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De-industrialization and the Changes in Occupational Structure in Three East Asian Cities

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This paper aims to examine a pattern of recent changes in occupational structure across Tokyo, Shanghai, and Seoul. We address the following questions; 1) considering different stages of economy in three countries, do employment structures in Seoul, Tokyo, and Shanghai show different patterns, corresponding to the economic development stage? 2) to what extent are employment structures in the three cities polarizing, or upgrading?, and 3) who fills newly created jobs? Are there any socio-demographic patterns in the distribution of employment gains? We particularly focus on the relationship between (de) industrialization and occupational transformation. The results demonstrate that deindustrialization tends to have similar polarization effects in Tokyo and Seoul, considering the decline in manufacturing workers and concomitant loss of middle income jobs. The job polarization has deepened in Tokyo due to its more mature industrial structure. Seoul has yet to reach the same level of occupational disparity, but shows a sign of polarized upgrading with strong job growth at the top of the occupational hierarchy and weak growth at the bottom. In Shanghai, newly created jobs are mainly concentrated in the mid to high income ranges, indicating the predominant upgrading in Shanghai's occupational structure. We find unequal distribution of jobs in all three cities, although disadvantaged groups differ across cities. We end this paper with several concluding remarks.

Keywords: *deindustrialization, job structure, occupational upgrading, occupational polarization, East Asian cities*

Introduction

Over the last three decades, technological progress and the competitive pressures of globalization have changed the industrial structure and labor market in advanced countries. Although there appear country variations, many developed countries are likely to go through the similar pathway of the industrialization and concomitant occupational as well as social transformations. At the risk of oversimplification, the changes in job structure accompanied by industrialization process can be summarized as follows. In the early stage, as technology advances, the manufacturing industry booms and generates massive employments of skilled work forces. This leads to the growth of better-skilled, middle income jobs. As a consequence, the middle class proliferates, and they demand various services in education, health, and many other areas. The development of welfare states and the public sector expansion also foster the public services sectors. The expansion of higher education and active participation of women in labor market serves to fill those better-skilled jobs and newly created service works. The increase in skilled manufacturing and services employment results in overall occupational upgrading.

As technology progresses further, service sectors employment continues to increase with a corresponding drop in manufacturing employment. Most of advanced countries move into a post-industrial phase of development. The technological advancement and the offshoring of production affect the mid and low-skilled workers in the manufacturing sectors harder. While the needs for the high-skilled, high-paying occupations such as managers, professionals and technicians grow rapidly, together with the skill-biased technological changes, the job demand for middle and low skilled, routine tasks shrinks. The workers displaced from manufacturing sectors face challenges in transferring into skill-biased sectors, as they lack the appropriate knowledge and skills. In addition, computerization encroaches on routine tasks mainly performed by medium-skilled service workers such as office clerks. Those who fail to get skilled jobs find little options but to move into unskilled, low-paying jobs. This leads to job polarization which implies increasing employment shares for both high-skilled and unskilled jobs at the expense of middle-skilled jobs.

Recent empirical researches also reveal that job polarization is not confined to the developed economies. According to the World Development Report in 2016, the developing countries, where the industrialization is still

in progress, also experience polarization in their industries. As Rodrik (2015) argues, the discrepancy between high and low skilled jobs in countries like China or India has been aggravated due to their premature transition into the service economies without full maturity in manufacturing industry development. This duality in economy and labor markets complicates their development process, different from that of the developed countries.

In fact, the impact of technological evolution on the labor market and job structure is disputable. Until the late 1990s, there was a consensus favoring the positive impacts of technology on job structure (Bekman et al. 1998), to some extent. And researchers expect technological change may lead to a similar pattern of occupational transformation across countries. Since the early 2000s, however, researchers have concentrated more on the variations in the occupational structures of different countries. Evidence reveals a significant diversity in the patterns of occupational change over time, depending on the timing of industrialization and institutional factors such as welfare regime types, employment policies, etc. (Wright & Dwyer 2003; Goos & Manning 2007; Oesch 2015).

The economy and labor markets in East Asia are in the midst of dramatic structural changes. Particularly Japan, China, and Korea have been undergoing different phases of economic development, and are faced with various challenges in their economic future. It is often criticized national level labor market policies alone have limited effects on local labor markets. It is partly because the experience and impacts of global structural changes among local areas may well vary per local labor market, employment and other situations specific to the region. Nevertheless, previous researches examine the shifts of labor markets and occupational structure mainly at the national level, assuming overall structural changes are not so different from those at the local level. Only recently, researchers and policy makers have grown aware of the significance of local labor markets and their roles in implementing more effective and sustainable market and employment policies. The OECD Programme on Local Economic and Employment Development (LEED) and EU URBACT programme are a few examples of taking this concern seriously.

This study examines the patterns of changes in occupational structure in three Asian cities: Seoul, Tokyo, and Shanghai. We scrutinize the major differences among the three cities and their respective countries. Firstly, we examine the similarities as well as the peculiarities of three cities and to what extent each city differs from its national features. We specifically pay attention to industrial structures at the local level. Secondly, we look at the

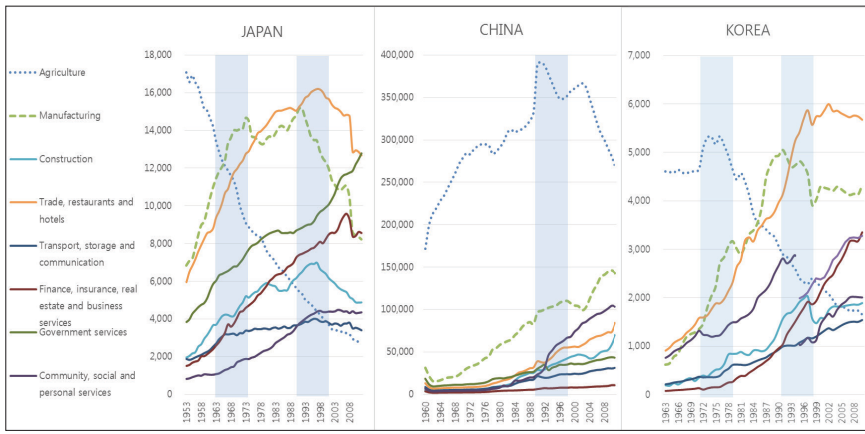
structural transformations in three cities, by analyzing the emergence and disappearance of jobs occurring in the demographic, economic, and social structures.

We organize the rest of this paper in the following way. In the first two sections, we present the current industrial stage in which each city has reached and how they differ from that of its national level. Then, we investigate the recent shifts in employment shares of various occupations and its relevancy to the changes in workers' socio-demographics. Lastly, we conclude this paper by drawing some conclusions and suggesting policy implications for a possibly sustainable job structure.

