

Urbanization Trend of South, East, and Southeast Asian Countries: Influence of Economic Growth and Changing Trends in Employment Sectors

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Abstract

This study is focused on effect of economic growth and contribution of employment sectors on urbanization process. The level of Urbanisation is defined by the percentage of the population living in urban areas. The primary analysis started with the observation of selected indicators among all Asian countries. This phase of the study indicates declining employment in agriculture in highly urbanized countries. Most South Asian countries and some Southeast Asian countries contribute the most to the agricultural sector. The urbanized population is comparatively low in these countries. On the other hand, highly urbanized countries shifted towards service-oriented employment, and other countries also followed the same trend. The share of the industrial sector on employment is also rising in countries with fast urbanization rates. Some of the highly urbanized countries are reducing the focus on industry-based employment. A detailed statistical analysis has been conducted to get a precise indication of the influence of indicators on urban population growth. Change in growth trend in last three decades analyzed with OLS and panel data regression using R programming as a tool. The OLS test result also supports that service and industry-based employment contribution is statistically significant to enhance urbanization growth. Some countries show a significant negative correlation between employment in agriculture and urban population growth. The influence of growth in GDP per capita indicates less statistical significance on urban population growth. Though economic growth and urbanization are correlated in trend analysis charts, the detailed analysis indicates a higher impact of change in employment sectors on urban population growth.

Keywords

Urbanization, Employment Sectors, GDP Growth, Population, R programming

1. Introduction

The urbanization rate is much higher in Asia than in other parts of the world (Ooi, 2009). A large number of cities and megacities located in the South, South-east, and East Asian countries are boosting the rapid growth of the urban population in this region. Currently, the percentage of the urban population is comparatively low in South and Southeast Asia, but the growth rate is very high (Jones, 2002). The East Asian countries have a higher percentage of urban population and better economic strength. Especially the rapid growth of capital cities from developing countries of these regions is creating new megacities. Closely clustered cities in this region positively impact the urban population's growth of the neighboring cities, where the distance from regional centers inversely influences the urbanization rate (Sohn, 2012).

The sustainable growth of cities is very much important to build a better future for these countries. Urbanization is mainly driven by industrialization and a service-based economy that leads towards the declining of agro-based primary industry (Henderson, 2003). It is a huge challenge to cope up with the urbanization pace and ensure sustainable development. Asian megacities are taking initiatives and following sustainable development guidelines to accommodate new developments without hampering the environmental balance (Michael et al., 2014). It is necessary to understand the driving forces behind rapid urbanization. This study analyzed the relevant data of all the countries in study regions and further investigated the temporal change of the indicators over the last three decades to identify the most relations and interactions among the factors. It is crucial to identify the probable future of the cities of the region and possible challenges to manage the growing urban areas to prepare sustainable planning policies for the emerging cities. After analyzing the data of all Asian countries, the detailed study explored the scenarios in selected regions (Figure 1).

Existing studies are confined to individual countries or regions and some of them also lack comprehensive analysis. Comparative analysis on the effect of relevant indicators on the urbanization trend is needed to understand the competitiveness of countries in the study region and identify the common factors among countries to learn from each other. This study includes a diverse set of variables and uses multilevel analysis to identify correlations. In addition to the analysis results on study regions, the analytical framework of this study can be used to conduct a more comprehensive study on even larger study areas. The use of panel data regression and test on the robustness of different methods to select the most appropriate method in changing circumstances ensures the unbiased result

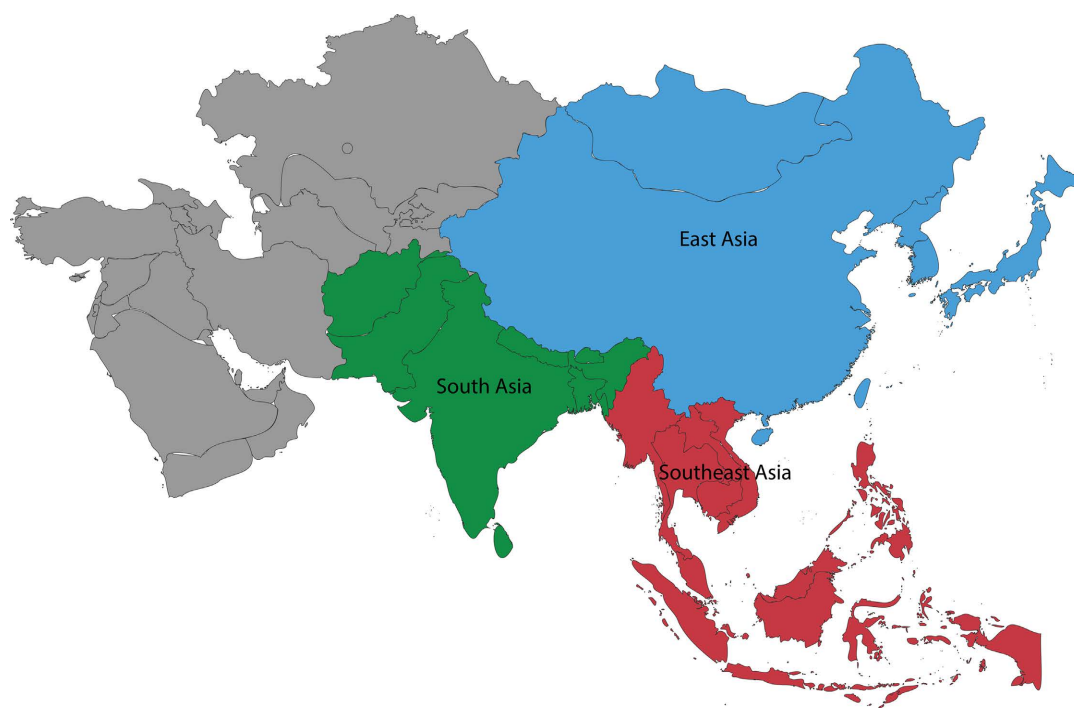


Figure 1. Study regions of Asia identified in the map.

of the study in various sets of samples. The limitation of the study is using limited quantitative indicators, which are available in the trusted data source. Other socio-political factors that cannot be quantified were excluded from the study that might influence urbanization. This study uses only unbiased statistical data to examine the research hypothesis.

2. Literature Review

2.1. Urban Population Growth

Despite low urbanization, 54% of the total urban population lives in Asia (United Nations, 2018). Tokyo, Delhi, and Shanghai are the three largest cities of the world located in the study region. The urban population is going to reach 68% of the total population by 2050. For most of the countries, urbanization is driven by economic development and GDP growth, but there are other countries where the urban population is still growing without any positive growth of the economy (Brückner, 2012; Castells-quintana et al., 2019). Better facilities in cities and less attractive income sources in rural areas motivate the rural population to migrate to urban areas (Annez & Buckley, 2009; Brückner, 2012; Kasarda & Crenshaw, 1991; Onjala & K'Akumu, 2016). However, the economic and social integration of the newly added people is not so easy. Especially when urbanization does not result from economic growth, new employment is yet to support the new urban population. Original size, location, and living standard in a city work as a natural driver. In contrast, Industrialization and employment opportunities are imposed drivers of urban population growth (He & Sim, 2015).

Any growing trend experiences a decline after it reaches its peak. Countries with negative population growth can be found easily, but cities with declining populations are not common. The declining cities of North America, who experienced rapid growth in the middle of the last century, have been experiencing a decline in urban population since the end of the last century (Kasarda & Crenshaw, 1991). These cities with high economic growth have already passed the peak moment of urbanization. Some European cities are facing de-urbanization due to the decline of the industrial economy (Bontje, 2004).

2.2. Expansion of Urban Land Area

Horizontal and vertical expansion of cities is happening to accommodate the growing population. The growth pattern of urban areas is influenced by the economic strength of the country and the availability of suitable land for expansion (Li et al., 2018). The growth of urban areas occurs around existing settlements and road infrastructure (Li et al., 2018; Zhao et al., 2017). Traditionally cities grew along with the water bodies and heavily depended on water transport. However, in recent years the connection of cities with water is significantly decreased. Even the existing waterfronts are losing identity over time. Improvement of road transportation facilities minimized rural isolation and connected the sub-urban and adjacent rural areas to the cities (Jones, 1997, 2002). At the beginning of this century, the urban land cover was only 2% - 3% of the total land on earth (Lambin et al., 2001). However, the land availability for urban expansion is quite limited for some countries. A considerable amount of land area is not habitable, and we need a large proportion of land for agriculture. Though the rapid growth of other industries resulting economic growth and supports urban development, the need for agricultural land is also growing with increased population. Including new areas in city territories can directly influence the urban population by converting the rural or suburban population into the urban population (Buhaug & Urdal, 2013; Kasarda & Crenshaw, 1991). Some cities are growing faster due to the higher concentration of facilities or government focus (Henderson, 2003). The effect of urbanization can expand beyond the city boundary by converting the adjacent agricultural or naturally reserved lands into recreational areas (Lambin et al., 2001).

