The Study of Influential Factors for Developing Industrial Agglomeration in Thailand

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Abstract

Based on data obtained from the mail survey conducted in October 2006 and November 2007, this study analyzes nature and characteristics of industrial agglomeration in the Bangkok Metropolitan Area of Thailand in order to investigate the formation of industrial agglomeration and influential factors for the agglomeration formation. As part of the survey in 2006, it was shown that the industrial agglomeration in Thailand could be divided into three periods (before 1986, 1987-1994 and after 1994). The early period was establishments of large firms, while the later was establishments of smaller firms forming themselves around the large firms to become the agglomeration. Furthermore, another survey was done in 2007, aiming to identify influential factors encouraging the development of such agglomeration. In this regard, there were twenty factors investigated in the survey. The firms were divided into two groups, namely, large firms and small firms. It was found that some of the factors significantly affect the development of the Thai industrial agglomeration. For examples, the large firms were attracted by investment incentives, physical infrastructure, legal systems, availability of skilled labor and living conditions, while the small firms were satisfied with the government policies on trade liberalization and system of intellectual property rights. However, the innovation of agglomeration cannot be concluded clearly since the results from the analysis showed that there was no significant common factor to explain the upgrading of industry among models.

Keywords: Industrial Agglomeration, Industrial Clustering, Innovation

บทคัดย่อ

ในเดือนตุลาคม พ.ศ. 2549 และเดือนพฤศจิกายน พ.ศ. 2550 ได้มีการสำรวจโดยแบบสอบถามเพื่อทำการศึกษาถึงการก่อตัวของกลุ่มอุตสาหกรรมในพื้นที่กรุงเทพมหานครและจังหวัดใกล้เคียงของประเทศไทย ข้อมูลที่ได้จากการศึกษาทั้งสองครั้งนี้ได้นำไปสู่การศึกษาการรวมกลุ่มอุตสาหกรรม และปัจจัยที่มีอิทธิพลที่สนับสนุนให้เกิดการเกิดการรวมตัวกัน จากข้อมูลบางส่วนของการสำรวจใน พ.ศ. 2549 พบว่า การรวมตัวกันของอุตสาหกรรมของ

ประเทศไทยสามารถแบ่งออกเป็นสามช่วงเวลา ได้แก่ ช่วงที่หนึ่งคือช่วงก่อน พ.ศ. 2529 ช่วงต่อมาคือช่วง พ.ศ. 2530 ถึง พ.ศ. 2537 และช่วงสุดท้ายได้แก่ช่วงหลัง พ.ศ. 2537 ในช่วงที่หนึ่งจะเป็นการก่อตั้งของกลุ่มบริษัทขนาดใหญ่ และในช่วงหลังจะเป็นการก่อตั้งสถานประกอบการของกลุ่มบริษัทขนาดรองๆ ลงมา เพื่อทำธุรกิจกับกลุ่มบริษัทขนาดใหญ่ จนเกิดการรวมตัวกันเป็นกลุ่มอุตสาหกรรม จากการสำรวจครั้งที่สองในเดือนพฤศจิกายน พ.ศ. 2550 การสำรวจในครั้งที่สองนี้ มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อการส่งเสริมการให้เกิดการรวมตัวกัน โดยมีปัจจัยที่ทำการศึกษาทั้งสิ้นยี่สิบปัจจัยในการสำรวจตรวจสอบ มีการแบ่งบริษัทที่ทำการศึกษาออกเป็นสองกลุ่ม คือ บริษัทขนาดใหญ่ และบริษัทขนาดเล็ก พบว่า มีบางปัจจัยที่มีผลต่ออย่างมีนัยสำคัญต่อการกระตุ้นให้เกิดการรวมกลุ่มอุตสาหกรรม เช่น บริษัทขนาดใหญ่ที่ถูกดึงดูดโดยแรงจูงใจการลงทุน โครงสร้างพื้นฐานทางกายภาพ ระบบกฎหมาย ความพร้อมของแรงงานที่มีทักษะ และสภาพความเป็นอยู่ของพลเมือง ในขณะที่ปัจจัยที่มีผลต่ออย่างมีนัยสำคัญต่อบริษัทขนาดเล็ก ได้แก่ ความพึงพอใจกับนโยบายของรัฐบาลในระบบการค้าอย่างเสรี และสิทธิในทรัพย์สินทางปัญญา แต่อย่างไรก็ดีไม่สามารถสรุปได้อย่างชัดเจนจากการสำรวจว่าการรวมตัวของกลุ่มอุตสาหกรรม ก่อให้เกิดนวัตกรรมอย่างมีนัยสำคัญ