Deindustrialization and Key Features of Three Countries

As industrialization advanced, China, Japan and Korea all have experienced labor transitions from the manufacturing to service sectors. In 1980, the employment share of the service industry was 54% in Japan, 37% in Korea, and 13% in China (World Development Indicators Database, China Statistical Yearbook). The numbers demonstrate the service sectors in Korea and China were yet to develop during this time. On the contrary, Japan seems to have reached the stable stage of the post-industrialization by the mid-1980s. Shown from <Figure 1>, the employment in the manufacturing industry peaked around 1973 and exhibit gradual decline thereafter. On the other hand, Korea retained significant share of employment in the primary industry even in 1970s, with more than 40% of the total employments condensed in the farming and fishing. Around the mid 1980s, the employment in the manufacturing sector exceeded that of the agricultural, and continued to rise till 1991. Ever since, the manufacturing jobs have decreased sharply, signaling the start of the post-industrial era. In China, where industrialization began in the late 1980s, the primary industry still accounted for a large share of employment, but in the 1990s the expansion in the manufacturing and service sectors arose instigated by the large migration movement as the manufacturing and construction industries boomed. In the mid-1990s, the employment in the service industry finally surpassed that of the manufacturing, and the gap widened bigger since then. As of 2015, 7 in 10 workers in both Korea and Japan, and 4 in 10 in China are engaged in the service sectors.

The service industry can be divided into two groups in terms of skill level; first, the low-skilled, traditional service sector which include personal



Source.—Groningen Growth and Development Center (GGDC) 10-Sector Database.

Note.—Korea: Until 1994, government service was included in community, social and personal services.

Fig. 1.—Change in the number of employments by Industry, 1960-2010 (Unit: 1,000 persons)

and social cares, trade and hotel/restaurant services; and second, the high-skilled, modern sector with more added values such as finances and insurance, real estates and business services. In general, the share of employment in high skilled and high value-added sectors rises as the service industry matures.

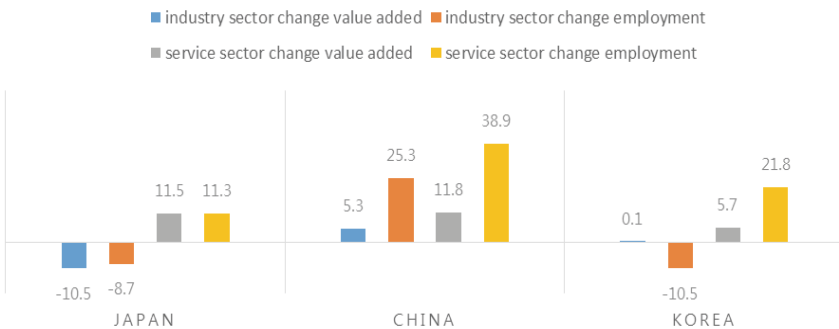
As we find in <Figure 1>, Japan's employment in trade, restaurants and hotels sectors, which is one of the low skilled service sectors, has increased along with the manufacturing, but only to drop significantly after the late 1990s. Instead, the number of employment in the high-skilled service sectors such as finance, insurance and business services exhibit gradual increments. Korea appears with the similar patterns; the increase in high-skilled service employments since mid 1990s. However, the employments in trade and hotel/restaurant sectors still consume one third of the total service sectors. In China, the employments in various service sectors have expanded since the 1990s, but the high and value-added service sectors are yet to grow as most of service related jobs is highly concentrated on the social and personal services.

What is particularly noticeable is the difference between Korea and Japan in the magnitude of employment loss during the industrial transitions from the manufacturing to the service. As <Figure 1> illustrates, Japan seems to avoid a sharp decline in manufacturing employment and to maintain the

employment for a considerable period of time during the transition period, while rapid decrement appears in Korea. For 10 years after the beginning of the post-industrial ear, Japan's employment share in the manufacturing sector have declined by 5.6%p (from 1973 to 1983), comparing with that of Korea by 14.1%p (from 1991 to 2000).

Such differences in post-industrial employment evolution among the three countries had meaningful impacts on their labor markets and job structures. During the economic transition period, the key to secure quality jobs depends on how the labors displaced from the manufacturing sector are absorbed in the service sectors. It demands two conditions; first, the service sectors, especially high valued service sectors, should provide sufficient job opportunities to workforces in order to stabilize the labor transition and absorb the displaced labor forces. Second, the institutions should support the labor transition through adequate institutional arrangements and policies. The superseded workers need time and economic resources to accumulate new knowledge and skills appropriate to the high-skilled industry (Kim2006: pp. 9-10). When lack in these conditions, the unemployment and underemployment would intensify along with the job quality decline.

If we compare the changes in output shares of economic sectors as of GDP and their employment shares of total employment, we can figure out the capacity of service sectors to absorb the displaced workers. Looking at <Figure 2>, we can see that the shifts of output shares have kept pace with that of employment shares in Japan. On the contrary, there is a large gap between employment growth and output growth in China and Korea. In Korea, while the employment share of manufacturing industry has declined significantly, its share in value added remain constant. On the other hand, the change in service sectors employment has risen faster than its share of GDP. The rapid growth of employment share in the service sectors and a remarkably slower increase in its share of GDP indicates that the service sector has absorbed those workers who are unable to find high-paid employment in face of the structural transformation. This has led many of those workers to end up in marginal, low-productivity, low-wage services jobs. On the basis of these facts, we can conclude that three countries have reached different phases of deindustrialization: Japan, a fully deindustrialized, high-value added service economy, Korea, a deindustrialized economy, but still in the transition from low-value added towards high-value added service economy, China, an industrialized, but emerging service economy. In addition, we may say that three countries have experienced quite different transitions toward service economies. Japan has experienced relatively

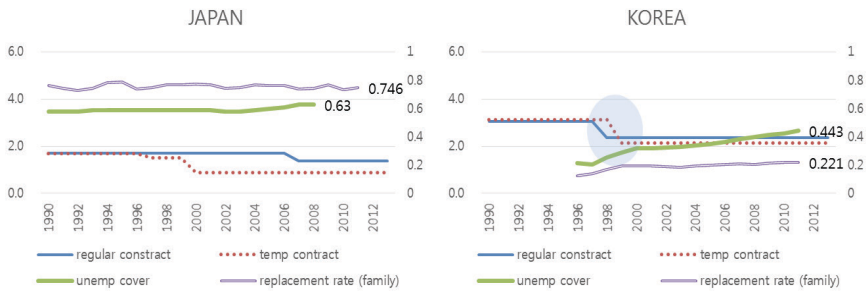


Source.—China Statistical Yearbook; World Development Indicators, World Bank Database. Value-add (% of GDP); Employments (% of Total employments)

Fig. 2.—Employment growth and output growth in three countries, 1990-2010 (Unit: %)

smooth transition to the high-valued service economy. Korea and China have gone through the deindustrialization process at an exceptional speed.