2.3. Economic Growth

Urbanization is significantly influenced by the economic growth of a country (Annez & Buckley, 2009; He & Sim, 2015). Urbanization can happen in three ways: 1) natural population growth; 2) migration (both rural-to-urban and urban-to-urban); and 3) boundary redefinition of urban areas. Among the three, most research has highlighted the relative contribution of natural growth and migration (Kasarda & Crenshaw, 1991). Better economic condition supports the people to move into urban areas and expand existing city boundaries. In developing countries, government policy attracts more people to migrate into urban areas by

providing better infrastructure, social services, and employment through industrialization (Onjala & K'Akumu, 2016). Most of the people in the rural areas of our study region earn through agriculture. Their migration to urban areas causes them to change their profession, which might cause a decrease in the share of agriculture in economic growth. Such within-country decreases in the share of agricultural value added to the GDP lead to significant increases in the urbanization rate (Brückner, 2012). Urbanization is seen to have a close link to sustained economic growth as nations' share of GDP as well as employment swaps from agriculture to industry and services, which are the sectors that get advantage from agglomeration in urban centers (Tacoli et al., 2016). Generally, the economic development of a country happens when the country transforms from a rural-agricultural-based economy to an industrial-service-based economy (Henderson, 2003). Changing trend of industrial revolutions reduced the dependency on urbanization to support economic growth (Renaud, 1987). However, economic growth positively affects urbanization and the rise of the industrial sector and population growth (Zhao et al., 2017). Urbanization is not a constant migration of rural people to urban areas but the result of net urban migration from the two-way movement. This net urban migration results from net economic advantages in urban areas (Tacoli et al., 2016). Regardless of the changes in other factors of analytical methods, economic growth is always correlated to sustained rate of urbanization (Lu et al., 2013). High population growth of a country can lead to high rate of urbanization without economic growth, but it cannot be sustained (Castells-quintana et al., 2019).

2.4. Employment Sectors

The employment sectors are divided into three main categories – 1) Agriculture, 2) Industry and 3) Services. Considering a hundred years before-after scenario, we see an extreme change in the employment sectors almost everywhere. As for Asian countries, the highest proportion of people was involved in the agriculture sector. From 1991 to 2019, employment in agriculture decreased by 20.68% in South Asia and 28.82% in East Asia (The World Bank, 2020). The industrial revolution happened at different times. The first industrial revolution was based on coal, the steam engine, railroads, and textiles. The second revolution was on petroleum products, chemicals, the automobile, and electrical and mechanical industries. The last one occurring is based on new energies, electronics, information industries, bioengineering, and services. The first two revolutions influenced urbanization more compared to the third one (Renaud, 1987). In such a way, the involvement of people in agriculture abated, which caused the move out of agriculture, while, on the other hand, the development of the modern manufacturing sector proceeds along with the economic development. Urbanization, therefore, is a “by-product” of these phenomena.

The transformation from an agriculture-based economy to an industrial service-based economy drives the urbanization of a country (Henderson, 2003; Ta-

coli et al., 2016). The cities with high dependency on exporting natural resources are named “consumption cities,” and the cities with production-based economies depending on service and industry are named “production cities” (Gollin et al., 2016). In Asia and Latin America, the production cities show a higher urbanization rate than consumption cities. Countries with the majority of the population living in urban areas have gone through rapid industrialization. Though some countries support economic development and urbanization by exporting natural resources, most developed countries achieve it through a greater share of the industrial and service sectors. The economic dependency of the rural population on the earning of their family members living in the city reduces the active involvement in the agricultural sector (Lambin et al., 2001). As a result, a significant portion of croplands remain unutilized, and the agriculture sector declines. Some studies show that the relation between the agricultural sector and urbanization is either negative or not significantly related (Brückner, 2012). Though the industry and service sector has become the most contributory sector in today’s global economy, some Asian countries are still dependent on Agriculture. In Asia, on average, 21.67% of people are employed in Agriculture, 22.64% in industry, and 55.72% in services. Countries such as Nepal (64.38%), Laos (61.44%), and Bhutan (55.78%) have agriculture as their main economy, while countries in the Middle East have developed their industry as their most contributory economic resource. Among them, Qatar (53.70%) employs the highest number of people in the industry (The World Bank, 2020). The change in the employment sector influences urbanization, but the growth of urban areas also increases rural export employment (Schmitt et al., 2006). Focus on different employment sectors changes with the development cycle of the city. Industry-based cities shifted towards a service-based economy at later stages of the development cycle (Bontje, 2004; Martinez-fernandez & Audirac, 2012). With time, a production-oriented economy gets decentralized, and the residents’ preference also gets shifted from the city core to the suburban areas.

3. Materials and Methods

The study started with the extraction of relevant data from data bank (The World Bank, 2020). After examining all available data on Asian countries, the study selected the potential indicators (Table 1). Urban population percentage and urban population growth rate determine the present urbanization level and possible future scenario of a country. The share of different employment sectors is listed here to examine any possible correlation with urbanization. GDP per capita in USD (constant 2010) represents the economic strength of the country to support urbanization. Percentage of urban land and population density refers to the land management and challenges of the countries to accommodate more urban population in the future. A thorough literature review provides a clear conception of the possible impacts of the selected indicators on urban growth. The focus of the study is on the urbanization trend of South, East, and Southeast Asia.

Table 1. Urbanization, employment, and economic data of ASIAN countries.

Country Name	Urban Population Percentage	Urban Population Growth Rate	Employed in Agriculture (%)	Employed in Industry (%)	Employed in Services (%)	GDP per Capita (USD)	Urban Land Percentage	Urban Population Density (per sq. km)
Afghanistan	25.75	3.32	42.50	18.55	38.96	507	N/A	N/A
Armenia	63.22	0.31	24.05	24.75	51.20	4623	N/A	N/A
Azerbaijan	56.03	1.48	36.00	14.79	49.22	4806	N/A	N/A
Bahrain	89.39	4.59	0.94	35.25	63.81	23,443	70.42	2773
Bangladesh	37.41	3.12	38.30	21.32	40.38	1856	8.55	5651
Bhutan	41.61	2.88	55.78	10.15	34.06	3316	N/A	N/A
Brunei Darussalam	77.94	1.41	1.95	20.76	77.28	31,086	19.30	337
Cambodia	23.81	3.21	34.53	27.91	37.56	1643	0.65	3517
China	60.31	2.29	25.33	27.42	47.25	10,217	4.04	2263
Cyprus	66.81	0.77	2.41	18.44	79.16	28,288	24.68	354
Georgia	59.04	0.52	38.15	14.26	47.59	4698	5.18	613
Hong Kong SAR, China	100.00	0.75	0.17	11.08	88.75	48,354	85.86	8299
India	34.47	2.30	42.60	25.12	32.28	2101	7.49	2164
Indonesia	55.99	2.28	28.50	22.36	49.14	4135	2.24	3682
Iran, Islamic Rep.	75.39	2.01	17.37	31.39	51.24	3115	4.25	920
Iraq	70.68	2.54	18.27	22.93	58.80	5658	2.86	2294
Israel	92.50	2.00	0.92	17.23	81.86	43,589	29.57	1334
Japan	91.70	−0.12	3.38	24.22	72.40	40,113	29.82	1063
Jordan	91.20	1.61	2.47	24.45	73.09	4405	3.81	2756
Kazakhstan	57.54	1.48	14.86	20.98	64.16	9813	N/A	N/A
Kuwait	100.00	1.67	1.78	22.15	76.07	32,373	22.12	1083
Kyrgyz Republic	36.59	2.75	19.32	25.36	55.33	1374	N/A	N/A
Laos	35.65	3.33	61.44	12.94	25.62	2545	0.44	2592
Lebanon	88.76	0.13	11.32	23.59	65.10	7584	22.65	2619
Macao SAR, China	100.00	1.39	0.40	9.66	89.94	86,118	53.87	36,636
Malaysia	76.61	2.08	10.28	27.01	62.72	11,414	4.74	1604
Maldives	40.24	3.99	8.32	19.13	72.55	10,626	N/A	N/A
Mongolia	68.54	1.86	25.32	21.58	53.11	4340	N/A	N/A
Myanmar	30.85	1.51	48.85	16.94	34.21	1477	1.07	2434
Nepal	20.15	3.88	64.38	15.11	20.52	1195	N/A	N/A
North Korea	62.13	0.83	43.82	12.73	43.45	N/A	1.95	6862
Oman	85.44	4.03	3.99	32.01	63.99	15,343	1.83	780

Continued

Pakistan	36.91	2.68	36.92	24.96	38.13	1285	4.65	2289
Philippines	47.15	1.88	22.86	19.12	58.03	3485	3.63	4802
Qatar	99.19	1.85	1.17	53.70	45.14	62,088	13.01	1912
Saudi Arabia	84.07	1.93	2.41	24.80	72.79	23,140	1.92	712
Singapore	100.00	1.14	0.03	15.55	84.41	65,641	79.77	10,053
Sri Lanka	18.59	1.20	24.98	27.87	47.15	3852	6.49	1021
South Korea	81.43	0.16	5.14	24.58	70.28	31,846	22.48	1923
Syrian Arab Republic	54.82	1.94	10.13	23.19	66.69	N/A	6.51	812
Tajikistan	27.31	3.03	44.72	15.79	39.49	891	N/A	N/A
Thailand	50.69	1.76	31.43	22.84	45.73	7817	7.16	981
Timor-Leste	30.95	3.16	39.28	16.32	44.40	1561	2.42	1149
Turkey	75.63	1.96	18.11	25.32	56.57	9127	5.73	1456
Turkmenistan	52.05	2.42	20.68	39.83	39.49	7612	N/A	N/A
United Arab Emirates	86.79	1.75	1.39	34.22	64.39	43,103	12.06	1005
Uzbekistan	50.43	1.79	25.71	23.02	51.27	1719	N/A	N/A
Vietnam	36.63	2.91	37.22	27.44	35.34	2715	2.45	4789
West Bank and Gaza	76.44	2.87	6.05	30.37	63.59	3657	41.47	1476
Yemen, Republic	37.27	4.01	27.55	10.20	62.25	774	0.89	2404

Data source: (The World Bank, 2020).