คำสำคัญ: การรวมกลุ่มอุตสาหกรรม กลุ่มอุตสาหกรรม นวัตกรรม

1. INTRODUCTION

A strong economic background is usually a result of a country's strong industrial sector. This is why most of the countries are trying to strengthen their industrial sectors. Strength of the industries in each country may be developed through different paths. For industrial countries, they have originally built their own technology and industrial system. Until the present time, as the world becomes smaller, a number of companies from the industrial countries are now seeking for new opportunities for overseas investments. Non-industrial countries such as many countries in Asia have become promising targets for such investments. As a result, many non-industrial countries have then turned up to be the new industrial countries, in which Thailand is inevitably one of them. At present, a majority of gross domestic product (GDP) of Thailand is from the industrial sector rather than that from the agricultural sector as it used to be in the past. As the new comer in this industry development phenomenon, Thailand has to find the right path to promote the country's industries in the light of long-term prospect. In this regard, the concept of industrial agglomeration is one of the effective ways to strengthen the industrial sector in Thailand. Therefore, it is essential for the country to understand the formation of industrial agglomeration in order to promote industrial agglomeration with a limited resources allocation. Not only helping in appropriate resources allocation of the country but, by understanding the formation of industrial agglomeration, it can also

help in defining their needs. Kuchiki, A. and M. Tsuji (eds). (2008) proposed that industrial agglomerations were developed based on the concept called "Flowchart Approach." In the flowchart approach concept, an industrial agglomeration started by investments of large companies. Then, such investments from those large firms induced investments from smaller-sized firms in the respective country to create business transaction with the large ones. This process slowly created a formation of industrial agglomeration in the area. However, details of each stage may depend on business environments in each country as discussed by Fujita, M. and J.-F. Thisse (2002).

2. RESEARCH OBJECTIVES AND APPROACH

The objective of this research is to understand how industrial agglomerations in Bangkok, Thailand have been developed. To achieve the objective, two surveys were done in years 2006 and 2007. The survey in 2006 was to understand characteristics of the industrial agglomerations while the survey in 2007 tried to investigate possible influential factors that made a company decide to establish its business in Bangkok. Both surveys were distributed among companies and factories in Bangkok and its vicinities. The results of the surveys were analyzed by applying statistical models to identify the significant factors.

3. SUMMARY OF THE SURVEY IN 2006

A mail survey was conducted in October 2006, in which questionnaires were sent to 1,600 companies in Bangkok and near-by areas. Accordingly, there were 143 valid responses returned with an average response rate at 8.9 percent. Some of the interesting facts were found as follows.

3.1 Size of Firms

Surveyed firms were generally divided into two groups by their amount of capitals. It was found that more than half of the surveyed firms had 4 million dollars or less in the amount of capitals, while 20.3% of them were capitalized at over 20 million dollars. A similar distribution pattern among the respondent firms can also be found in their total number of employees, in which more than half of respondents had fewer than 300 employees.

3.2 Types of Business

More than 70% of respondents were involved in the manufacturing sector. 67.5% of them were Japanese companies and the rest 77.8% of them were other foreign companies. All of the Thai firms had some sort of manufacturing-related businesses. The wholesale industry was the second most represented. Services were the major businesses field for the Japanese firms. Many Japanese firms had already entered into Bangkok markets and closely related to business support services and construction.

3.3 Industrial Sectors

Among the firms in the manufacturing sector, about 25% and 16.5% were in automobile-related and electronic-related production, respectively,

followed by those involved in chemicals (14.6%), foods (9.7%), metals (9.7%), steel (8.7%) and machinery and tools (8.7%). These results seemed to largely reflect the fact that majority of the respondents were Japanese firms. On the other hand, higher percentages of the Thai firms were found engaging in manufacturing of steel (23.5%), food (17.6%) and textiles (17.6%).