It has often been noticed that the speed of adjustment to employment shifts is closely related to the level of employment protection and welfare support for unemployment (Nickell et al. 2008; Pertold-Gebicka 2012). <Figure 3> demonstrates the strictness of the individual dismissal policies as well as the coverage and replacement rates of the unemployment insurance in Japan and Korea. The figure explains that Japan had protected regular workers via rigid policies, but eased on the regulations on temporary workers during its economic fluidity period. These dualized protection policies have been criticized for preventing the entrance of the socially vulnerable groups like females or the youth into the primary segment of labor market. And it has eventually deepened the duality in Japanese labor structure. (Kambayashi & Kato 2013). Nonetheless, these social protections have served to secure the employment status of Japanese regular workers, and the relative high rates in net coverage and replacements of unemployment insurance have provided workers with adequate supports in their job transitions. Unlike Japan, Korea has alleviated all its labor regulations on both regular and temporary workers, without comprehensive social protections for the growing unemployment during its high fluidity. It has consequently exposed workers to turbulent transitions in the labor market, and those displaced were left with limited options, and mainly absorbed into the informal, low wage service jobs of worse quality.



Source.—OECD, strictness of employment protection (individual dismissals), Scruggs, Lyle, Detlef Jahn and Kati Kuitto. 2014. "Comparative Welfare Entitlements Data Set 2, Version 2014-03."; Unemployment Coverage: Percentage of the labor force insured for unemployment risk. Replacement rate (family): Percentage of 100% earning of an average production worker in manufacturing sector who is 40 years old, has been working for the 20 years preceding the loss of income or the benefit period. Family means cohabiting with a dependent spouse with no earnings, two children aged 7 and 12.

Fig. 3.—Employment Protection Indicators and Unemployment Insurance Coverage

In China, the rapid industrialization and urbanization has mobilized the domestic migration. The 'floating population', which denotes temporary migrants, has doubled from 79.0 million in 2000 to 170.6 million in 2010. However, its household registration system (the *hukou* system), which has been installed since the 1980s, restricts migrant workers from access to, and opportunities of certain jobs, particularly those jobs of higher pay and security. Due to the discriminated access of the migrants to local welfare benefits including educational opportunities, the low educated migrant workers have little chance to obtain higher level education in urban areas. It forces the migrants into the informal and marginal jobs in cities. As Zhang and Wu's study (2013) shows, such institutional barriers produce an occupational segregation between the migrants and the local residents. The migrant workers in the cities are mainly engaged in low-wage service jobs or the self-employment, different from the job distributions of the local workers.

Then, how do jobs and occupational changes in the cities reflect these differences in the national macro-economic changes and institutional systems? In order to answer this question, we first examine the industrial and occupational structures in Seoul, Tokyo and Shanghai.

Labor Market Characteristics in Three Cities

Industrial Structures

Most cities have divergent local characteristics and institutional arrangements in terms of economy, labor market and welfare which condition the development of cities. These local specificities enforce cities to follow different pathway from the national level economy.

Tokyo and Seoul have long been the political, economic and cultural hubs in their countries. As of 2014, 34% of information-telecommunication business is located in Tokyo followed by 18.8% of R&D businesses (Tokyo Metropolitan Government 2016). The city has also attracted various high value added services such as financial and business services. Similarly, Seoul has been the heart of various high value-added service sectors. 55.7% of the total information and media firms, 39% of the science and technology, 27% of the business support service, and 25.3% of the finance and insurance companies are doing their business in Seoul as of 2014 (the Census Reports on Establishments 2015).

Shanghai has long been the traditional industrial capital in China. Partly due to this traditional function, industry sectors still compose relatively high share of total employment. With the Open and Reform Policy and the Pudong district Development as a commercial centre, however, its service industry has expanded dramatically. The local government played a critical role in boosting service industry in Shanghai. In 1992, the Shanghai government announced its public plans, and prioritized the growth in the service sector. And in 2001, it implemented the "Master City Plan of Shanghai", the blueprint for the economic developments through the invigoration of an international finance, the trade and shipping, and the information-technology sectors (Kim 2015: p. 138). Thereafter the growth of service sectors and employment has accelerated in Shanghai.

As such, the service sector is not only core industry, but also strategic area of development of their economy in all three cities. The majority of workers are employed in the service sector; 81.5% in Tokyo, 84.0% in Seoul, and 61.8% in Shanghai, and all higher than the national average. The share of service employments in Shanghai is 20% higher than that of the national level. All three cities play a leading roles in the development of service sectors in their countries.

However, when we examine workers composition of service industry in

details, we can find significant differences across the three cities. The employment shares of different service sectors vary in three cities. The number of the wholesale and retail employments accounts for the largest share in both Tokyo and Seoul. In Tokyo, the medical care (8.6%) and the information-telecommunication sector (7.8%) then sit at the second and third in its total employment rates. In Seoul, the employment in the wholesale/retail sector (8.6%) ranks the second, followed by those in the education sector (7.8%). In terms of the service sector employment, Tokyo has clearly established the high added value service industry, and Seoul is yet caught in the transition between the high and low added values. As for Shanghai, the strong tradition of manufacturing industry manifests, explaining 26.8% of the total employment concentrated in the sector. And, the wholesale/retail and the rental services hold the large share of employments in the year 2014, and it indicates that Shanghai still in the early stage of the traditional services.

Recent changes in the industrial structures reveal the directions of three cities' economic transitions. Tokyo has experienced the decrease in the wholesale/retail share (-1.8%) while the increase in the medical care sector (+1.7%), compared to 2007. Additionally, the employment shares in the science and technology sector as well as the public administrations have also grown. In Seoul, the shares of the science and technology, health and social care, and the business support services have expanded while those in the manufacturing and hotel/restaurants have stagnated. Lastly in Shanghai, the employments in most industries have increased except for the agricultural, repair and personal service sectors. Specifically, the rental service and the construction have led the largest increments in Shanghai; the rental service from 5.4% in 2005 to 9.2% in 2014, and the construction share from 4.8% in 2005 to 8.1% in 2014 – each grown about twofold in a past decade. While the numbers of manufacturing workers have expanded in Shanghai, its volume has diminished as other industries bloomed; 31.9% in 2005 to 26.8% in 2014. As for the repair and personal services, it has declined from 9.1% in 2005 to 2.6% in 2014 – about 6.5% drop in 10 years.