However, it is necessary to have a comparative look with the countries from the rest of the Asian regions to identify any similarities or differences that can affect the future development trend of the countries from study regions. So we incorporated multilevel analysis and different analytical tools to create a comprehensive analytical framework (**Figure 2**). Simple representation of extracted data in bar charts illustrates the comparative scenario of all Asian countries. Some countries were selected from the study sample to conduct a detailed analysis. In the first phase, development trend analysis of actual and normalized data is represented with simple graphs. To understand the impacts of independent indicators on urban growth analyzed with OLS test using R programming. Statistically significant variable identified from the OLS test to propose necessary recommendations for future development.

3.1. Urbanization Rate

For better comparison, the countries are arranged according to the level of urbanization in this section's figures. The countries with the least urban population are placed at the left, and the highest urban population percentage is placed to the right (**Figure 3**). From South Asian region are less urbanized, and most of

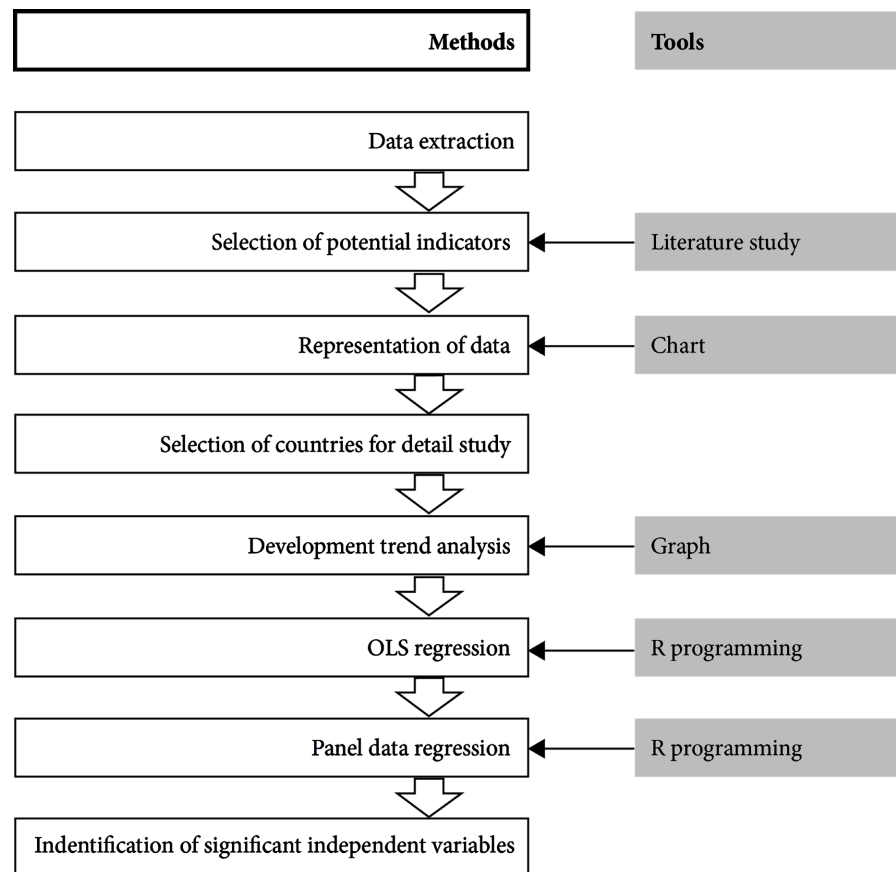
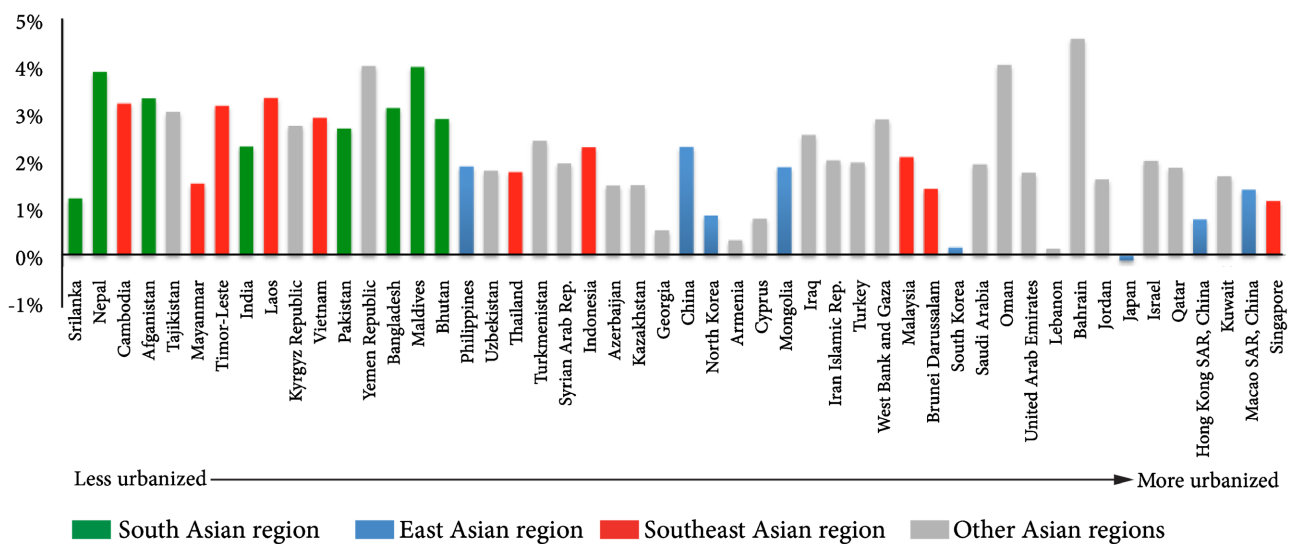


Figure 2. Analytical framework.



Data source: (The World Bank, 2020).

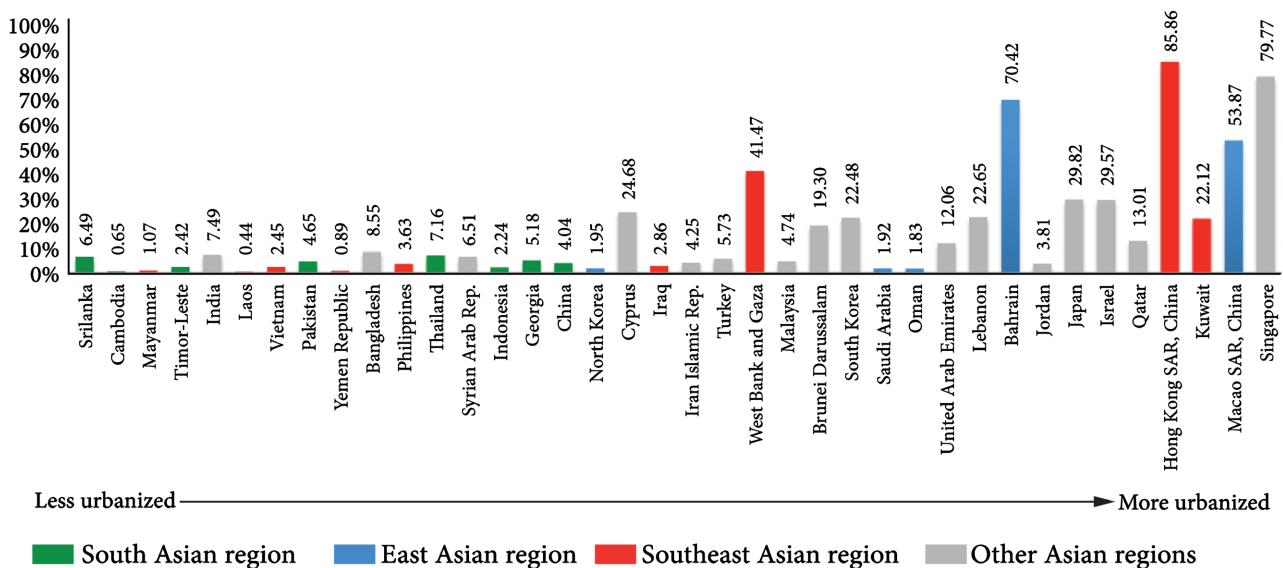
Figure 3. Urbanization rate of all Asian countries and territories at the year 2019.

