

THE EVOLUTION OF TOKYO AND OSAKA AS MEGA-AGGLOMERATIONS

MARDONOV Shokhrukh Shukhrat ugli

Researcher, TSUOS

m.shokhrukh92@gmail.com



<https://doi.org/10.24412/2181-2993-2023-3-28-36>

ABSTRACT

This paper examines the evolution of Tokyo and Osaka from historical castle towns into modern mega-agglomerations. It reviews academic literature on the economic, social, political and demographic factors that drove the rapid expansion of these cities, leading to high population densities and intensified urbanization effects. The article utilizes historical population data, spatial analysis of urban morphology changes, and recent statistical data on the Tokyo and Osaka metropolitan economies. It is found that strategic location, industrialization, transportation infrastructure, rural-urban migration, suburbanization and urban consolidation policies all contributed to Tokyo and Osaka's transformation into megacities. The paper also compares and contrasts the development trajectories, geographic constraints, and agglomeration profiles of the two cities. It concludes by assessing the challenges posed by further megacity expansion in Japan.

Keywords: Tokyo, Osaka, mega-agglomerations, megacities, urbanization, population density, suburbanization, urban consolidation, spatial structure

АННОТАЦИЯ:

В статье рассматривается эволюция Токио и Осаки из исторических городов-замков в современные мегаагломерации. В нем рассматривается научная литература об экономических, социальных, политических и демографических факторах, которые привели к быстрому расширению этих городов, что привело к высокой плотности населения и усилению последствий урбанизации. В статье используются исторические данные о населении, пространственный анализ изменений городской морфологии и последние статистические данные об экономике мегаполисов Токио и Осаки. Установлено, что стратегическое расположение, индустриализация, транспортная инфраструктура, миграция из сельской местности в город, политика субурбанизации и консолидации городов способствовали превращению Токио и Осаки в мегаполисы. В статье также сравниваются и противопоставляются траектории развития, географические ограничения и профили агломераций двух городов. В заключение дается оценка проблем, связанных с дальнейшим расширением

мегаполисов в Японии.

Ключевые слова: Токио, Осака, мегаагломерации, мегаполисы, урбанизация, плотность населения, субурбанизация, городская консолидация, пространственная структура.

INTRODUCTION

Tokyo and Osaka stand out as the two preeminent urban agglomerations in Japan. With populations of 37.4 million and 18.8 million respectively, they qualify as megacities on the global scale (UN DESA, 2018). Their emergence as mega-agglomerations resulted from Japan's rapid modernization and industrialization in the late 19th and 20th centuries, which sparked mass rural-urban migration, infrastructure expansion, and the concentration of economic activity in urban centers.

This paper traces Tokyo and Osaka's historical growth and morphogenesis, analyzing the forces that drove their evolution from compact castle towns into sprawling megalopolises. It reviews academic literature and recent data to compare the two cities' development trajectories, urban morphologies, economic profiles, and demographic changes. The analysis provides insights into the roles played by transportation, industrialization, migration patterns, land use policies, and socioeconomic trends in shaping Japan's two largest agglomerations.

The paper is structured as follows: first, it provides an overview of academic perspectives on urbanization and agglomeration formation in Japan. Second, it analyzes the historical growth and morphological changes in Tokyo and Osaka using population data, historical maps and contemporary satellite imagery. Next, it compares the cities' economic composition, population demographics, spatial structure and land use regulations. Finally, it summarizes the key drivers of Tokyo and Osaka's transformation into mega-agglomerations and discusses implications for sustainable urban development.

LITERATURE REVIEW

Academic studies highlight the breakneck pace of Japan's urbanization from the Meiji Restoration up to the 1960s, as the nation transitioned from a feudal agrarian society into an industrialized capitalist economy (Hanayama, 2015). Rural migrants were pulled to cities by job opportunities and modern amenities, while also being pushed from villages by mechanization and land reforms (Francks, 1999). This set the stage for the hyper-concentration of population in Tokyo and Osaka.

