Urbanisation and its Socioeconomic Trends in Vietnam

Presented to

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ABSTRACT

This paper will use secondary data to analyse the correlation between the level of urbanisation of different provinces in Vietnam and five specific economic and social indicators: income per capita, trained employed workers rate, infant mortality rate, poverty rate and literacy rate. Our hypothesis states that more urbanisation correlates with more economic development. The paper uses two conceptual frameworks, including the "Rapid Urban Growth Triad" to analyse the causes and consequences of urbanisation. Data is taken from the General Statistics Office of Vietnam, and is considered reliable as it is governmental data. Our results show that there is a negative correlation between urbanisation level and infant mortality and poverty rate, but a positive correlation between urbanisation level and income per capita, percentage of trained employed workers, and literacy rate, confirming our hypothesis. However, because the correlation coefficient is weak-to-moderate for our social factors, our hypothesis cannot be completely proven. On the other hand, the r-value for our economic variables are moderate-to-strong, giving space for evaluation. Whilst urbanisation can possibly correlate to economic development, there are many other confounding factors we should take into consideration. Negative consequences of urbanisation is also prevalent, such as high production of solid waste, congestion, overcrowding, and urban poverty. The government should have specific urban planning, inclusive growth policies to ensure healthy urban development and growth, as well as targeting specific variables that lead to and are consequences of urbanisation (better healthcare in rural districts, more waste management policies etc.).

1. INTRODUCTION

1.1 What is "Urbanisation"?

In our paper, we define urbanisation as "the proportion of people living in built environments such as towns and cities" - in terms of the "percentage of urban population to total population" attained from the General Statistics Office of Vietnam. There are other dimensions of urbanisation we do not take into account in our definition, such as the population shift from rural areas to urban areas (Internal Migration), the gradual increase in the proportion of people living in urban areas, and the ways in which each society adapts to this change. It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas.

1.2 Why are we interested in this topic?

Urbanisation may be an inherent and crucial part of economic development. More urbanised areas seem to produce more job opportunities, have higher productivity, and tend to be a better livable space - from noticing this, we were interested whether there is a correlation between how "urban" an area is and its economic development trends.

Vietnam is in the process of development, and is rapidly growing not only in the ASEAN region but as an attractive FDI, export-production country. With its compelling history alongside strange geographical landscape, we noticed how Ha Noi and Ho Chi Minh City developed drastically in

comparison to the midland provinces. Doing some research, we found this to be extremely interesting; we encountered a paper discussing “Polycentric Urbanisation”, with urban centres of HCMC and Ha Noi which are extremely urbanised. The areas around it are also becoming more urbanised - perhaps due to centrifugal movements and counter-urbanisation from the crowded and congested centres. The two independent urban systems hold the highest growth rate of urbanisation - around 3.4% per year. With this sort of urban development, we are curious about whether there are specific correlations with social, economic and demographic indicators. Does higher urbanisation mean better health? Better education? Higher income? From the unique geographical shape of Vietnam and its diversity in culture and ways of development, our interest in the internal movement of Vietnam, urbanisation, and its trends developed.

1.3 Significance of topic:

As the world's population keeps increasing over time, the population in cities is rising rapidly compared to in rural areas. In addition, countries rapidly change overtime not only in terms of technology, transportation, society but also in terms of movement of people. When people move into the city, it makes the city to be more urbanised. Factors that need to be taken into consideration are poverty, education, health, employment utility and so on. It brings inequality to the society. Management in the country is significant. Cultural differences in the country is also in consider.

Looking into poverty, no one chooses to be born poor but it is possible to change and improve like some people in Vietnam. They were born poor but they are now improving and developing themselves. As the country is moving from poverty line, people move from rural areas to urban areas and it makes economic growth. People do not have the same opportunities but education is the simplest opportunity for all and it makes changes to people.

Vietnam keeps developing everyday. The country goes fast forward and it attracts more investors to come and invest in the country. Internal migration is important to the country as when people move, it brings two-edged effect and our group would like to study how Vietnam become more urbanised. In addition, we would like to see the relationship of urbanisation and indicators in the sense of social and economic.