them are experiencing rapid growth. Nepal is the 2nd least urbanized country with one of the highest growth rates of the urban population. East Asian countries have a higher urban percentage and comparatively lower growth rate. From this region,

China has the highest urbanization rate, and already a good proportion of Chinese people have been living in urban areas. Japan is the only country with a negative urbanization rate, which is influenced by negative population growth. The Southeastern Region has a variety of urbanization trends. Cambodia, Timor, Laos, and Vietnam have low urban population share and high growth rate. On the other hand, Singapore has the highest urbanized population ratio in entire Asia and still has moderate population growth in urban areas. Interestingly, few Asian countries like Oman and Bahrain, with high urban population ratios, are still growing quickly. The overall data indicate that the countries with a low percentage of the existing urban population are growing much faster than those with a high urban population. Highly urbanized Asian cities already have plenty of cities. The countries having exponential urbanization rates will add more cities and megacities in the near future. Especially, large countries like China and India already have numerous cities which are becoming megacities over time. Bangladesh is a small country in terms of land area, contributing a substantial urban population with its high population density. The East Asian countries are already urbanized. The South and Southeast Asian countries are growing very fast and contributing to the dominance of Asian countries in terms of urban population and number of cities. Population bomb in the developing countries of this region is attracting more people in some large cities, which are the capital cities in most cases. Capital cities like Dhaka, Jakarta, and Delhi are facing a great challenge to ensure sustainable growth of the city with this large number of people moving in every year.

3.2. Urban Land Percentage

It is crucial to examine the ratio of urban land allocated to accommodate the rising urban population by different countries. **Figure 4** illustrates that some



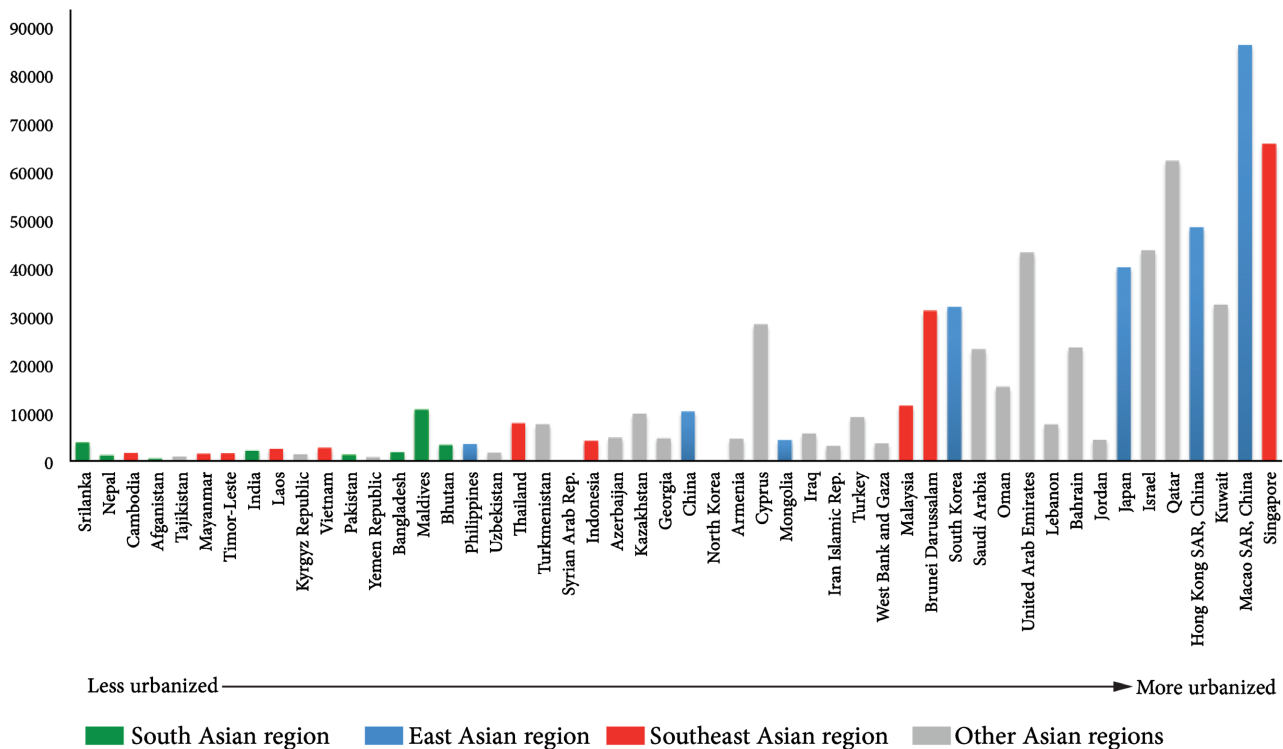
Data source: (The World Bank, 2020).

Figure 4. The urban land percentage at the year 2019 (all Asian countries and territories).

Asian countries or territories already allocated more than 70% of the total land for urban areas. This created a high dependency on foreign product imports to serve the urban peoples. Especially the scope for the agriculture sector is very minimal to support a portion of the population. There are also other countries where the urban land area is around 30% of the total land area. Moreover, the portion of suitable land for agriculture and settlement varies from country to country. So it is essential to predict the future scenario and dependency on other areas to support the urban population.

3.3. Economic Growth

Since the paper is focused on observing and analyzing the urbanization trend of the South, East, and Southeast regions of Asia, it is important to get a comparative view of the urbanization and economic strength among countries from these regions and the rest of Asia. **Figure 5** supports the theories from the literature study that urbanization is highly related to economic development. The South Asian countries have the lowest GDP per capita, placing all the countries in the left zone, which refers to less urbanized countries. Singapore took the 2nd highest position in this criterion from the Southeast region and the highest percentage of the urbanized population. Brunei has high GDP per capita and a moderate percentage of the urbanized population. Other than these two countries, Malaysia and Thailand have moderate economic strength. The rest of the countries from this



Data source: (The World Bank, 2020).

Figure 5. GDP per capita in USD at the year 2019 (all Asian countries and territories).

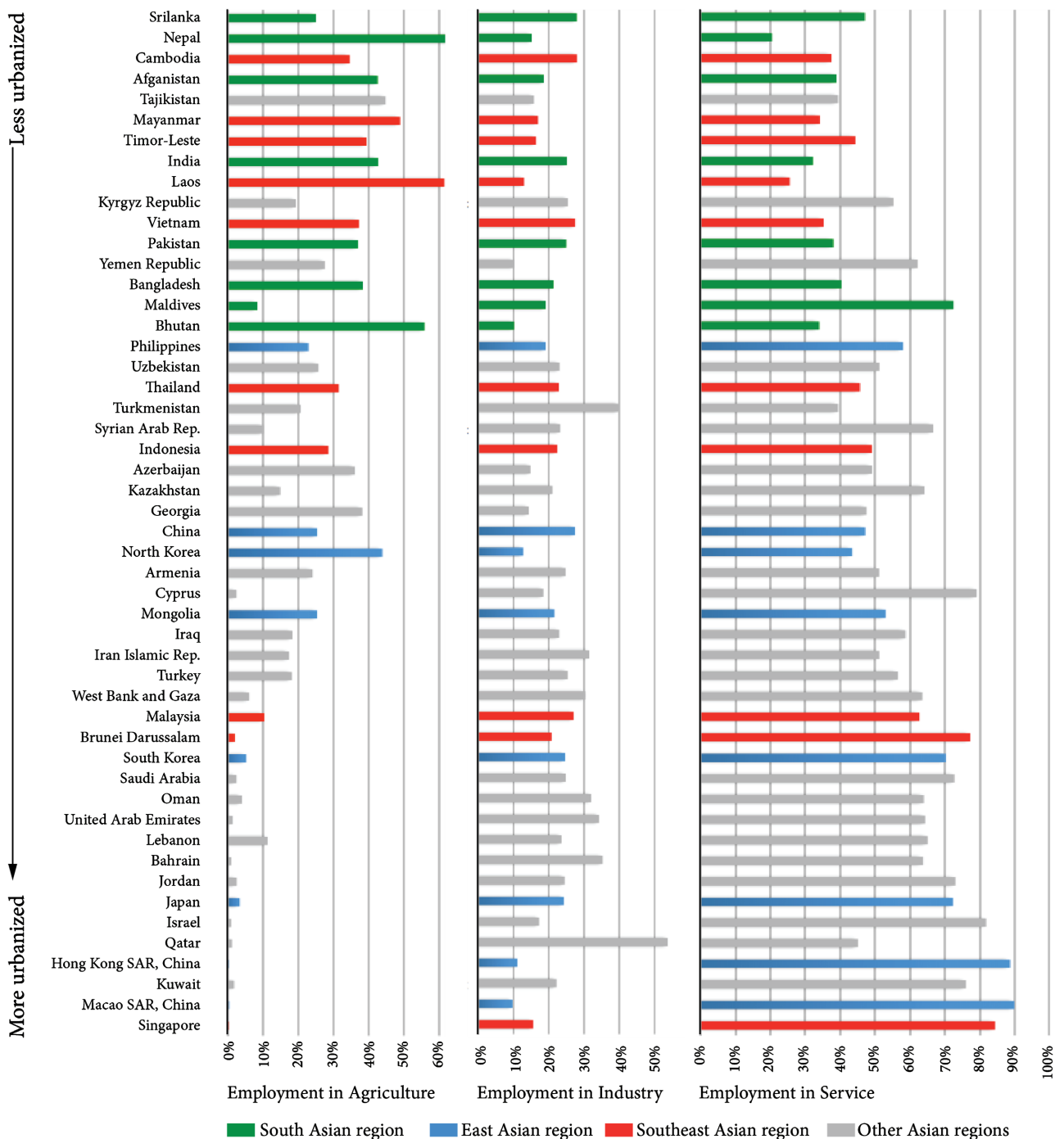
region have less economic strength, which also placed them into the less urbanized size of the chart. East Asia has the highest number of highly urbanized countries and high GDP per capita among the study regions. The top two positions are taken by Hong Kong and Macao, which are special administrative zones of China. Similar to major Chinese cities, these two territories are experiencing an economic and population boom. Having some of the world's largest cities, China's average urban percentage and GDP per Capita are not that high. In contrast, Japan and South Korea have a very high percentage of urban population and GDP per capita. Other Asian regions have numerous countries with strong economies and high urban ratios. But many of those countries are dependent on a resource-based economy instead of a production-based economy, which is quite different from the study regions of this research.