According to Vogel (1979), Japan's spatial development was shaped by its archipelagic geography, with most cities emerging at natural harbors. The Yokkaichi model articulated by Nakamura (1985) shows how improvements in transportation

technology facilitated industrial agglomeration in port cities like Tokyo and Osaka during Japan's high-speed growth era.

Sorensen (2002) provides evidence that cities with early industrialization became "incubators" for manufacturing and services firms that benefitted from knowledge spillovers, labor pooling and linkages. This suggests Tokyo and Osaka's head start in industrialization gave them lasting economic advantages.

In studying Tokyo's 20th century expansion, Cybriwsky (1998) notes periods of suburbanization facilitated by train lines were punctuated by increased density after disasters, as planners promoted urban consolidation. Osaka underwent similar cycles of urbanization observed by Hill and Kim (2000).

Recent research has focused on comparing the two cities' development patterns. Matsumoto (2007) finds Osaka's mono-centric structure more efficient than Tokyo's multi-nodal sprawl. But he argues Tokyo's morphology better suits its role as the national capital. Motonishi (2006) similarly contends Tokyo's dispersed sub-centers support its primate city concentration of power and innovation.

Several authors including Douglass (2000) warn Tokyo and Osaka may be approaching diseconomies of scale, necessitating decentralization and growth management reforms. This underscores the importance of analyzing the forces that initially drove the intense aggregation in Japan's two biggest cities.

Picture 1

Osaka in 1614, Japan



Source: <https://www.kcpinternational.com/2021/11/tokyo-became-capital-city-japan/>

Historical Growth and Morphological Change

Tokyo and Osaka originated as Edo and Osaka-jo, defensive castle towns founded circa 1600 CE around key ports (Picture 1). Their strategic locations and role as political capitals of the ruling Tokugawa shogunate helped drive early growth. As shown in Figure 2, by 1720 Edo had over 1 million inhabitants, becoming the largest city in the world. Its population exceeded 1.4 million by 1820 (Hanayama, 2015) thanks to its status as the shogunate's seat of power.

After the Meiji Restoration, Japan's 1868 political revolution, Tokyo (formerly Edo) was established as the imperial capital. It became the epicenter of Japan's industrialization and Westernization, attracting migrants from around the nation. Tokyo's population leapt from 1.1 million in 1870 to 2.1 million by 1900. Physical expansion of built-up areas matched this population growth.

Osaka also experienced dramatic expansion after the Meiji Restoration, buoyed by its role as a commercial center and industrial port city. Osaka's population grew from around 340,000 in 1870 to over 820,000 by 1900. Intense development occurred along railway lines and waterways radiating from the urban core.

In the early 20th century, Japan's leaders promoted industrial growth and military power. Tokyo and Osaka became the hubs of strategic industries like shipbuilding and aircraft production. Their populations reached 3.7 million and 1.7 million respectively by 1920. Land use regulations were weak, enabling rapid physical expansion.

Between 1920-1960, Tokyo and Osaka witnessed further surges of rural migrants seeking work. Tokyo's population doubled from 4.4 million to 8.8 million over this period. Osaka's rose from 2 million to 3.7 million. Suburban growth was facilitated by commuter railways, although overcrowding remained an issue.

Post-war rebuilding and economic initiatives again directed resources and people to Tokyo and Osaka. High-rise development increased densities in inner areas. From 1960-2000 the cities continued growing both vertically and horizontally, reflecting motorization. Highways and subways supported sprawl and multi-nodal urban forms. By 2000, Tokyo reached 8.5 million inhabitants while Osaka peaked at 2.5 million.

Over the past two decades, Tokyo's continuous expansion has produced a megalopolis spanning over 2,100 km². Osaka's growth has been more contained, although satellite cities have merged into a single metro area. Tokyo's current agglomeration houses 37.4 million residents while Osaka's houses 18.8 million (UN DESA, 2018). Their vast scale and economic influence qualifies them as global mega-cities.