1.4 Objectives

- To explore the different urbanisation levels of the provinces in Vietnam
- To distinguish the causes behind different urbanisation levels of each province in Vietnam
- To find out whether there is a correlation between urbanisation and other independent variables (poverty, education, health, income per capita and trained employment) we chose

1.5 Hypothesis and research question

- More urbanised areas (higher urban population) can correlate to more economic development
- Higher urbanisation levels correlates to less poverty, less infant mortality, better literacy rates, better income per capita, and better trained employment levels.

2. LITERATURE REVIEW

2.1 Effects of Urbanisation in Vietnam

Economics Development, Urbanisation and Environmental Changes in Ho Chi Minh City, Vietnam: Relations and policies; LE Van Thanh (2007)[1]

This article talked about urbanisation in Ho Chi Minh City from different areas in the city. The most significant change of urbanisation is the use of land as rural lifestyles change, as farmers become workers. To make things work when there is urbanisation, local governments need to ensure sustainability. Education, infrastructure projects, and creation of new districts must be considered in order to facilitate the growing population by creating more facilities and space. In addition, there are many environmental issues such as land, water, air quality. The higher the level of urbanisation, the more serious the environmental pollution will be. Lastly, negative aspects of urbanisation needs to be solved, such as congestion, pollution, oversupply of labour, social disintegration.

The policy that this article recommends are credit, science-technology disseminating, and urban planning policies. For credit policy, they suggested that the government should give priority to fund sectors that are less polluting in order to incentivise less pollution creation, as well as investing in certain locations that governments want to develop in order to incentivise businesses to invest in that area. The second policy is a science-technology disseminating policy which is about promoting science and technology in order to innovate new and cleaner technological developments and research. Finally, urban planning policy in order to organise people and investors in order to structure functions of the land and prevent overuse and overexploitation of space.

2.2 Urbanisation and Economic Growth

Urbanisation in Asia: An Overview; Graeme Hugo (2003)[2]

Asia faced a doubling population in urban areas compared to rural areas. The number of people who migrate to urban areas from rural areas increases at a faster pace in comparison to urban-rural movement. Population movement is the key factor of growth in urban areas and also influences the social and economic development of these areas. This article also talks about urbanisation in Indonesia due to reclassification of areas from rural to urban.

Urbanisation and economic growth are related as the most important sectors in national economies in Asia is in the form of urban based activities. Countries in the region deregulated and opened for investors, leading to a growth in the economy. In addition, there is a link between urbanisation and wellbeing - as the economy grows, people's standard of living improve. However, they may not necessarily improve equally amongst inhabitants, and may lead to more inequality between the rich and poor. In Jarkata, there is an anti-urban policy limiting the amount of people allowed into urban areas. Unregistered residents are not allowed to move into the city, preventing overpopulation of urban areas.

[1] LE, T. V. (2007). Economics Development, Urbanisation and Environmental Changes in Ho Chi Minh City, Vietnam: Relations and policies

[2] Hugo, G. (2003). Urbanisation in Asia: An Overview.

On the other hand, there are urban policies that encourages people to move to urban areas when the government fixes the price of food, rice and welfare, as well as job creation in urban areas.

2.3 Urbanisation Increases Standard of Living

Urbanisation and Health; Richard Godfrey and Marlene Julien (2005)[3]

Urbanisation brings both good and bad aspects to health. During the industrial revolution, more individuals migrated into urban areas, bringing in a two-edged health effect into England. Rapid growth of in-migration into urban areas led to worse conditions in both urban and rural areas. Since rural areas tend to be less developed, infant mortality is twice as high and nutrition levels are poor - leading to an influx of migrants into urban areas to access clean water, sanitation, better education, hospital access and job opportunities. On the other hand, urbanisation can lead to a growth of diseases of affluence - such as obesity, diabetes, asthma, caused by heavy environmental damage, congestion, and overcrowding in urban areas.