3.4. Employment Trends

Figure 6 represents the comparative scenario of shares from different employment sectors of Asian countries. The least urbanized country is placed at the top, and the more urbanized countries are arranged gradually towards the bottom of the chart. This figure supports the arguments discussed in previous studies. The share from the agriculture sector significantly reduced in the countries with high urbanized populations. South and Southeast Asian countries are making the highest contribution in this primary industry. Employment in the industrial sector does not show any clear pattern. The mean value of the South, East, Southeast, and other regions are quite close. It is necessary to investigate the changing trend in the industrial sector over the last few decades to understand the pattern and predict the future of this sector. It is evident from the chart that service-oriented employment enhances the urbanization process. Especially the countries with high urbanization rates have the largest share from the service sector. The majority of the South Asian countries have a moderate percentage of the population involved in the service sector. The East and Southeast region has some countries with high urbanized populations and a very high percentage of them involved in the service sector. Some of the Southeastern countries are also staying close to the South Asian countries in these criteria. In general, the pattern from the chart is aligned with the arguments from the literature study. Detailed analysis of the changing trends is necessary to identify more specific patterns.

4. Analysis and Results

This study analyzed the temporal change of different indicators from 1991 to 2019 to understand the correlation between urbanization trends and the influence of the employment sector and economic growth. Since the data bank ([The World Bank, 2020](#)) does not provide complete information of all the selected criteria for the year 2020, this study counted the data until 2019.



Data source: (The World Bank, 2020).

Figure 6. Percentage of people involved in agriculture, industry, and service sectors at the year 2019 (all Asian countries and territories).

4.1. Selection of Countries for Detailed Analysis

Conducting detailed statistical analysis on all the countries from three study regions is challenging and time-consuming. So, a total of twelve countries have been selected from three study regions according to the urbanization percentage

and growth, economic strength, employment sectors, size, population, and geographic location. From the South Asian region, Bangladesh, Bhutan, India, Nepal, and Pakistan have been selected for detailed analysis. Among these countries, Nepal is one of the least urbanized countries, and Bhutan has the highest percentage of the population engaged in agriculture. Pakistan and Nepal from South Asia and the Philippines from Southeast Asia show consistent growth in different employment sectors, which is quite different from most of the countries in this region. The other two South Asian countries are Bangladesh, with the highest population density, and India, the largest country in this region. China is the largest country in the East Asian region. Japan and South Korea achieved the highest level of urbanization and very good economic strength. Singapore is the most urbanized country in Asia and has a very high dependency on the service sector. Philippines, Indonesia, and Vietnam are three fast-growing countries from this region and also have several emerging cities. The unique factor of these three countries is that they have a balanced distribution of population in agriculture, industry, and service sectors. Further analysis will be done using the following data of these countries: Urban Population, Employed Population in Agriculture, Industry and Services, GDP per capita (constant 2010 USD). Descriptive statistics of these variables are presented below (Table 2).

4.2. Changing Trends in Employment Sectors, Economic Growth, and Urbanization

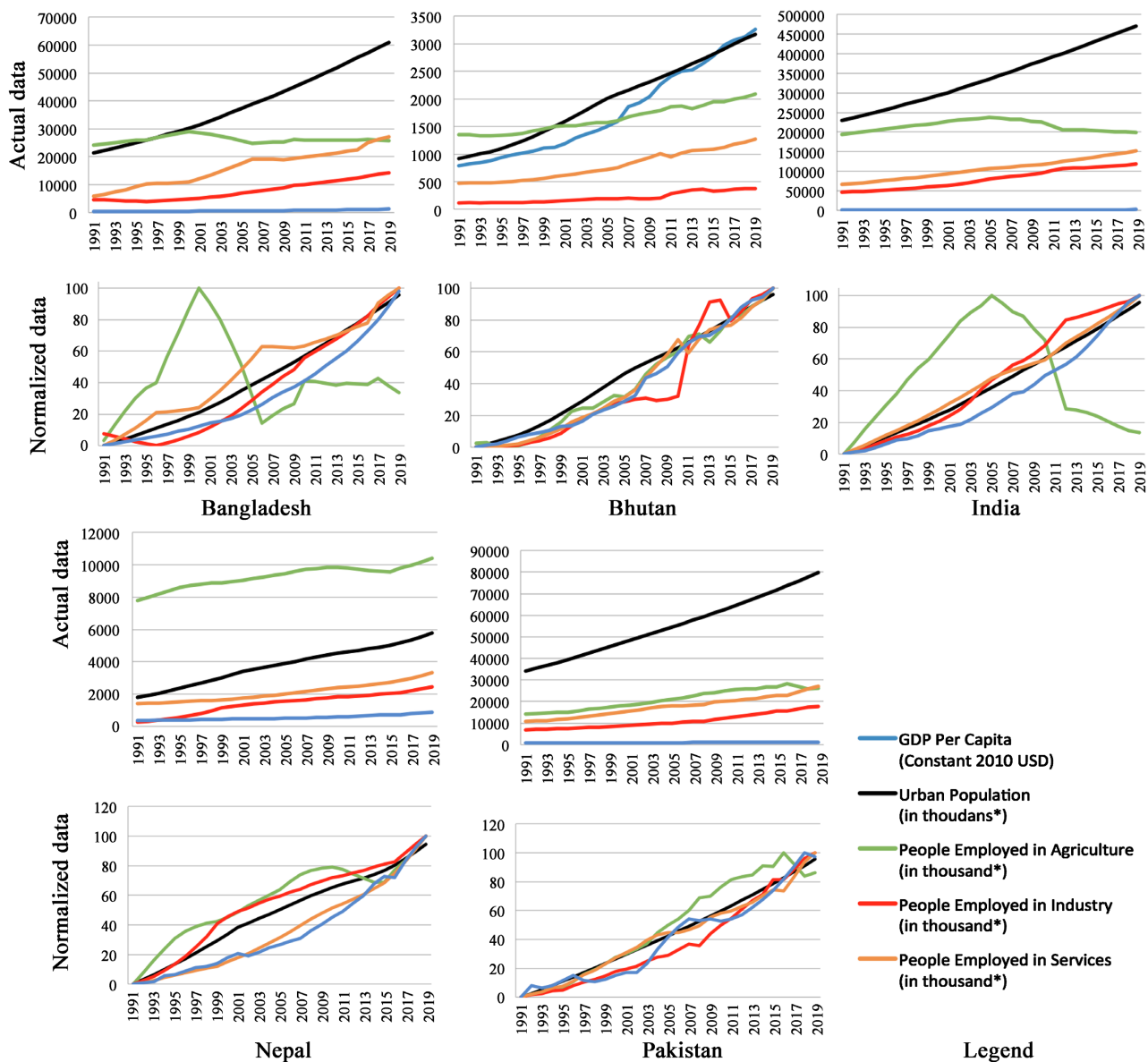
Change in share of different employment sectors and GDP per capita and percentage of urban population is recorded since 1991 from data bank (The World Bank, 2020). Since all the selected indicators data are available until the year 2019, this analysis included the data until that year. A simple line chart presented the comparative trend of changes in different factors over the last three decades in the first phase. Urbanization represented the percentage of the urban population each year. Economic growth is represented with GDP per capita in USD. All years of economic data counted in constant 2010 USD to achieve consistency in data analysis, which is the latest available reference value. The number of people engaged in different employment sectors refers to the share of employment sectors that may influence urbanization. The value is counted in thousands, except for Singapore and Bhutan counted in hundreds as a response to the small population

Table 2. Descriptive statistics.