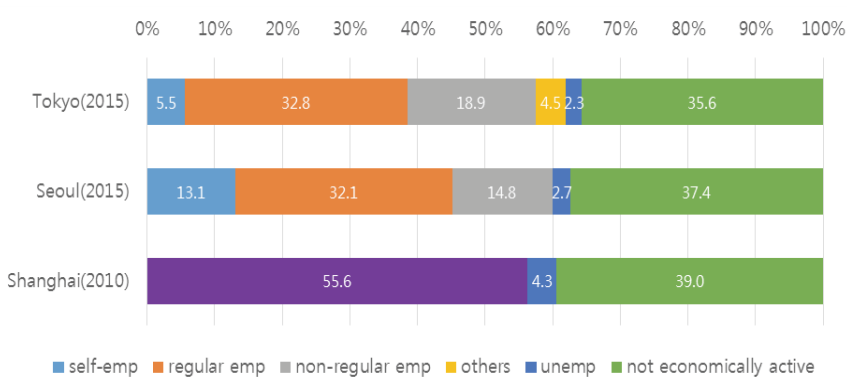
As we can see above, service sectors compose relatively high share of employments for all three cities. However, the nature of main service sectors differs across the cities. While the high value-added sectors have thrived in Tokyo and Seoul, the manufacturing industry still predominates and the high value added service sectors are yet to develop in Shanghai. The employment shares of information-telecommunication, the finance and insurance, and the science-technology sectors are more than 18% in both cities, compared to

9.1% in Shanghai. On the other hand, the wholesale/retail and rental and leasing services are main service sectors and have grown rapidly in Shanghai, while those sectors have declined in Tokyo and Seoul.

Demographic Composition of Labor Forces

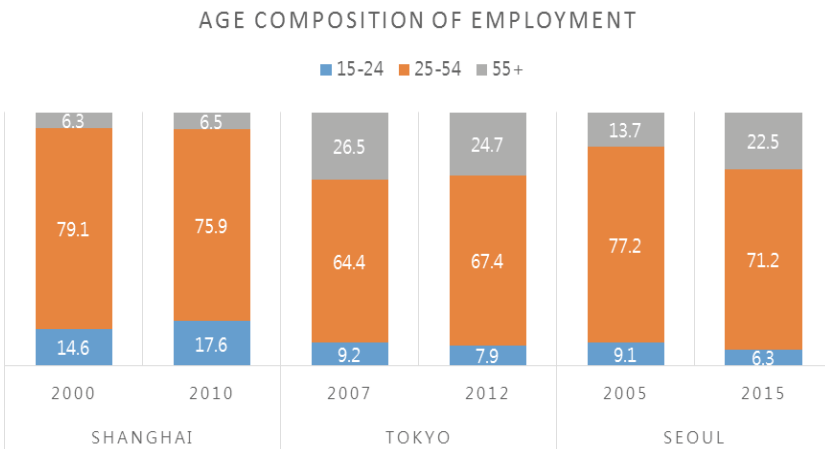
Next, we examine the labor forces characteristics in three cities. According to the Labor Force Survey conducted by the Ministry of Internal Affairs in 2015, 64.4% of the Tokyo residents aged 15 or older have jobs or seeks employments (the economically active population), and 62.1% are employed, consisting of 5.5% of the self-employed, 32.8% of permanent workers, and 18.9% of temporary workers (shown in <Figure 4>). In Seoul, 62.6% of those above 15 years-old are economically active, and 60% are currently working: 13.1% of the self-employed, 32.1% of the permanent, and 14.8% of the temporary. The share of the economically active population in Seoul is slightly lower than that in Tokyo, while the self-employed higher and the temporary workers lower. The 2010 Shanghai census data indicates about 5 of 10 people aged 15 or higher are currently working. The employment rate is 55.6%, which is significantly lower than Tokyo and Seoul.

If we compare the age composition of labor forces across three cities, we can see that the share of prime-age labor forces (ages 25 to 54) is the largest in Shanghai, followed by Seoul (shown in <Figure 5>). Tokyo holds the largest share of 55 or older working population, corresponding to population ageing



Source.—Seoul, the Economically Active Population Survey, 2015; Tokyo, the Labor Force Survey, 2015; Shanghai, the Shanghai Statistical Yearbook, 2010

Fig. 4.—The Labor Force Breakdown in Three cities (those aged 15 or older=100)

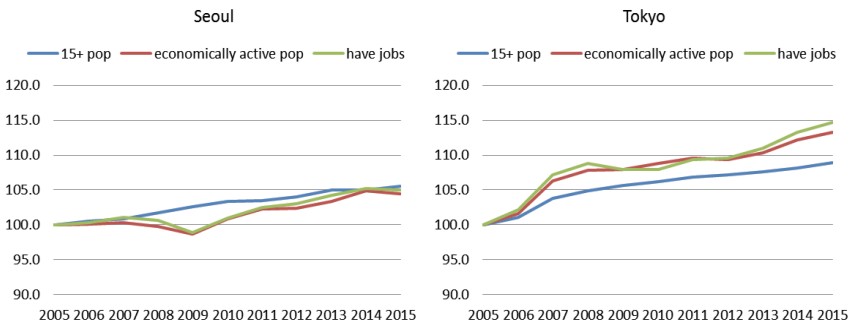


Source.—Shanghai, Shanghai Statistical Yearbook; Tokyo, Tokyo Statistical Yearbook; Seoul, Economically Active Population Survey

Fig. 5.—Age Composition of labor forces in three cities (% of total working population aged 15 and older)

in Japan. What is interesting is that the labor forces in Seoul have aged rapidly since 2005. Of the working population, 22.5% is age 55 or older in 2015, compared with 13.7% in 2005. The share of prime-age workers has shrunk significantly instead. On the other hand, Shanghai's working population is relatively young with the large share of the youth labor (aged from 15 to 24), compared to other two cities. But the 55 or older accounts only 6.5% of the total working population in Shanghai. In other words, the majority of the aged are economically inactive partly due to the relatively early retirement after 55 years-old, and it imposes a burden on social security spending in Shanghai.

The vitality and health of local economy and labor market requires three conditions; first, the continuity of the population growth; second, the active participation in the labor market; and third, the high employment rate and low unemployment rate. <Figure 6> shows several indicators of the health of the labor market in Tokyo and Seoul since the last decade. We find that Seoul exhibits slower growth than Tokyo in all three indicators, productive population, economically active population, and employment population. Ageing is expected to bring a slowdown of labor force growth. However, the fact that the growth pace of the latter two falls below of the productive population implies the growing share of the economically inactive population



Source.—Seoul, the Economically Active Population Survey; Tokyo, the Labor Force Survey

Fig. 6.—Growth of Labor Forces, 2005-2015 (Y2005=100)

as well. On the contrary, the labor participation and employment population has risen faster than the productive population in Tokyo. It illustrates the labor market in Seoul remains stagnant in the last decade.

<Table 1> presents gender differences in the changes of the economically active participation rate as well as the employment and unemployment rates in Seoul and Tokyo. When examined the gender differences, men's situation in labor market has exacerbated while improved for females in Seoul. The participation rate and employment rate has declined and men's participation rate and employment rate are identified as major contributors to the declines. Tokyo, conversely, has improved in overall labor market situation for both males and females. Particularly, Tokyo's female workers exhibit significant increments in participation rates and employment rates – higher than those in Seoul. Since the collapse of the bubble economy in the early 1990s, Japan has infamously undergone long fluctuations in employment and economy, so called the "lost decades". Nevertheless, these numbers suggest that Tokyo hasn't lost it all, as the labor market seems to retain its momentum again.