2.4 Lack of Impact with Urbanisation

Urbanisation, Rural–Urban Migration and Urban Poverty; Cecilia Tacoli, Gordon McGranahan and David Satterthwaite [4]

This article discussed the different dimensions of poverty - not just rural poverty, but also issues of urban poverty that urbanised areas face. Urban poverty cannot be measured on simple, singular terms. If monetary poverty lines are merely based on the cost of food in urban populations, this can suggest that there is little urban poverty, whilst, in fact, there are still many city-dwellers who "live in poverty" in overcrowded tenements or cheap housing. Urban poverty does not simply come in terms of attaining food, but also on reliable infrastructure provision, services provisions in the settlements they reside in.

Migrants that flow into urban areas come from a range of income groups, often including rural migrants pushed out of their hometown due to natural disasters (drought), livelihood loss, debt or conflict. However, when reaching urban areas, they are still faced with poverty: poor quality and insecure housing, lack of insurance and health care assistance, overcrowded living areas build on dangerous sites, poor quality education, and high prices on necessities such as food, fuel and water. Standard of living is extremely poor, and urbanisation does not improve their income nor their livelihoods.

Poverty also still exists in rural regions, amongst ethnic minorities in remote mountain areas (North Mountains and Midlands, for example). When considering the multi-dimensional measurement of poverty, income-based poverty may be low in the city, but in terms of levels of disadvantage regarding social security and access to health and education, both rural and urban regions still struggle with providing those aspects.

[3] Godfrey, R., & Julien, M. (2005). Urbanisation and health.
[4] Tacoli, C., McGranahan, G., & Satterthwaite, D. (n.d.). Urbanisation, Rural–urban Migration and Urban Poverty.

2.5 Reasons Behind Urbanisation

Urbanisation, unemployment and migration in Africa: Theory and policy ; Micheal P. Todaro[5]

The article tells about the economic theory of Africa rural-urban migration explaining the movement of labor from rural to urban areas. The paper talks about how "expected gains are measured by the difference in real incomes between rural and urban work and probability of a new migrant's obtaining an urban job". They also illustrate a theory created by Derek Byerlee in which migration decisions are based on rural income and urban income. However, simple economic theory would indicate that such migration should lead to a reduction in wage differentials through the interaction of forces of supply and demand, in areas of both emigration and immigration. The migration cannot expect high-paying job immediately. In fact, the people who are unskilled or uneducated migrant lead to have more risk to be unemployed in urban areas.

3. CONCEPTUAL FRAMEWORK

Urbanisation is an irrevocable process. Hence one can say that there are plenty of urban theories and some of which go back to the time of initial civilization. Most urbanisation theories are derived from the theory of spatial disparities (the disparities are created due to variation in geographically advantaged and disadvantaged regions, political importance of a city, economically favorable policies etc.), migration theories such as the push and pull theory of migration. Push factors are the factors that are unfavorable about the specific case that "pushes" people to move away. Pull factors are the factors that are favorable about an area that "pulls" people in. In addition, the Lewis two sector model is one of the urban theories. It is the theory that the urbanisation process supports industrialisation. Lewis presents two sector model of development with high productivity of modern urban industrial sectors. He assumes that the labor in intensive labor industry can be absorbed in capital intensive industry.