	Obs.	Min.	Median	Mean	Max.	Standard Deviation
Urban Population(in thousands)	348	91.75	40,658.96	109,995.85	842,933.96	171,289.30
Employment in Agriculture (in thousands)	348	1.02	13,381.38	54,544.63	378,741.73	95,520.90
Employment in Industry (in thousands)	348	11.294	7403.1	28,496.737	225,771.794	52,256.66
Employment in Services(in thousands)	348	46.92	17,134.04	41,882.45	353,386.07	67,025.22
GDP per Capita Constant 2010 US\$	348	367.11	1752.08	9840.51	59,374.44	15,757.29

size of these countries. The upper row (**Figures 7-9**) represents the illustration of the actual data, and the lower row represents normalized data. Since there are different ranges of datasets in our actual data, e.g., GDP per capita ranges within thousands in most of the countries. In contrast, the urban population ranges from millions to billions. Such differences in the data ranges might cause the relatively smaller dataset to look unchanged or consistent. So, for better understanding, we have normalized all the datasets using the following formula,

$$\text{normalized data} = \frac{(\text{actual data} - \text{minimum})}{(\text{maximum} - \text{minimum})} \times 100$$



Data source: (The World Bank, 2020).

Figure 7. Changes in employment section, GDP per capita, and Urbanization rate in South Asian countries over last three decades (selected samples only).

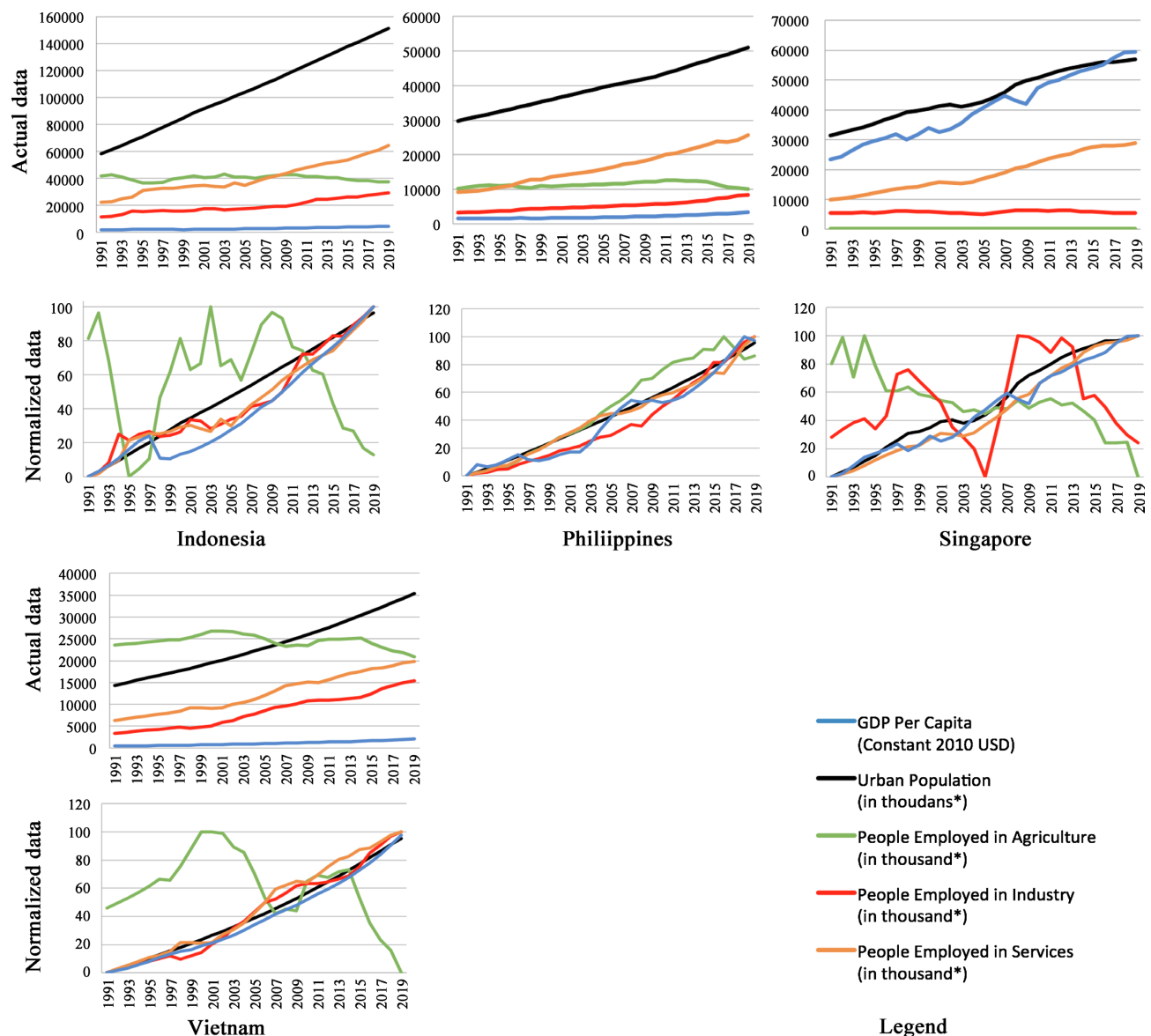
where maximum and minimum mean the highest and the lowest value of the observed dataset, so, all the datasets will be in the same range (0 - 100). The normalized data represents the change of growth over this period. Thus phase of analysis is divided into three sets according to the regions.

Figure 7 includes the charts of selected South Asian countries. The agriculture sector is declining in Bangladesh and India, whereas Nepal, Bhutan, and Pakistan sustain growth. For all these South Asian countries, Agriculture has the largest share in the employment sector. The service sector takes the 2nd position, and it is constantly growing. Industrialization is also booming in these countries but not showing the trend to surpass the other sectors in the near future. The urbanization and growth of GDP per capita are quite consistent in all these countries. The normalized data represents consistent growth of GDP per capita, urbanized population, industry, and service sector.

Figure 8 illustrates a diversified pattern in the Southeast region. Among these selected countries, Vietnam has the highest contribution from the agriculture sector but has significantly lost its position in recent years. In Philippines, agriculture was growing consistently until it started declining in 2015. Indonesia, Philippines, and Singapore have the highest share of employment from the service sector. Especially Singapore has a very high dependency on the service sector and reducing industrial employment in recent years. Philippines maintains balanced growth of all employment sectors. The urbanization rate and economic development are consistent. The normalized data set indicates an inconsistent trend of agriculture in Vietnam and Indonesia that ultimately results in a decreasing pattern. The change in the industrial sector is inconsistent in the case of Singapore.

The number of people involved in agriculture is declining in all three selected countries from East Asia (**Figure 9**). In China, agriculture was the most dominating employment sector until the last decade, but it is already surpassed by the industry and service sectors. Until 2012 industry and service sectors were growing equally, but after that, the focus shifted more on the service sector. At present, service is the highest contributing employment sector in China, Japan, and South Korea. Japan started facing some decline in urban population since the beginning of this decade, but the GDP is still growing. The industrial sector is also declining in Japan. Overall the economy and service sector is growing in all these countries. The normalized data illustrate a consistent rise or fall in most of the indicators but an inconsistent pattern of industrial sectors development in South Korea.

