties and Regional Employment Growth of Kitami City, *Kitami Daigaku Ronshu*(Bulletin of Hokkai-Gakuen University of Kitami), Vol.23, No.2, 131-148(in Japanese).
- Ito, Akio(2001b), The Strategic Implication of Regional Industrial Cluster through the Consideration of Competitive Development Models, *Journal of DPRI*(The Development Policy Research Institute, Hokkai-Gakuen Kitami University), Vol.3, pp.19-29(in Japanese).
- Porter, M.E. 1992 (Translation; Mamoru Toki et al.) ,The Competitive Advantage of Nations, Daiyamond Sya(Tokyo), (in Japanese)



Table 1a: The analytical result of LQ(1)

City Industries	Kitam			Kusir			Obihro		
	1975	1995	rat	1975	1995	rat	1975	1995	rat
Agriculture	0.77	0.76	0.99	0.04	0.09	2.18	0.5	0.74	1.48
Forestry	4.92	4.95	1.01	0.52	1.21	2.36	3.4	3.86	1.13
Fishing	0.04	0.12	2.62	3.67	3.59	0.98	0.05	0.09	1.84
Mining	1.31	0.99	0.76	16	22.7	1.42	0.7	1.61	2.27
Construction	1.47	1.35	0.92	1.34	1.21	0.9	1.4	1.38	0.99
manufacturing	0.48	0.52	1.08	0.54	0.52	0.96	0.37	0.4	1.09
Electricity, Gas	1.02	1.05	1.02	1.33	1.41	1.06	0.96	0.87	0.91
Transportation&Communication	1.29	1.14	0.88	1.87	1.48	0.79	1.22	1.04	0.85
Wholesale&Retail	1.3	1.2	0.92	1.24	1.13	0.91	1.38	1.16	0.84
Finance&Insurance	1.02	1.04	1.02	1.14	1.17	1.03	0.99	0.95	0.96
Real Estate	1.24	0.63	0.51	1.56	0.72	0.46	1.37	0.64	0.46
Service	1.16	1.1	0.95	1.16	1.09	0.94	1.26	1.13	0.9
Public service	1	1.07	1.07	1.12	1.33	1.18	2.25	2.02	0.9
Activities not elsewhere c	0.72	0.45	0.63	0.5	0.67	1.34	0.64	0.84	1.32

Note: The figures of ratio are 1995/1975. Furthermore, as the figures place are rounded.

Data: Statistical Bureau, The Prime Minister's Office(1977), "1975 Cen and Miniciparities, Part 3: Hokkaido".

Statistical Bureau, The Prime Minister's Office(1999), "1995 Ce Part 2: Hokkaido".

Statistical Bureau, The Prime Minister's Office(1977), "1975 Ce Whole country".

Statistical Bureau, The Prime Minister's Office(1997), "1995 Ce Part 1: Whole country".



Table 2: The analytical result of LQ(2)

City Industries	Kitami			Kushiro			Obihiro		
	1975	1995	difference	1975	1995	difference	1975	1995	difference
Food, tobacco	2.35	2.37	1.01	5.85	4.46	0.76	3.43	3.47	1.01
Textile	0.02	0	-	0.12	0.17	1.4	0.08	0	-
Apparel	0.15	0.07	0.44	0.19	0.25	1.3	0.38	0.54	1.44
Wood products	6.71	5.21	0.78	1.39	2.61	1.88	2.61	3.05	1.17
Furniture	2.68	1.33	0.5	0.56	0.8	1.43	3.18	2.44	0.77
Pulp,paper&paper products	6.1	0.87	0.54	5.54	6.96	1.26	0.55	0.56	0.02
Publishing, printing	1.42	1.28	0.9	1.21	0.82	0.68	2.61	1.45	0.55
Industrial chemicals	0.13	0.34	2.69	0.31	0.57	1.84	0.26	0.42	1.61
Petroleum&coal products	0	0.55	-	0.08	0.16	1.99	0	0.16	-
Rubber products	0.2	0	-	0.03	0	-	0	0	-
Leather&leather products	0	0.59	-	0.04	0	-	0.08	0.16	2.12
Pottery&gravel	2.19	1.96	0.89	0.8	0.93	1.17	2.24	1.75	0.78
Steel, non-metallic products	0.04	2.38	0.03	0.2	7.22	0.13	0.21	1.65	
Metallic products	0.56	0.84	1.49	0.76	0.69	0.91	0.82	0.67	0.82
Non-electrical machinery	0.49	0.16	0.33	0.2	0.14	0.71	0.77	0.76	0.98
Electrical machinery	0.91	1.58	1.74	0	0.03	7.65	0.39	0.65	1.68
Transport machinery	0.01	0.1	7.48	0.52	0.42	0.81	0.22	0.18	0.81
Minute machinery	0.83	0	-	0.1	0.09	0.84	0.07	0	-
Other manufacturing	0.58	1.04	1.8	0.24	0.56	2.37	0.34	0.62	1.79

Notes: 1)The figures of difference are 1995-1975. Furthermore, as the figure place are rounded.

2)Above figures are extracted data.

Data: Statistical Bureau, The Prime minister's Office(1978), "1975 Census, Part 2: First part Hokkaido and Tohoku area."

Statistical Bureau, The Prime minister's Office(1999), "1995 Census Part 2: Hokkaido area."

Statistical Bureau, The Prime minister's Office(1978), "1975 Census Part 1: Whole country."

Statistical Bureau, The Prime minister's Office(1999), "1995 Census Part 1: Whole country."

Table 3.The analytical result of Shift-share(1)

City & Peripheral Area	Region's employment growth gr	Growth due to other factors (gr-grn)	Growth due to industry mix (grn-gn)	National Growth gn
Kitami-City	31.07	3.25	7.04	20.78
Kushiro-City	3.89	-26.2	9.31	20.78
Obihiro-City	36.31	4.53	11	20.78
Abashiri area	-8.74	-19.29	-10.23	20.78
Kushiro area	2.15	-7.68	-10.95	20.78
Tokachi area	-1.69	-6.51	-15.95	20.78

Note: The figures are rounded at decimal third place.

Data: Statistical Bureau, The Prime Minister's Office (1977), "1975 Census Vol 3: Prefectures and Municipalities, Part 1: Hokkaido".

Statistical Bureau, The Agency of Public Management (1999), "1995 Census, Vol 3, Part 2: Hokkaido".

Statistical Bureau, The Prime Minister's Office (1977), "1975 Census Vol 2, Whole country".

Statistical Bureau, The Agency of Public Management (1997), "1995 Census, Vol 3, Part 1: Whole country".

Table 4.The analytical result of Shift-share(2)

City	Region's employment growth gr	Growth due to other factors (gr-grn)	Growth due to industry mix (grn-gn)	National Growth gn
Kitami	23.84	5.48	16.72	1.64
Kushiro	-18.15	-15.72	-4.07	1.64
Obihiro	19.31	15.03	2.64	1.64

Note: The figures are rounded at decimal third place.

Data: Statistical Bureau, The Prime Minister's Office (1977), "1975 Census Vol 3: Prefectures and Municipalities, Part 1: Hokkaido".

Statistical Bureau, The Agency of Public Management (1999), "1995 Census, Vol 3, Part 2: Hokkaido".

Statistical Bureau, The Prime Minister's Office (1977), "1975 Census Vol 2, Whole country".

Statistical Bureau, The Agency of Public Management (1997), "1995 Census, Vol 3, Part 1: Whole country".