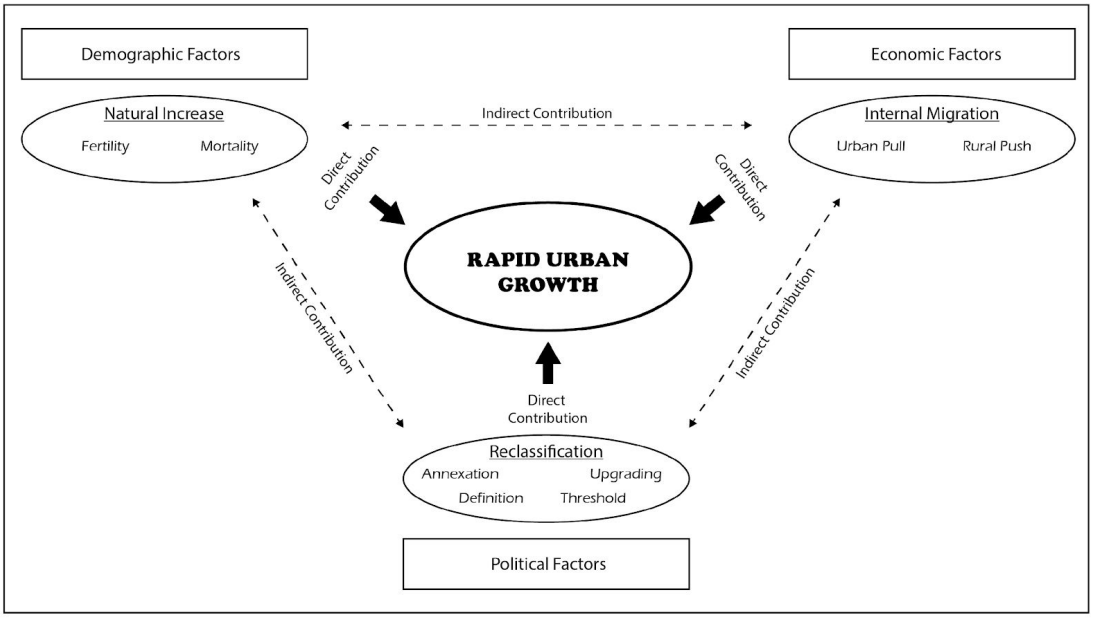
Urbanisation occurs either naturally or planned as a result of individual or government actions, and has impacts on the growth and development of the economy. Urban regions have always remained a centre for production, innovation, commerce, art and science, social and political revolution.

3.1 Framework for Causes of Urbanisation: The Rapid Urban Growth Triad [6]

Our paper will first focus on the causes being urbanisation and the increase in urban populations in Vietnam. According to the Rapid Urban Growth Triad, a framework supplied by Kyle Farrell in his 2017 paper, there are three factors that cause the urban growth: economic factors, demographic factors, and political factors. The graph below illustrates their relationship and examples in each category. We will apply this in the context of Vietnam as well as thoroughly explain the factors in the analysis.

[5] Todaro, M. P. (1997). Urbanization, unemployment and migration in Africa: Theory and policy

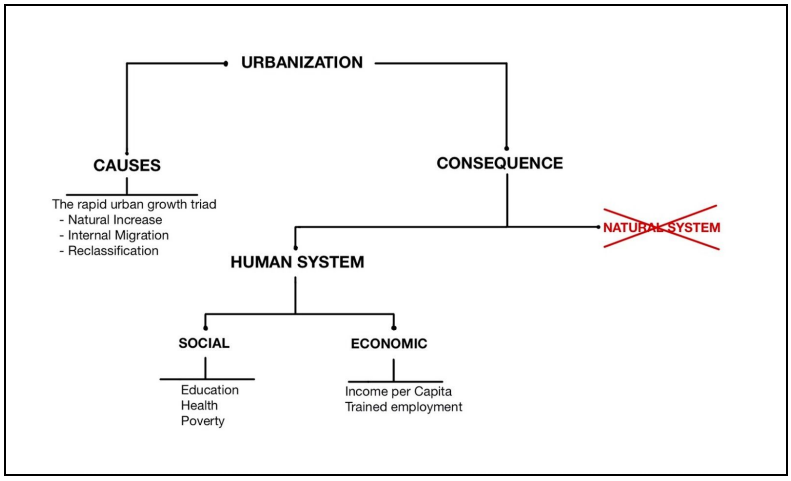
[6] The Rapid Urban Growth Triad: A New Conceptual Framework for Examining the Urban Transition in Developing Countries. (2017).