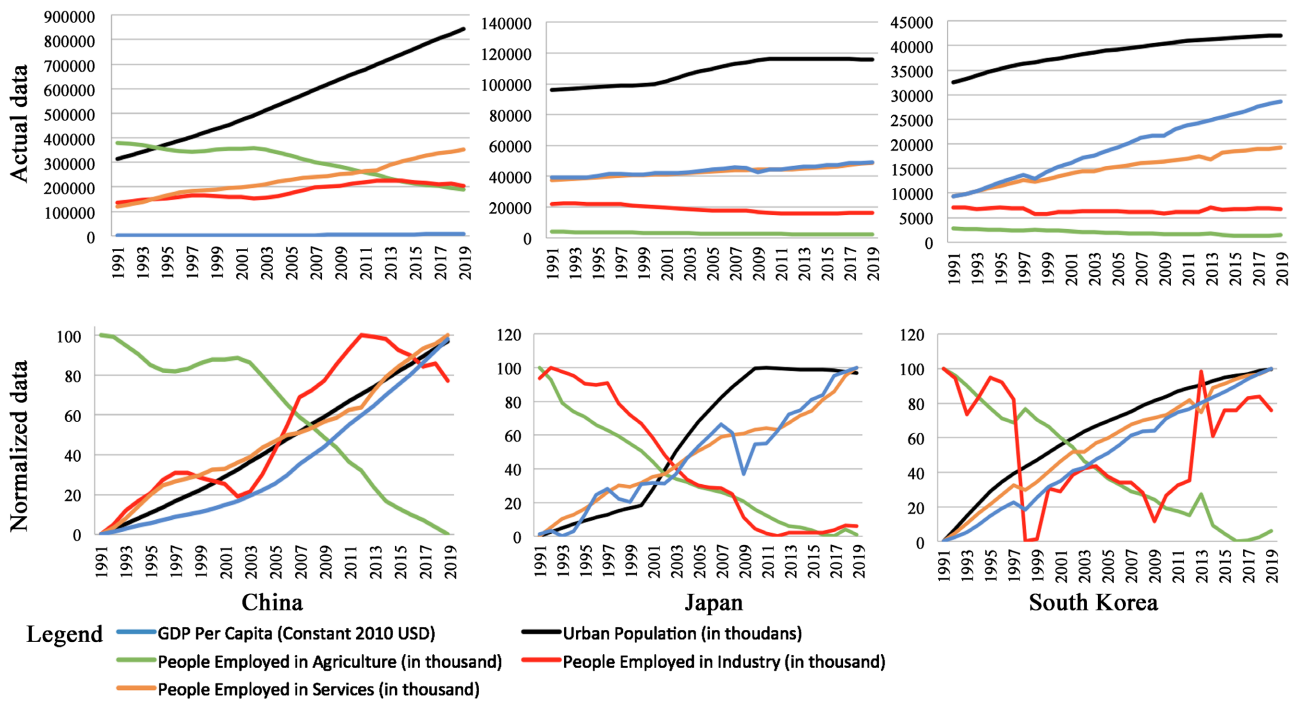
Analyzing the growth pattern of 12 selected countries reveals that the South Asian countries have the highest contribution in the agriculture sector, with some countries facing a decline of employment in the agriculture sector. Philippines and Indonesia from the Southeast region are also making a higher contribution to agriculture than other employment sectors. From the overall analysis, it is evident that the agriculture sector starts falling with the rise of urbanization.



Data source: (The World Bank, 2020).

Figure 8. Changes in employment section, GDP per capita, and Urbanization rate in Southeast Asian countries over last three decades (selected samples only).

In the rest of the Asian regions, many countries have a very high share in the industrial sector to support the urbanization process. Nevertheless, in these three regions, the service sector is contributing more. No example was found out of these 12 samples having a negative employment trend in the service sector with urban population growth. It proves that the service sector is the most consistently developing sector in this region. Only Japan and Singapore show some negative trends in the industrial employment sector. In general, the last three decades change in different employment sectors reveals negative relation of agriculture and positive relation with service and industry in most of the cases. The GDP growth is also relatively consistent. So the countries can support the rising



Data source: (The World Bank, 2020).

Figure 9. Changes in employment section, GDP per capita, and Urbanization rate in East Asian countries over last three decades (selected samples only).

urban population and expansion of the cities. Still, further investigation is required to identify if these correlations are statistically significant or not.

4.3. Estimation Strategy

The estimating equation that relates the urban population ($urban_{c_i}$) to the population at different employment sectors ($agri_{c_i}$, $industry_{c_i}$, $service_{c_i}$) and the GDP per capita ($GDPPerCapita_{c_i}$) for each country t in the i^{th} year where $i = 1$ to 28 is:

$$urban_{it} = \alpha(agri_{it}) + \beta(industry_{it}) + \gamma(service_{it}) + \delta(GDPPerCapita_{it}) + \varepsilon \quad (1)$$

As we see, the dependent variable of interest is the country's urban population. The causal variables are the employed population in the three employment sectors: agriculture, industry, and services and the GDP per capita of the country, and ε is the error term. In the case of the fixed effects model, the Equation (1) will be:

$$urban_{it} = a_i + b_t + \alpha(agri_{it}) + \beta(industry_{it}) + \gamma(service_{it}) + \delta(GDPPerCapita_{it}) + \varepsilon \quad (2)$$

where a_i and b_t are country and year fixed effects respectively.

To obtain the estimates of Equation (1), we have used Distinguished OLS regression for each selected countries' (Table 3), Pooled regression of panel data, and Random effects regression of panel data (Table 4). Accounting for country

Table 3. Summary of OLS test results.

Country Name	Employment in Agriculture	Employment in Industry	Employment in Service	GDP per Capita
Bangladesh	3.951*** (0.149)	4.848*** (0.314)	8.51*** (0.089)	3.197** (3.434)
Bhutan	3.189** (0.731)	0.971 (0.791)	2.097* (0.77)	−1.642 (0.026)
China	12.11*** (0.195)	15.22*** (0.129)	13.99*** (0.0961)	13.02***5.537***
India	2.59* (0.077)	7.108*** (0.133)	3.988*** (0.281)	4.433*** (0.106)
Indonesia	5.353*** (0.461)	1.298 (1.200)	3.937*** (0.512)	−0.45 (6.537)
Japan	1.847 (2.372)	−8.189*** (0.434)	1.076 (0.51)	0.301 (0.385)
Nepal	0.347 (0.081)	13.458*** (0.0894)	4.584*** (0.218)	−1.454 (0.756)
Pakistan	10.581*** (0.075)	5.679*** (0.166)	11.44*** (0.124)	0.992 (3.756)
Philippines	2.162* (0.25)	3.563** (0.6719)	3.628** (0.1927)	−2.231* (0.6446)
Singapore	−3.075** (0.291)	5.777*** (0.409)	6.687*** (0.142)	1.694 (0.008)
South Korea	0.121 (1.13)	−3.367** (0.204)	3.018** (0.285)	0.454 (0.114)
	15.649*** (0.019)	4.659*** (0.048)	4.54*** (0.040)	30.846*** (0.331)

Note: Standard errors are shown in parenthesis. *Significantly different from zero at 90% confidence; **Significantly different from zero at 95% confidence; ***Significantly different from zero at 99% confidence.

Table 4. Panel data models.

Dependent Variable: Urban Population (in Thousand)			
	Pooled Model	Fixed Effects Model (Country and Year Fixed Effects)	Random Effects Model
Employment in Agriculture	0.285*** (0.032)	−0.058 (0.044)	−0.087*** (0.023)
Employment in Industry	−0.733*** (0.165)	0.891*** (0.065)	0.850*** (0.068)
Employment in Services	2.751*** (0.106)	2.071*** (0.057)	2.032*** (0.044)
GDP per Capita	0.021 (0.078)	0.070 (0.113)	−0.099*** (0.091)
Observation	348	348	348
R^2	0.985	0.986	0.985
Adjusted R^2	0.985	0.985	0.985
F-Statistic	5517.600*** (df = 4; 343)	4420.120*** (df = 4; 304)	22,072.830***

Note: Estimates for each variables are shown with standard errors in the parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

and year fixed effects, we have estimated Equation (2) using Fixed effects regression (**Table 4**).

4.3.1. Distinguished OLS Regression for Selected Countries'

Twelve different linear models were estimated through the ordinary least square regression method. The regression analysis results (**Table 3**) consist of the t-values, and the standard errors are also enclosed in parenthesis. The higher value represents a higher impact of that particular independent variable on the de-

pendent variable. A positive value indicates a positive correlation, and a negative value indicates a negative correlation. China shows the highest level of positive correlation with the industrial and service sector. These T statistics value also has the highest level of statistical significance too. Japan and South Korea negatively correlate with the industrial employment sector, and Singapore is the only country with a negative correlation with the agriculture sector. Though the agriculture sector has less statistical significance, it does not negatively correlate with urbanization in most cases. Vietnam has the highest positive correlation with agriculture and GDP per capita growth. Overall GDP per capita has a lower T statistics value and the least number of statistically significant correlations with urbanization. The OLS test also proves the significant impact of employment in service and industry on the growth of the urban population. Though the simple trend analysis in section 3.2 shows similar growth of the economy and urban population, it does not necessarily influence urban population growth. Rather the urbanization may support economic activities and result in growth in GDP per capita.

4.3.2. Panel Data Regression

Three types of panel data models have been used to perform the panel data regression. As it is seen, all the models have shown a statistically significant correlation of urban population with the number of the employed population in industry and services sector. Besides, two of the models except the Fixed effects model have indicated a statistically significant correlation with a population employed in agriculture. Standard errors are not clustered yet. To increase the robustness of our model, we have conducted some diagnoses in two phases. In the first phase, we have tested for choosing the appropriate model among the three. Later, we have run some more tests on the chosen model to check for cross-sectional dependence, unit roots, heteroskedasticity, and serial correlation.

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In Table 5, as per the result of the Lagrange Multiplier Test, the Pooled model cannot be used. Further, we have incorporated the Hausman test that compares the other two models, the fixed effects model and the Random effects model. The test resulted in rejecting the null hypothesis. Thus, obeying the alternative

Table 5. Selection, comparison and robustness tests of panel data models.