However, Tokyo still needs to resolve the disparity between its labor market and economic growth. The gross regional domestic product (GRDP) in Tokyo has continued to decline (OECD Regional Database). Decoupling trend of the labor market performance from economic growth signify the "employments without growth" in Tokyo. Interestingly, the case differs in Seoul. Its GRDP of Seoul has increased from 100% in 2007 to 112% in 2012; in other words, the "growth without employments". Whichever is better for the economy? It remains unanswered. The "employment without growth"

TABLE 1
Shifts in Labor Forces by Gender in Seoul and Tokyo, 2005, 2015 (%)

		Total			Male			Female		
	(Rates)	2005	2015	changes	2005	2015	changes	2005	2015	changes
Seoul	Participation	63.3	62.6	▽0.7	75.3	72.9	▽2.4	52.0	53.2	1.2
	Employment	60.3	60.0	▽0.3	71.5	69.8	▽1.7	49.6	51.0	1.4
	Unemployment	4.8	4.2	▽0.6	4.9	4.3	▽0.6	4.6	4.1	▽0.5
Tokyo	Participation	61.9	64.4	2.5	74.5	75.2	0.7	49.5	53.9	4.4
	Employment	59.0	62.1	3.1	71.0	72.3	1.3	47.2	52.2	5.0
	Unemployment	4.7	3.6	▽1.1	4.7	3.8	▽0.9	4.7	3.2	▽1.5

tends to lower the average wage of the workers despite growing job opportunities, which then threatens workers' productivity and job quality. On the other hands, the "growth without employments" aggravates the income inequality and unemployment, particularly among the youth. The virtuous cycle between economic growth and employment are yet to accomplish in both cities.

Changes in the Job Structures

In this section, we describe employment shifts in three cities during the last decade. We break down employment changes into occupational categories and see which occupations have risen and which occupations have fallen in terms of numbers of employment. Eventually, we intend to see whether job structure in three cities has been upgraded or polarized, correspondent with industrial restructuring. If there appears upgrading employment shift, we expect a pattern of the highest employment growth in high-paid jobs and the lowest growth in low-paid jobs, with middling growth in the medium-paid jobs. If polarization, we expect a pattern of lower employment growth in the medium-paid jobs and higher growth at both ends of the job-income hierarchy.

In order to examine the structural shifts in jobs, it requires the longitudinal data of representative and sizable sample. We utilized the Local Area Labor Force Survey (LLFS) collected by the National Statistic Bureau in 2008 and 2015 for Seoul, and the Japanese Employment Status Survey (JESS) of 2007 and 2012 for Tokyo. These two surveys aim to produce basic data on employment situations of local areas. The target population of the surveys is household members who are 15 years old or older. LLFS is a semi-annual

survey and its sample size is approximately 199,000 households in total. JESS is conducted on a five-year basis since 1982 and approximately 470,000 households are surveyed. For Shanghai, we do not obtain regional data representative of the city. Thus we rely on a published source provided by Shanghai Municipal Bureau of Statistics that reports its labor resources and employment situation via Shanghai sixth national census data.

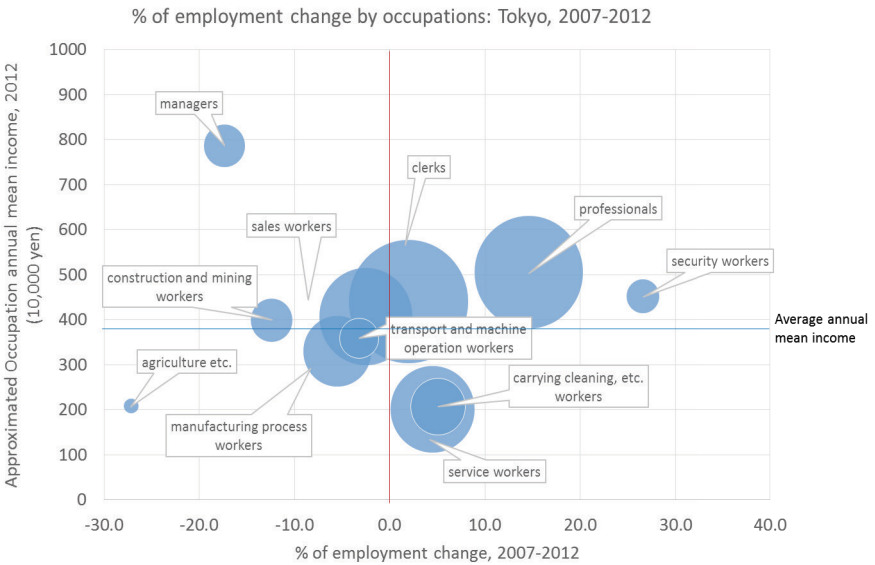
Method of estimating income levels of each occupational category is as follows. The income level by occupations is calculated via monthly salary answered by wage workers for Seoul. For Tokyo, the estimation is based on the number of employees in each occupation per different wage ranges provided by the Japanese Statistic Bureau. In the case of Shanghai, the calculation uses the income variable of the Shanghai Social Survey in 2010. Although these crude approximations may not provide accurate estimates, they may help to identify a relative difference in the income level of each occupation.

One caveat we would like to mention is whether income level can be a relevant indicator of job quality. Many scholars argue the wage level of a job does not always represent its quality. However, there have been numerous findings which reveal high correlation of wage with job stability, satisfaction, and the overall quality of its working environment. As this analysis aims to explore the overall trends in the occupational transitions in each city, we have thus considered the wage as the representative variable of its job quality. The validity of the wage as the representative of the job quality remains to be scrutinized in further studies.

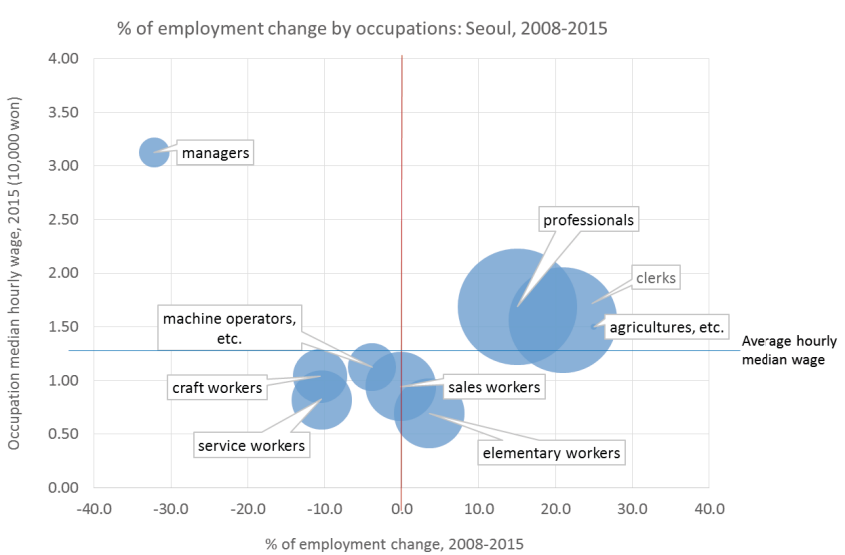
Now, what have changed in the job structures in three cities? <Figure 7> displays changes in the share of employment by occupations. The X-axis represents % of employment changes in the occupation size between two periods. The Y-axis displays the estimation on the annual average income of occupation for Tokyo and Shanghai and the median hourly wages for Seoul. The circle size indicates the number of workers in each occupation near the end of a year.