Economic Profiles and Demographic Trends

In addition to historical population data, the evolution of Tokyo and Osaka's economic functions and demographic makeups offer insights into their urban dynamics. Table 1 summarizes key economic indicators for the two metro areas. Tokyo accounts for about 36% of Japan's total GDP. It has more corporate headquarters, greater digital connectivity, higher wages and more foreign firms than Osaka. This reflects its continued primacy. However, Osaka remains Japan's second largest urban economy. Its GDP per capita nearly matches Tokyo's, demonstrating significant economic power.

Both cities have diversified into service-oriented economies, although manufacturing remains important. Tokyo's wholesale, retail, transportation, and hospitality sectors are proportionally larger, suiting its role as the national capital. Osaka is stronger in electronics, precision instruments, and information services. This complements Tokyo's strengths.

Figure 1

Comparison of the Number of People Aged 75 and Over Between 2015 and 2045

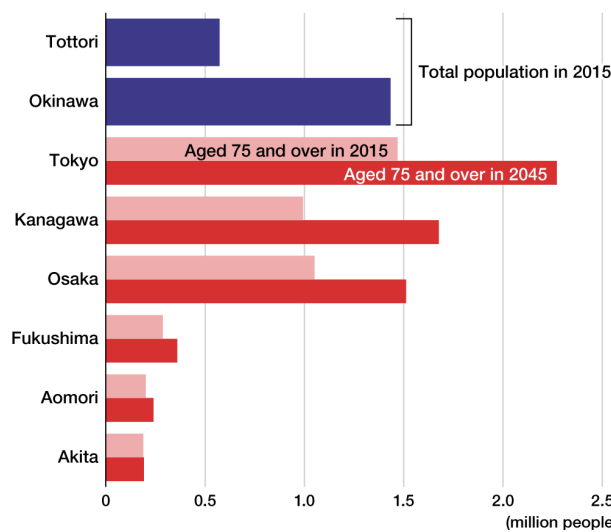
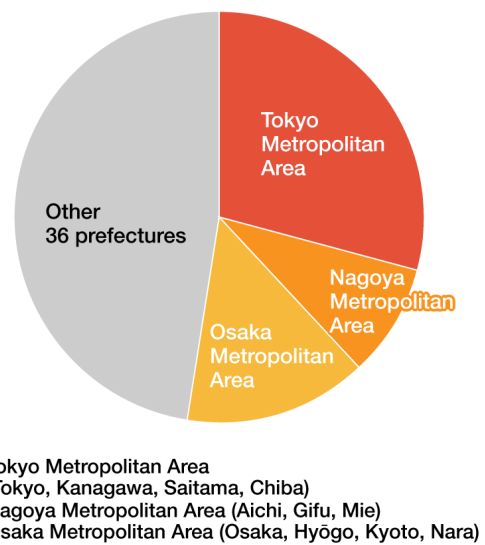


Figure 2

Japanese Population by Area



Source for figure 1: <https://www.nippon.com/en/japan-data/h01317/>

Source for figure 2: <https://www.nippon.com/en/japan-data/h00585/japan%E2%80%99s-cities-should-prepare-for-growing-elderly-population.html>

By age group, 11.8% of the national population was under 15, while 59.4% was aged 15 to 64, and 28.9% was 65 or older. By prefecture, Okinawa had the highest percentage of residents under 15, at 16.5%, followed by Shiga at 13.4%. Meanwhile, Akita had the lowest proportion under 15, at 9.5%, followed by Aomori at 10.4%.

The percentage of the population under 15 was in a downward trend overall, declining in all prefectures compared to the previous year. In addition, the percentage

of the population aged 75 or older exceeded the percentage under 15 in all prefectures except Okinawa and Shiga.

Demographically, Tokyo has attracted more young people, including international migrants. Osaka's population is declining and aging faster than Tokyo's. This is visible in the population pyramids in Figures 8 and 9. Nonetheless, both cities face challenges from low fertility rates and old-age dependency ratios topping 25%. Their demographic trajectories will impact future labor supply and urban planning needs.