	Model/Data	Result			Remarks
		Chi-Square	df	p-Value	
Model Selection Phase					
Lagrange Multiplier Test (Breusch-Pagan)	Pooled Model	1859.9 (Chi-Sq.)	1	<2.2e−16	Rejects null hypothesis (<i>i.e.</i> , significant individual effects). Therefore, the pooled model cannot be used.
Hausman Test	Fixed Effects Model, Random Effects Model	2.7448 (Chi-Sq.)	4	0.6014	Unable to reject the null hypothesis. As a result, we should choose the random effects model.
Measures for Robustness of Selected Model					
Breusch-Pagan LM Test for Cross-Sectional Dependence in Panels	Random Effects Model	833.38 (Chi-Sq.)	66	<2.2e−16	Cross-sectional dependence present.
Pesaran CD Test for Cross-Sectional Dependence in Panels	Random Effects Model	−2.0132 (Z-Test)		0.04409	Cross-sectional dependence present.
Augmented Dickey-Fuller Test for Unit Roots	Panel Data	−17.913 (Dickey-Fuller)	7 (Lag Order)	0.01	Rejects null hypothesis. No unit-roots, and therefore, time series is stationary.
Breusch-Pagan Test for Heteroskedasticity	Random Effects Model	689.5 (BP)	4	<2.2e−16	Rejects null hypothesis. heteroskedasticity is present.
Breusch-Godfrey/Wooldridge Test for Serial Correlation in Panel Models	Random Effects Model	292.67 (Chi-Sq.)	29	<2.2e−16	Rejects null hypothesis. Serial correlation idiosyncratic errors are present.

hypothesis, we have chosen the Random-effects model for further analysis.

To measure the robustness of the selected model and data, we have conducted a few more tests. As we see in all the tests, p-values are less than 0.05 (or very close to 0.05) that implying accepting all the alternative hypotheses. According to all these tests—cross-sectional dependence, heteroskedasticity, and serial correlation are present. But there are no unit-roots, and therefore, the time series is stationary. To resolve heteroskedasticity, a robust covariance matrix estimator has been used. On the other hand, since serial correlation is present in our model, we are supposed to use a cluster robust variance estimator. Cross-sectional dependence and serial correlation can be corrected or adjusted through clustering standard errors by time and groups (in this case, at country level), respectively. In **Table 6**, Standard errors are clustered at different levels (*i.e.*, Country, Year) with the help of robust variance estimators. Finally, we obtain the estimates for the model where standard errors are clustered. Hence robustness of the model is ensured through different tests (as included in **Table 5**), and diagnosed issues (like Heteroskedasticity, Cross-sectional dependence, and serial correlation) are resolved through robust and cluster robust variance matrix estimators.

Table 6. Clustered standard errors using different estimators.

Dependent Variable: Urban Population (in Thousand)			
Explanatory Variables	Robust Variance Estimator (1)	Cluster-Robust Variance Estimator with Clustered Groups (2)	Cluster-Robust Variance Estimator with SEs Clustered across Time (3)
People Employed in Agriculture	−0.087*** (0.023)	−0.087 (0.077)	−0.087* (0.045)
People Employed in Industry	0.850*** (0.068)	0.850*** (0.063)	0.850*** (0.118)
People Employed in Services	2.032*** (0.044)	2.032*** (0.077)	2.032*** (0.070)
GDP per Capita in Constant 2010 USD	−0.099 (0.091)	−0.099 (0.102)	−0.099*** (0.032)

Note: Estimates for each variable are shown with standard errors in the parenthesis. In column (2), standard errors are clustered at the country level, and in column (3), errors are clustered across time. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

5. Discussion and Recommendations

5.1. Policy Recommendation for Sustainable Urban Population Management

In Asia, almost 60% population is urbanized, and the contribution of migration is significantly higher in this urbanization process (Tacoli et al., 2016). Many of these newly migrated people are not getting desirable living standards in the urban areas. Income inequality has increased with urban growth, especially in Asia's South and Eastern parts (Jones, 1997). So, in recent times, most countries have been trying to reduce population migration to large urban cities (Buhaug & Urdal, 2013). During the rapid growth period, people were heavily dependent on employments generated by industries, but with the shift of the economy, they started to move to suburban areas or other cities with jobs in the service sector. Core areas in many cities are experiencing a decline in population due to trade-offs between locational priority and affordability of necessary facilities at the city centers (Martinez-fernandez & Audirac, 2012). Though many of the countries are not yet highly urbanized, the pace of urban population growth will add a substantial number of residents in urban areas. A long-term development plan is essential to meet the challenge of ensuring desirable living standards for all the urban population. At present, the new population migrates to the urban areas first, and the facilities get developed later. The growth of the urban population should be predicted in advance to cope up with the upcoming changes.

5.2. Policy Recommendation on Land Cover and Physical Expansion of Urban Areas

In the last fifty years, the number of large cities in developing countries increased faster than in developed countries (Castells-quintana et al., 2019). Almost 80% of the large cities are from developing economies, where the study regions contribute a significant number of cities. The high land conversion rate for industrial use and comparatively low land allocation for residential development and conservation of natural sites in urban areas create socio-economic and environmen-

tal problems in cities (He & Sim, 2015). It is evident that rural-urban migration is related to the economic success of cities and other facilities that provide a better lifestyle (Tacoli et al., 2016). Being attracted to cities, a significant proportion of the rural population migrates to the cities by means of permanent and circulatory migration, and their earned wages are often remitted to their rural homelands. Thus in some cases, the use of croplands is transformed by creating “remittance landscapes” (Lambin et al., 2001). The necessity for better education and career make people leave the rural areas. Reducing active rural landscape and agricultural land can directly affect the sustainability of the urban economy and food supply. This study indicates that there will be more and more urban areas in this region. This conversion of rural lands into urban areas will create social and environmental challenges. Resource consumption in urban areas is very high compared to rural areas. It is necessary to adopt policies to establish self-sufficient new urban areas, where the dependency on surrounding rural areas will be reduced.

5.3. Policy Recommendation for Sustainable Economic Development with Urbanisation

According to various pieces of literature, urbanization and economic growth are closely related in many cases (Annez & Buckley, 2009; He & Sim, 2015). Theoretically, economic growth and urbanization should occur simultaneously. However, the scenario is not always the same. In a study on Sub-Saharan African (SSA) countries, the relational pattern is observed in developed and developing economies. It is argued that urbanization in developing countries is not usually led by economic growth as it happened in developed countries (Onjala & K’Akumu, 2016). The correlation of economic growth with urbanization is not statistically significant in this study too. But with further development, the consistent growth of the economy is essential to support sustainable urban growth. The developed countries from this study regions achieved better economic strength to support urban growth. The developing countries will face a higher challenge in the coming years.

5.4. Policy Recommendation to Guide the Change in the Employment Sector

Cities support the people to live closer to each other and utilize the density to enhance efficient use of resources and mutual economic benefits (Annez & Buckley, 2009). The shift of the employment sector from agriculture to service and industry supports economic growth and urbanization (Tacoli et al., 2016). Over time, a production-oriented economy gets decentralized, and the residents’ preference also gets shifted from the city core to the suburban areas. Though migration shows the labor absorption capability in a given city, employment opportunities in the city are the most triggering factor to create urban agglomerations as well as an agglomeration economy (Lu et al., 2013). The study also noted that

industrial competitiveness has a consistently significant relationship with urban growth, implying that such competition promotes urban growth. Unplanned urban-centred industrial and service sectors are causing the urban areas to get densely populated and hence lower the living standard. Urbanization would not be inevitable if the industries were spread around the countryside instead of being concentrated in towns (Lewis, 1978). Due to the transportation cost advantages, the cities were used to be located around waterways; for example, in the United States and Western Europe, the coastal cities, major rivers, or the great lakes were essential to industrial development. In the post-war period, coastal megacities dominated most Asian countries; for instance, in Japan, urban and industrial growth was centered in the Tokaido coastal corridor (Tokyo, Nagoya and Osaka) (Annez & Buckley, 2009). In the past urban population boom was resulted by high industrial growth, which was easier to be guided with government policy and land allocation for industries. The recent urbanization trend shows closer relation with the service sector that may not be easy to predict or visualize in advance. So it is necessary to track the government and private job sectors to predict the future growth of urbanization. Some governments started decentralizing the cities with job allocation at new towns and fringe areas of the cities.

6. Conclusion

This study identifies the significant factors to influence the urbanization process. The possible shift in the future trend of the employment sector and its impact on urban population growth and land expansion can be predicted from the previous trend. Different cities are at different development stages. The proportion of the urban population can indicate the position of a country in the urbanization process. The responses of independent variables may change at the different development stages. The general trend is showing a shift from an agro-based economy towards a service-oriented economy. Resource allocation and development policy can significantly influence the urbanization process of a country. To ensure sustainable development, it is necessary to learn from other cities ahead in the development life cycle and follow a similar strategy focusing on employment sectors. The preliminary analysis is limited to Asian countries, and the detailed analysis included only twelve selected countries from three Asian regions. Further study on other parts of the world will be fruitful to get a complete idea of the interaction among economic development, growth of employment sectors, and urbanization. Limitations of data availability on various indicators of different countries confined the detailed analysis on a span of three decades of changes on determinant factors. Still, the outcome of the study shows a consistent pattern among different countries. Expansion of study samples is expected to reinforce the pattern found in this study further.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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