Let's look at the size of each occupation in three cities first. The largest occupation in Tokyo is the clerks, amount to 24.3% of the total employment, and professionals, sales and service workers are next in order. In Seoul, the size of the professionals appears the largest (26.6%) and the clerk on the second. Lastly, Shanghai demonstrates the largest share of the maintenance and production workers (34.6%), and the service workers the second.

Between 2007 and 2012, Tokyo has lost about 154,000 jobs and gained about 300,000 jobs. In Seoul, about 390,000 jobs have been created while



SOURCE.—Japanese Employment Status Survey, 2007, 2012. Persons engaged in work. Size of ball indicates number of workers in each occupation in 2012. Occupation annual median income is approximated based on information of income category and number of workers in each income category.



SOURCE.—Local Area Labor Force Survey, 2008, 2015. Size of ball indicates number of employees in each occupation in 2015.

Source.—Shanghai labor resources and employment situation: Shanghai sixth national census data analyzed nine series, Shanghai Municipal Statistics Bureau 2011-11-07 (http://www.stats-sh.gov.cn/fxbg/201111/235037.html);

Fig. 7.—Relative employment growth of occupations in three cities

losing 160,000 works between 2008 and 2015. During this period, the professionals have increased the most in both cities – 186,000 in Tokyo and 183,000 in Seoul; each amount to 61% and 47% of new jobs created. The growth in service workers ensues in Tokyo, recording about 38,000 new jobs (12% of the total increase in jobs). In Seoul, clerks have increased the second most; between 2008 and 2015, and they have produced 182,000 employments– almost the same increments as professionals. Two occupations in total construct 94% as of the employment growth in Seoul.

Regarding the employment loss, managers have declined significantly in Tokyo, recording 28.6% of the total job loss, succeeded by manufacturing process workers, and construction and mining workers consecutively. In Seoul, service workers have declined the most– about 35% of the total decreases, followed by craft workers.

<Figure 7> elucidates the rise and fall of occupations in Tokyo; the rise mainly led by professionals, security workers, clerks and service workers, and other elementary labors like carrying, cleaning and such; and the fall by managers, transportation and machine operation, production process,

construction and mining, and agricultural workers. Between 2007 and 2012, professionals have increased by 15% while managers have decreased by 17%. These variations in occupations indicate that the most of disappearance has occurred in the mid-income range, while the creations concentrated in the high and low income tiers. In this respect, we can conclude the job structure has been polarized in the labor market of Tokyo.

In Seoul, new jobs have emerged among professionals, clerks, and elementary workers between 2008 and 2015; particularly the number of clerks has expanded by 21%. And jobs have disappeared in managers, craft workers, machine operators, and service workers. When compared to their incomes, the jobs of mid-high incomes have expanded while those of mid-low incomes has shrunk, implying the overall job structure improvement in Seoul. However, there appears a sign of slight polarization in Seoul as the low-skilled elementary jobs have increased by 3.6% compared to that in 2008.

The findings demonstrate that deindustrialization tends to have similar polarization effects in two cities, considering the decline in manufacturing workers and concomitant loss of middle income jobs. The job polarization has deepened in Tokyo due to its more mature industrial structure. Seoul has yet to reach the same level of occupational disparity, but shows a pattern of polarized upgrading with strong job growth at the top of the occupational hierarchy and weak growth at the bottom.

In order to check the industry variation in job shifts, we break down industries into occupations and see in which industries, job polarization or job upgrading has occurred in Seoul. We see that employment shifts between 2008 and 2015 are highly concentrated in three sectors in Seoul: scientific and technical services, health and social welfare services, and manufacturing sectors. <Figure 8> explains the changes in occupations of each three sector in Seoul. The results show that the preponderant increase of the mid-high income jobs such as professionals and clerks in scientific and technical service sectors. On the other hand, the employment growth has taken place in lower level occupations as well as higher level occupations in health and social welfare services. It verifies that the expansion of the health and social welfare service industry contributes to the growing numbers in the low tier occupations. In manufacturing sector, the job destruction appears mainly from the mid-income tiers such as craft workers and machine operators.

The Shanghai data only convey the proportion of occupational changes unlike data of the other two cities. Hence the direct comparison to Tokyo and Seoul is not feasible. But we can deliver the overall trends. Between 2000 and 2010, the number of jobs in Shanghai has increased in all industries except

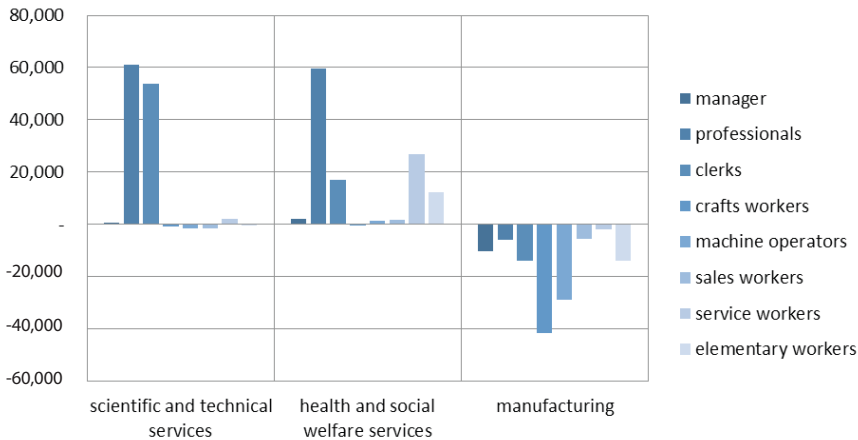


Fig. 8.—Changes in the employment by Industry and Occupation: Seoul, 2008-2015

for the manufacturing and agricultural sectors (see <Figure 7>). According to the Shanghai government, over 600,000 new jobs appear in each year, and they are mainly the service workers. Regarding its income levels together, the mid and high income jobs continue to replace those in the low tier. These changes validate China's industrial and economic development has improved the overall job structures within the city.