3.4 Activities

About 50.4% of the Bangkok offices surveyed were subsidiaries of Japanese and other transnational companies. In this regard, 30.8% and 7.0% of them were classified as headquarters and branches, respectively. A majority of these establishments carried out activities associated with sales (74.8%), accounting (69.9%), human resources (64.3%), marketing (59.4%), purchasing (56.6%) and production (52.4%), whereas fewer offices in Bangkok were responsible for research and development (R&D) (23.1%) and logistics (38.5%).

3.5 Years of Establishment

Years that the respondents established their Bangkok offices were the most important variable in this analysis. According to the questionnaire asking when a company established its first office or facilities in Bangkok, more than half of the respondents began their operations in Bangkok in 1980s. The number of establishments was greatest in the period of 1986-1990, followed by the years 1991-1995 and 1996-2000. This implied that the agglomerations in the Bangkok area were not a smooth process, but had experienced peaks and troughs.

3.6 Determination of Firms' Group for the survey 2006

By observing the peaks of business establishment years as seen in Table 1, the time of establishment could be divided into three periods: (a) before 1986; (b) 1987-94; and (c) after 1995. Accordingly, firms were divided into three groups. The firms established before 1986 were defined as "Group 1"; those established during 1987 and 1994 were defined as "Group 2"; and those established after 1995 were defined as "Group 3". These discussions implied an existence of "first movers" (large firms) and "followers" (smaller firms) of industrial agglomerations. Differences in foundation years could be attributable to different attributes such as firm size and business field. The data in Table 1 was plotted as shown in Figure 1.

Table 1 Year of Establishment of the respondent firms in Bangkok

Year of Establishment	Number of Firms	Percentage	Cumulative Percentage
1920	1	0.89	0.89
1928	1	0.89	1.79
1932	1	0.89	2.68
1952	1	0.89	3.57
1964	1	0.89	4.46
1965	1	0.89	5.36
1966	2	1.79	7.14
1967	1	0.89	8.04
1968	1	0.89	8.93
1969	1	0.89	9.82
1970	3	2.68	12.5
1972	2	1.79	14.29
1973	3	2.68	16.96
1975	1	0.89	17.86
1976	1	0.89	18.75
1977	1	0.89	19.64
1980	2	1.79	21.43
1981	1	0.89	22.32
1984	2	1.79	24.11
1985	4	3.57	27.68
1986	1	0.89	28.57
1987	8	7.14	35.71
1988	7	6.25	41.96
1989	8	7.14	49.11
1990	8	7.14	56.25
1991	5	4.46	60.71
1992	4	3.57	64.29
1993	2	1.79	66.07
1994	2	1.79	67.86
1995	6	5.36	73.21
1996	7	6.25	79.46
1997	7	6.25	85.71
1998	2	1.79	87.50

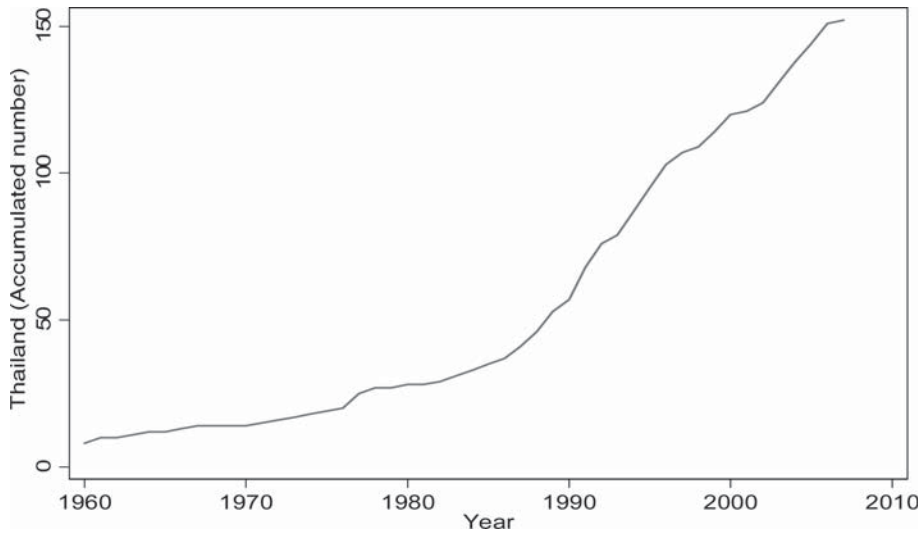

Figure 1 Accumulated number of firms established in Thailand

Actually, there were many facts found from the result of the survey in 2006. However, only the classification of the firm groups was mentioned in this study. By analyzing the firm sizes, it was found that the firms in "Group 1" were the large companies with huge investment volumes (first movers). The firms in "Group 2" and "Group 3" were the smaller-sized companies (followers) that came after "Group 1." Later on, the investments from the firms in "Group 2" and "Group 3" slowly formed industrial agglomerations in Thailand.