3.2 Framework for Consequences of Urbanisation:

To examine the impacts of urbanisation, we first look at the overall trend of Vietnam over time from 1986 to 2016. As a form of visualisation, we used colour intensity maps of rural population in 2000 and 2016, as well as net migration numbers. The consequences can be categorised into two groups, natural system and human system. In this case, we will not analyse the natural systems as its mainly addresses environmental issues. We will, however, observe impacts on the human system, illustrated using a radar diagram and data from the General Statistics Office of Vietnam.

In order to understand the characteristics of urbanisation, we will focus on 5 indicators from a social and economic perspective. In the economic indicators, we chose income per capita and percentage of trained and employed workers. For the social indicators, we decided to pick the poverty rate, literacy rate and the infant mortality rate. Our framework for our consequences is portrayed below.



4. RESEARCH METHODS

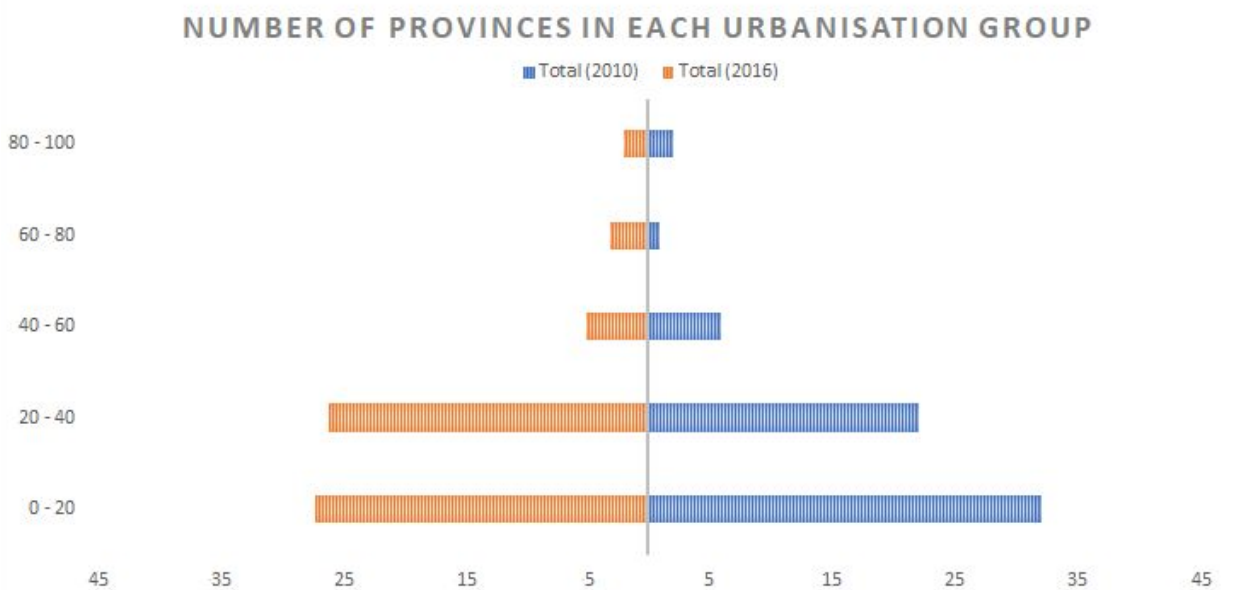
4.1 Definition of Urbanisation

In our research paper, urbanisation will be defined as "percentage of the population living in urban areas", organised based off the General Statistics Office of Vietnam's "Population by Province", splitting urban and rural population within each province. There are 58 provinces, and 5 centrally-controlled municipalities: Hanoi, Ho Chi Minh City, Can Tho, Da Nang and Hai Phong.

Urbanisation Group	Total (2010)	Total (2016)	Average Urbanisation Rate % (2010)	Average Urbanisation Rate % (2016)
0 - 20	32	27	15.024	16.001
20 - 40	22	26	27.808	28.391
40 - 60	6	5	46.420	49.090
60 - 80	1	3	65.932	68.839
80 - 100	2	2	85.094	84.349

Table 1: A table showing the number of provinces in each Urb. range and its average

In order to briefly examine how urbanisation levels have changed over the years, we categorised each province into different urbanisation groups ranging 20%. Two sets of data are shown above, for 2010 and 2016 and the number of provinces in each urbanisation group. A visualisation of the number of provinces in each urbanisation group is presented below.