In sum, all three cities exhibited a sharp rise of high level occupations. Tokyo has created more new jobs from 2007 to 2012. And yet, the increments in low and high income tiers continue, which exacerbates the job structure and its polarization. The labor market in Seoul has improved in general with relatively higher growth of professionals and clerks. The service and sales jobs have diminished or remains moderate in Seoul, compared to their increase in Tokyo. Nevertheless, its share in the low-skilled sectors displays a gradual growth, foreshadowing the potential polarization in near future. In Shanghai, new jobs are mainly concentrated in the mid to high income ranges. Even the manufacturing industry, the mid and high income jobs replace those in the low tier. These changes verify the predominant upgrading in Shanghai's occupational structure.

Patterns of Employment Shifts and Workforce Characteristics

Changes in the job structures favor, or reject a particular group of workers. For examples, the growth of the advanced service sectors has benefited those

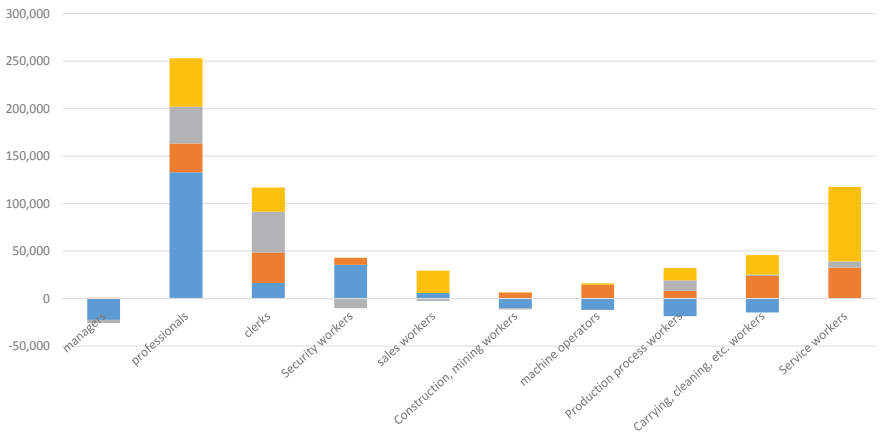


Fig. 9-1.—Changes in the Employment by occupation and job status: Tokyo, 2007-2012

with high skills and knowledge, but neglected others without. A worker's characteristics, such as gender, age, or current employment status, function as advantage, or disadvantage, when workers access to a certain job of a specific qualification. Then, are there any structured demographic patterns of employment in the occupational shifts? To put it another way, who gains (or who loses) what jobs? The distributions of gender, age, and job status per employment changes may give us an answer.

<Figure 9-1> elucidates that in Tokyo, an increasing share of employment is mainly in non-regular employment, while a decreasing share of employment is in male regular workers. Growth in regular employment is confined to high-level occupations such as professionals, security workers, and clerks. Non-regular employment has increased in almost all level of occupations. Particularly, the increasing employments in service and sales jobs and carrying and cleaning jobs have been filled predominantly with non-regular workers. The female non-regular workers have gained most of increasing share of the low-paid jobs such as service and sales jobs. The results suggest there appears a significant occupational inequality based on employment status and gender in Tokyo, which reinforces income inequality.

In Seoul, unlike Tokyo, an increasing share of employment is mainly in regular employment, while a decreasing share of employment is in non-regular employment, mostly male non-regular employment except service jobs. The increasing shares of professional and clerical employment have been filled with regular employment, similar to Tokyo. Especially, the female

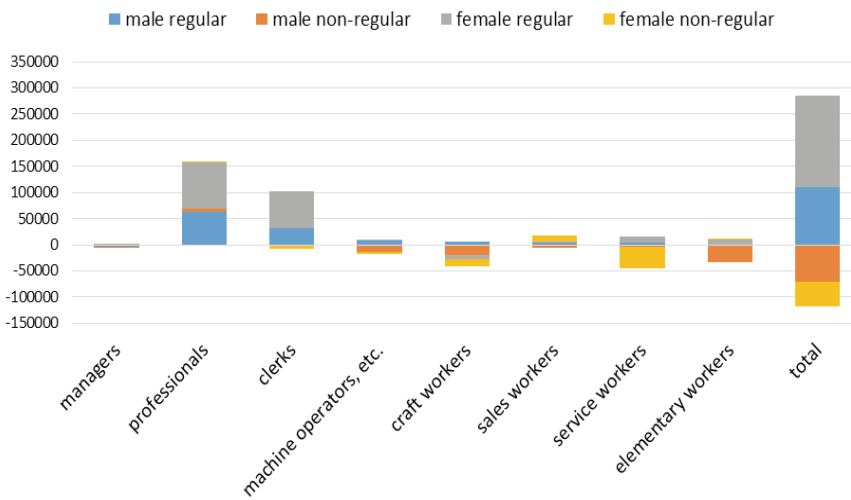


Fig. 9-2.—Changes in the Employment by occupation and job status: Seoul, 2008-2015

share has exceeded that of male in these occupations. This implies that job structure for female has been upgraded more than that for male during the period. Intriguingly, however, female regular workers have also gained the growing share of employment in the low-paid works such as service and elementary occupations.

Next, we examine the age distributions of occupational shifts in the cities. Evident in <Figure 10-1>, Tokyo demonstrates the growth in the prime-age workforces (24-54 years old) in most of occupations. Particularly, their share of increasing employment in the professionals and the clerks is notable. They have also gained the increasing employment in service and sales works. It indicates job polarization within the prime-age workers. On the other hand, most of jobs have ineffectively provided opportunities to the young (15-25 years-old) and the aged (55 or older) workers, except for the professional sector. The young workers especially experience the significant drop in the clerical works, while the aged in the production process and the sales works.

Quite the contrary trend appears in Seoul between 2008 and 2015. The employment shares among the aged workers have expanded, while the prime-age workers retracted. The 25-54 year old workers have lost in middle and mid-low occupations, but have gained the employment in high-paid jobs such as professionals and clerks. The opposite pattern is observed for the