4. SUMMARY OF THE SURVEY IN 2007

Another mail survey was conducted in November 2007. The questions in this questionnaire were not exactly the same as those in the previous survey. On the other hand, the survey aimed to study influential factors for agglomerations. There were 1,800 questionnaires sent to companies by mail and e-mail and some of the questionnaires were also distributed in person randomly. The response rate was 8.8%, with 160 valid responses returned and most of them came from management people.

4.1 Profile of Questionnaire Responders

42.5% of the respondents were in top management positions such as CEO, president, vice president, business owner, managing director, and general manager, while 6.9% held senior management positions such as financial director, regional (ASEAN) manager, manufacturing director, etc. Furthermore, 23.1% were in middle manager positions such as HR manager, production manager, sale manager, etc. and the rest 10% were general employees such as accountant and engineer. However, 17.5% of the respondents did not declare their working positions.

4.2 Years of Establishment

Based on the year of establishment, the range of the companies' establishment periods were varied from a year to fifty years. In conclusion, most of the companies have been established for 11 to 15 years (22%), followed by the companies, which have been established for 16 to 20 years (18%).

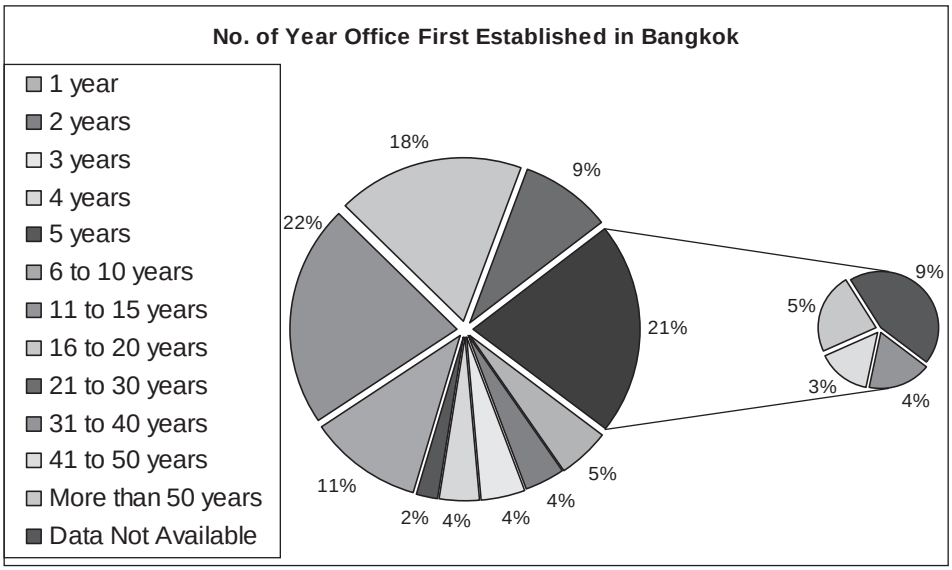

Figure 2 Age of the responding firms

4.3 Investment Structures, Major Investment Sources and Core Business Activities

Most of the responding companies were local companies (about 53%). 26% of them were joint-ventures and 21% of them depended on Foreign Direct Investment (FDI) as seen in Figure 3. For those who were joint venture companies and foreign companies, the majority of foreign investors were from other-Asia (48%). EU investors came in second (21%), while ASEAN and USA investors contributed by 17% and 9%, respectively. Most of the companies' core business activities were involved in manufacturing, while a few of them were involved in personal services.