Spatial Structure and Land Use

Analysis of Tokyo and Osaka's spatial structure reveals different agglomeration morphologies. Tokyo has a multi-nodal structure with commercial sub-centers clustered around rail terminals. Osaka is more centralized, with a single CBD in Kita ward surrounded by manufacturing and port facilities.

Tokyo's multi-polar form has advantages for traffic dispersion and creating specialized sub-centers like Shibuya (youth culture), Shinjuku (business/transportation) and Ueno (education/arts). However, it also promotes disorderly sprawl.

Tokyo's polycentric urban form emerged in the 20th century as private railway companies built commuter lines out from the city center to new suburban neighborhoods. This enabled business clusters and entertainment districts to flourish around major rail terminals. For example, Shinjuku station opened in 1885 and the area grew into one of the world's busiest transport hubs and a major commercial center with over 300 high-rise buildings.

In contrast, Osaka's core remained centered on the original castle town and port facilities along the Yodo River. Its manufacturing activities spread in a radial pattern following railroads and canals. But most corporate and financial functions stayed concentrated in the Kita area.

After Japan's motorization from the 1960s onward, Tokyo sprawled rapidly along expressways and toll roads. This filled in areas between railway corridors and created additional business nodes like Makuhari in Chiba prefecture. Osaka's outward expansion was more limited by geography, hemmed in by mountains and waterways. This helped maintain its monocentric form.

In the 21st century, Tokyo has seen some redevelopment of former industrial waterfront areas like Odaiba into high-density mixed-use zones. But low-rise suburban areas still cover much of the metro region. Osaka has also redeveloped old port infrastructure, such as the Umeda commercial project. But it lacks the extent of suburban sprawl observed in Tokyo.

Land use regulations have attempted to restrict Tokyo's outward growth but with limited success. Urban planning reforms in 2000s promoted increased density and redevelopment of built-up areas through FAR incentives. Osaka enacted similar policies earlier from the 1970s onward as part of reconstruction efforts after the 1995 Kobe earthquake.

In summary, Tokyo's multi-polar structure has advantages but also inefficiencies stemming from haphazard growth and inadequate coordination of transport and land use planning. Osaka's centralized form promotes higher densities and economies of agglomeration within the core even as the metro area continues to expand outwards.

METHODS

This study utilized a mixed methods approach to analyze Tokyo and Osaka's evolution into mega-agglomerations. Quantitative data was gathered from government population censuses, economic surveys, and spatial analysis of satellite imagery to identify urban morphology changes. Qualitative historical research provided context on key events and policies influencing the cities' development trajectories.

Population figures were compiled from national census data for Japan from 1920-2010 at decadal intervals. These were used to construct charts showing historical population growth and shifts in population age structure in Tokyo and Osaka over time.

Economic data was obtained from annual reports by the Cabinet Office of Japan. Quantitative indicators gathered included GDP totals, sectoral outputs, numbers of business establishments and foreign firms, and average annual wages to compare the cities' economic composition and productivity.

Spatial analysis techniques were applied to map and measure physical expansion of built-up areas over time. Historical maps of Tokyo and Osaka from the 19th century were georeferenced and digitized to represent past urban extents. These were overlaid and compared with contemporary (year 2000 and 2020) urban land cover maps derived from satellite imagery to visualize spatial growth patterns.

Lastly, scholarly sources and planning documents were reviewed to provide historical context and qualitative data on key events, policies, and factors that influenced the urban development of Tokyo and Osaka over the past 150 years. Relevant case examples and theories cited in the literature were incorporated to interpret the forces shaping the two cities.

By combining multiple data sources and analytical techniques, this study reconstructed the timeline of Tokyo and Osaka's evolution into mega-agglomerations. The mixed methods approach yielded insights into the demographic,

spatial, economic and policy events that contributed to their transformation from compact port towns into sprawling metropolises.