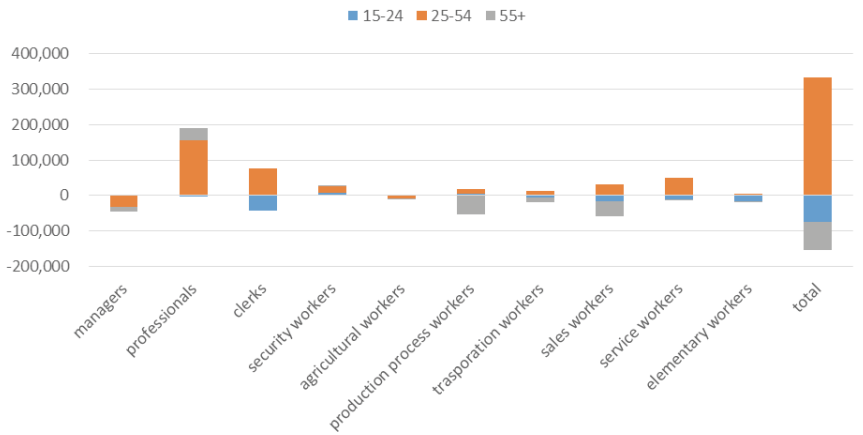


Fig. 10-1.—Changes in the Employment by Occupation and Age: Tokyo, 2007, 2012

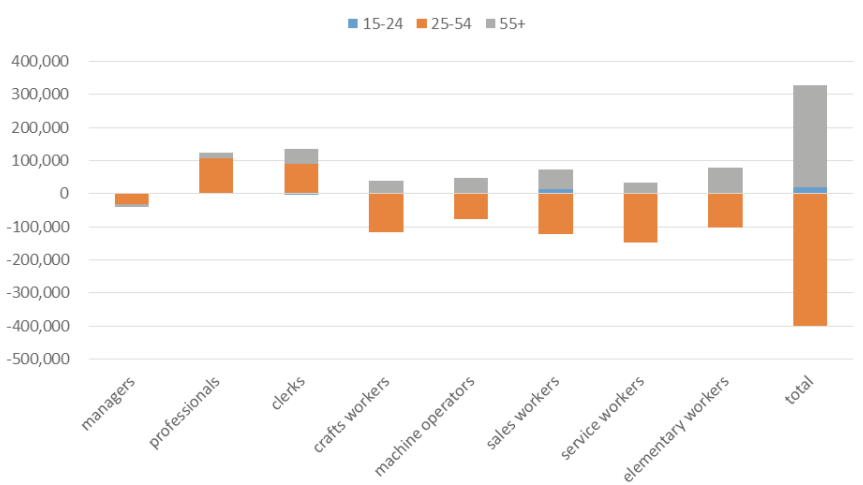


Fig. 10-2.—Changes in Employment Rates by Occupation and Age: Seoul, 2008, 2015

aged workers. Most of gains of the aged workers are in middle or lower level jobs. This finding shows age-related occupational segregation in Seoul.

Since the data on the demographic composition of each occupations remain undisclosed in Shanghai, we are not able to perform the similar anaysis for Shanghai. However, many existing studies have accentuated on the

significance of migrant workers in its occupational changes of urban China. For example, Zhang & Wu (2013) show the widening gaps in incomes between the local and the migrant workers and argue the primary reason for such income inequality is occupational segregation per one's registration than unequal income distribution itself.

In 2010, Shanghai has recorded about 9 million migrations – three times larger than the numbers in 2000. The migrant workers amount to a half (47%) of the total working population (males from 15-59 years-old, and females of 15-54 years-old) in Shanghai. They are mainly young, or female. Of the workers between 20-34 years old, 57.7% hold residency other than in Shanghai (Shanghai Statistic Bureau 2011). Interestingly, they construct the majority of labor forces in the traditional service sectors such as the wholesale/retails and the hotel/restaurant. Of the total migrant populations, 41.3% work for the manufacturing sectors compared to 28.9% of the local working population. Particularly, female migrant workers are mainly engaged in the low-skilled service jobs due to their low education levels. Conseuqenlty, it is reseanable to say that the job structure for local workers has been upgraded, but this does not apply to migrants. In this respect, Shanghai experiences the occupational polarization by one's household registration status, different from the patterns in Tokyo or Seoul.

Concluding Remarks

In order to understand the rapid changes that the labor market is currently experiencing, this paper has examined how different industrialization process has altered the job structures in three cities. The employment changes have impacted people in the city differently. The high wage jobs have increased in all three cities since the beginning of the industrialization. Yet, the job structures have rapidly polarized as it continued, noticeable in Tokyo. Seoul has enjoyed the high skilled job growth, and yet, is soon to face another turning point with the gradual increase in the low-skilled jobs. Only Shanghai maintains the continuous momentum in its development.

The employment changes are closely linked to the industrial transition of the city. For example, the declining manufactures has also decreased the share of the mid-wage jobs, shifting the traditional job structures. In addition, job upgrading is often concentrated on particular industrial sectors. Today, many expect the high value-added industries to produce more quality job opportunities and contribute to economic growth. Yet this is not always

the case. The expansion of scientific and technical service sectors has led the rise of the managerial and clerical jobs in Seoul, which has provided better jobs to workers, but the expansion of health and social welfare service sectors has produced the rise of lower tier jobs as well as that of higher tier jobs. The case in Tokyo also exemplifies the expansions in the high value service sectors do not necessarily result in the better job quality. This means labor inducement alone may fail to produce quality jobs. Therefore, it requires policy makers to take careful consideration of both industrial sectors and occupational forms in order to create quality jobs.

The equal employment opportunity also invigorates the labor market (Hurley, Fernandez-Macias and Storrie 2013). Unfortunately, the figures demonstrate labor markets in three cities have been offering more employment opportunities to those who have certain characteristics such as male, regular, and prime-age workers. Certain groups of workers have been marginalized in the low end of job structure; in Tokyo, female, non-regular workers; in Seoul, the aged workers; and in Shanghai, the migrant workers. Ultimately, the dual structures in the labor markets and labor policies that reinforce such segregations between insiders and outsiders aggravate the unequal distribution of jobs among different classes, age groups and social backgrounds. In this regard, the proper governmental intervention to mitigate the widened gaps among different groups of workers in labor market opportunities is an essential prerequisite.

The findings above indicate that in order to sustain productive and inclusive labor markets, we need to consider the quality as well as quantity of jobs and its distribution. This implies the policy design for occupational and economic upgrading should integrate and carefully coordinate related policies in industry, employment and welfare. In industry, the city should support a new industry with more job opportunities of the mid and high tiers. Employment policies should direct to promote job qualities rather than quantities, especially direct to reduce low-paid jobs. And, lastly through the welfare policies, the city needs to support workers with trainings and education in their process of occupational upgrading. The well-coordinated policy mix between three would alleviate the growing polarization in the labor markets.

Last but not least, we would like to point out the importance of effective governance system for implementing policies at the national and city level. The performance of labor markets in cities is largely influenced by a complex set of policies at the national level and city level. Due to traditionally strong authority of national government, there has been little room for city

government to implement policies for its own. Recently, however, policy makers have become aware of the importance of the local dimension of labor market policy and the need to cooperation with local government in order for effective policy outputs. The efficacy of the labor policies in a country heavily depends on the understanding of city labor market peculiarities and partnership with the city policy makers. Therefore, it is necessary to seek to build effective governance structures for local policy implementation.

All three cities face a formidable challenge in upgrading its job quality and occupational structure. The dramatic changes are soon to come. The U.S scholars have already predicted 47% disappearance of current jobs due to the automation and the digital revolution (Frey & Osborne 2013). The U.K. expects that the development of artificial intelligences will displace 35% of the current jobs (Diloitte 2014). And, the World Economic Forum (WEF 2016) expect about 5 million jobs will disappear in next 5 years. All predict labor and industrial transformation are immediate globally. Some even prophesizes provocative words that the employment competition would become the third World War (Clifton 2015). Have we well prepared for these changes? This question still remains unanswered.

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