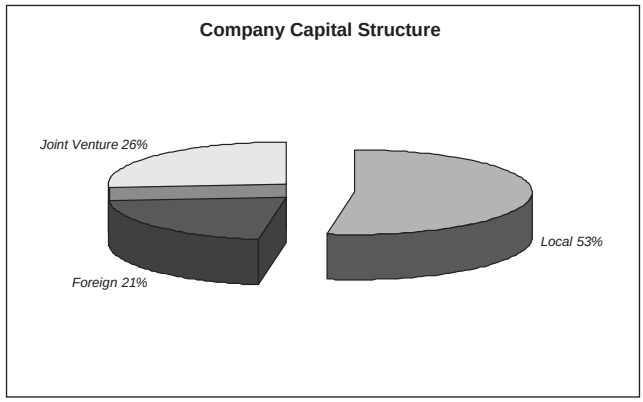

Figure 3 Investment structure of the responding firms

4.4 Determination of Firms' Group for the survey 2007

Similar to the results of the survey in 2006, it was concluded that the industrial agglomerations in Thailand could be divided into three periods (before 1985, 1986-1998 and after 1999). In the early period, there were establishments of the large firms and the later was establishments of the smaller firms to form themselves around the large firms to become agglomerations. Although the periods of time for establishing the firms were slightly different between these two surveys, it can be confirmed that there were three periods in the establishments of firms in Bangkok, Thailand to form the agglomerations in the later time.

4.5 The Model

To understanding a formation of industrial agglomerations, influential factors for starting the business in Bangkok, Thailand were investigated. In this regard, there are several factors that might affect decision-making of investors. However, in this study, twenty factors were selected based on the pre-survey and interviews with management people in previous researches [Tsuji, M., Ueki, Y., Miyahara, M. and Komolavanij, S., (2006)] as shown in Table 1. In the questionnaire, the respondents were asked to identify importance of the factors in the viewpoint of business investors. The degrees of importance were classified in five gradual levels, namely, "very important," "somewhat important," "not sure," "not very important" and "not important at all."

The model used to explain agglomeration in Thailand defined "year of establishment of the firm" as a dependent variable and "size of firms" was used as an independent variable as seen in Equation (1).

$$YoE = f(\text{firm's size, influential factors, function of an office}) \quad (1)$$

Where;

YoE = year of establishment of firms.

In this study, the size of firm could be represented in the function of the number of employees, firm's assets and paid-in capital. Therefore, Equation (1) can be expressed in three different ways and presented by Equations (2), (3) and (4).

$$YoE = f(\text{The number of employees, influential factors, function of an office}) \quad (2)$$

$$YoE = f(\text{firm's asset, influential factors, function of an office}) \quad (3)$$

$$YoE = f(\text{paid-in capital, influential factors, function of an office}) \quad (4)$$

Table 2 Factors affecting the Analysis

Factor	Influential Factors
F1	Investment incentives
F2	Liberal trade policy
F3	Customs procedures
F4	Local content requirements, rule of origin
F5	Physical infrastructure
F6	IT infrastructure
F7	Utility infrastructure
F8	Government institutional infrastructure
F9	Financial system
F10	Legal system
F11	Protection of intellectual property rights
F12	Size of local markets
F13	Access to export markets
F14	Proximity to suppliers/subcontractors
F15	Request by large/related company
F16	Availability of low-cost labor
F17	Availability of skilled labor and professionals
F18	Other companies from the same country
F19	Access to cutting-edge technology
F20	Living conditions