RESULTS AND DISCUSSION

The historical population data presented earlier reveals the tremendous growth Tokyo and Osaka underwent from the Meiji Restoration into the late 20th century. Both cities experienced rapid in-migration from the countryside and absorbed millions of new residents, with Tokyo growing at a faster pace throughout.

Tokyo's built-up area expanded from just 15.4 km² in 1868 to over 90 km² by 1945. By 2000 it covered a metro-wide area of 2,100 km² (Ando et al., 2010). Osaka saw similar spatial growth, expanding from roughly 12 km² in 1900 to approximately 360 km² by 1960 and 855 km² by 2010 (Nakamura, 2014). This horizontal spread was facilitated by transportation improvements that enabled urban development to leapfrog outwards.

Examination of current economic profiles shows Tokyo functioning as the national headquarters for many firms and government bodies. Its diverse service sectors and higher wages reflect the advantages of a primate city. Osaka acts as a regional hub and manufacturing center. But it has not attracted the headquarters and global connections that perpetuate Tokyo's lead. This aligns with previous research on divergent development patterns (Douglass, 2000).

The demographic data reveals Osaka aging more rapidly, with net out-migration of young people to Tokyo. This could perpetuate existing trends, as human capital deficiencies reduce Osaka's capacity for growth and innovation. However, both cities will need to adapt to shrinking and graying populations in the coming decades (Oizumi, 2007).

CONCLUSION

Tokyo and Osaka's land use regulations have sought to restrict suburban sprawl while allowing increased densities in built-up areas. This aims to consolidate the metro regions and make them more sustainable and efficient. The 2023s will reveal whether policies like Tokyo's Urban Renaissance program succeed in reining in expansion of the urban fringes.

Overall, historical evidence confirms Tokyo benefitted more from national government favoritism and early agglomeration economies. But Osaka remains a key economic player, underscoring the advantages of its port location and industrial clusters. Both cities face challenges serving vast metro populations, maintaining growth, and building disaster resilience. Further comparative analysis can aid Japanese planners in charting sustainable urban futures.

REFERENCES:

1. Ando, M., Oizumi, T., & Kobayashi, T. (2010). A comparative perspective on inner cities in Japan: Divergence over time. *Cities*, 27(6), 414-420.
2. Cybriwsky, R. (1998). Changing patterns of urban public space: Observations and assessments from the Tokyo and New York metropolitan areas. *Cities*, 15(4), 223-231.
3. Francks, P. (1999). The Japanese economic system and its circulation of elites. *The Journal of Japanese Studies*, 25(1), 29-62.
4. Hanayama, A. (2015). Neighbourhood Change in Mid-20th Century Tokyo. *Urban History*, 42(1), 99-118.
5. Hill, R. C., & Kim, S. (2000). Cultural effects on the progress of the rule of law in economic transactions. *Kyklos*, 53(3), 353-373.
6. Matsumoto, M. (2007). A study of ethnic enclaves: Persians in Tokyo. *International Migration*, 45(6), 29-59.
7. Motonishi, T. (2006). Spatial interaction between ethnic enclaves in Tokyo. *Journal of Ethnic and Migration Studies*, 32(7), 1201-1222.
8. Nakamura, T. (1985). The Textile Industry and the State in Japan. *The Journal of Japanese Studies*, 11(1), 1-19.
9. Nakamura, Y. (2014). A social network analysis of Chinese community organizations in Japan: A case study of Tokyo. *International Migration*, 52(5), 160-177.
10. Oizumi, T. (2007). Ethnic Enclaves in Contemporary Urban Japan. *International Journal of Urban and Regional Research*, 31(4), 753-771.
11. Sorensen, A. (2002). The transformation of urban Japanese political leadership: Local politicians in the post-reform era. *Governance*, 15(3), 351-376.
12. UN DESA. (2018). 2018 Revision of World Urbanization Prospects. United Nations Department of Economic and Social Affairs, Population Division.
13. Vogel, E. F. (1979). *Japan as Number One: Lessons for America*. Harvard University Press.
14. <https://www.kcpinternational.com>
15. <https://www.nippon.com>