Table 3 Results of Estimations: Agglomeration Model

		Employees		Assets		Capital	
		Full model	Selected model	Full model	Selected model	Full model	Selected model
1	10,000-24,999 (US$)/10,000-24,999 (US$)		[+]				
2	100-199/25,000-49,999/25,000-49,999			*	**	*	**
3	200-299/50,000-74,999/50,000-74,999						
4	300-399/75,000-99,999/75,000-99,999	*	+		*		
5	400-499/100,000-499,999/100,000-499,999						
6	500-999/500,000-999,999/500,000-999,999					[*]	[**]
7	1,000-1,499/1M-4.9M/1M-4.9M						
8	1,500-1,999/5M-9.9M/5M-9.9M	[*]	[**]				
9	2,000 & above/10M & above/10M & above						
1	Investment incentives including tax incentives	[**]	[**]	[**]	[**]	[**]	[**]
2	Liberal trade policy	**	**	**	*	**	**
3	Customs procedures	+	*		+	+	*
4	Local content requirements, rule of origin		[+]				[+]
5	Physical infrastructure (roads, highways, ports, airports)	+	[+]	[+]	[+]	[**]	[**]
6	Infrastructure (telecommunications, IT)		**		**	+	*
7	Infrastructure (electricity, water supply, other utilities)		+			+	**
8	Government institutional infrastructure						
9	Financial system						
10	Legal system	[**]	[**]	[**]	[**]	[**]	[**]
11	Protection of intellectual property rights	**	**	**	*	**	**
12	Size of local markets						
13	Access to export markets						
14	Proximity to suppliers/subcontractors						
15	Request by large/related company						
16	Availability of low-cost labor						
17	Availability of skilled labor and professionals	[*]	[**]	[+]	[**]	[**]	[**]
18	Other companies from the same country are located here (synergy)						
19	Access to cutting-edge technology and information						
20	Living conditions						
1	Retail/ Wholesale trade	[**]	[**]	[**]	[**]	[**]	[**]
2	Production (raw-material processing)			*			
3	Production (components and parts)						[*]
4	Production (final products)						[*]
5	Purchasing/ Procurement/ Logistics						
6	R&D/ Consulting						
7	Human resources development	**	[**]	**	**	**	**
		136	143	136	145	136	142
		-110.674	-126.518	-112.496	-131.094	-109.073	-121.714
		0.199	0.156	0.186	0.138	0.21	0.184

Remarks

Note 1: [ ] indicates that the coefficient is negative, and items without [ ] imply the coefficient is positive.

Note 2: **, * and + indicates that coefficient is at the 5, 10 and 20% significance level, respectively. The model as in Equations (2), (3) and (4) were tested to identify the influential factors for the industrial agglomeration in Bangkok and surrounding areas in Thailand. The result was shown in Table 3 as follows. Also, Table 4 shows the summary of the influential factors.

Table 4 Summary of the influential factors

Significant Factor	Coefficient Sign	Significant Level
F1	Negative	5%
F2	Positive	5%
F3	Positive	20%
F5	Negative	5%
F6	Positive	20%
F7	Positive	20%
F10	Negative	5%
F11	Positive	5%
F17	Negative	5%
F20	Negative	5%

From both surveys conducted in 2006 and 2007, the firms with different sizes of investment started their business in Bangkok, Thailand at different points of time. The larger investors came earlier, while the smaller investors came later. Therefore, their inferential factors affecting decision-making regarding investments were also different. From Table 3 and 4, it could be explained that the large firms were attracted by investment incentives, physical infrastructure, legal systems, availability of skilled labor and living condition since those factors (F1, F5, F10, F17 and F20) have negative signs. It means that, from Equation (1), the more values of those factors (F1, F5, F10, F17 and F20) are, the earlier of the years of establishments are. The small firms who come to set up the companies later were also satisfied with the government policies in liberal trade (F2) and the system of intellectual property rights (F11) as those two factors have strong significant level (5%) with positive coefficients. Customs procedures (F3), IT infrastructure (F6) and Utility infrastructure (F7) were also important factors for the small firms. However, those factors had less significant levels as the infrastructures were quite adequate in their opinions. Also, Thai custom procedures were indifferent from other countries.

5. CONCLUSION

In conclusion, the industrial agglomerations in Thailand can be divided into three periods (before 1986, 1987-1994 and after 1994) based on the study in 2006 and (before 1985, 1986-1998 and after 1999) based on the study in 2007. The firms were divided into two groups, based

on the firms' size, as the large firms and small firms. The earlier establishments were those of the large firms attracted by investment incentives, legal systems and skilled labor, while the smaller firms were also satisfied with the government policies in liberal trade and the system of intellectual property rights to form themselves around the large firms. Although the result of descriptive statistics showed that there were several upgrading of the firms in terms of alteration and modification in goods, production methods and sources of raw material supply; the common factor supporting the upgrading is hard to find. By knowing the influential factors for large and small firms, Thailand and other similar developing countries may be able to strengthen those factors to persuade Foreign Direct Investment (FDI) and local investments.

Acknowledgement

This research was conducted as a part of the research project 'Analysis of Industrial Agglomeration, Production, Networks and FDI Promotion' (FY2007) of the Economic Research Institute for ASEAN and East Asia (ERIA).

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