The data from 2010 is definitely more bottom-heavy than in 2016. There is a growth of 60 - 80% urbanised provinces, and a decrease of provinces in the 0 - 20% urbanisation group. For this paper, we will be focusing on 2016, using that as a reference in order to explore the characteristics of different urbanisation levels.

For our analysis, we calculated the percentage of urban population to total population of all provinces. With all the data points, we compare them with the five indicators listed below.

4.2 Five Indicators

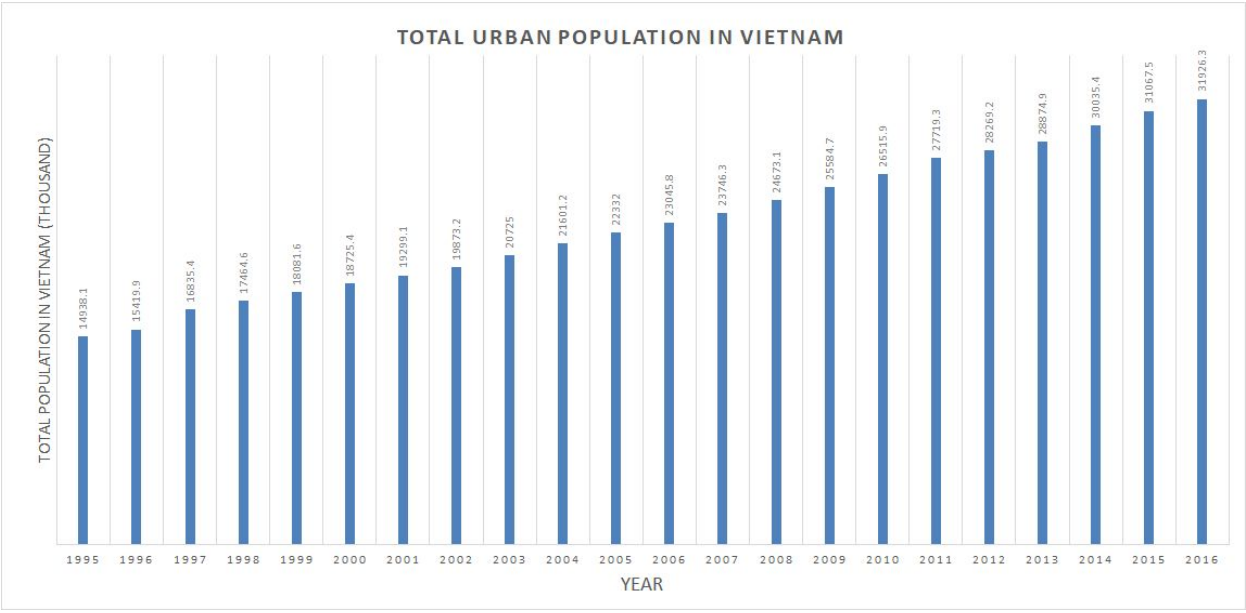
We will explore the relationship between urbanisation in all provinces and five different aspects, two of which are economical factors, and three representing social factors. All statistics are obtained from the General Statistical Office of Vietnam, listed below:

1. Percentage of literate population at 15 years of age and above by province
2. Percentage of trained employed workers at 15 years of age and above by province
3. Poverty rate by province
4. Monthly average income per capita at current prices by income quintile and by province
5. Infant mortality rate by province

We compare each aspect to urbanisation, running a pearson correlation and finding the R value in order to explore whether there exists a correlation between each factor above to the level of urbanisation. If there exists a trend, this could possibly illustrate certain “characteristics” of a higher urban population.

5. RESULTS

5.1 Urban Population Levels: Trends over Time

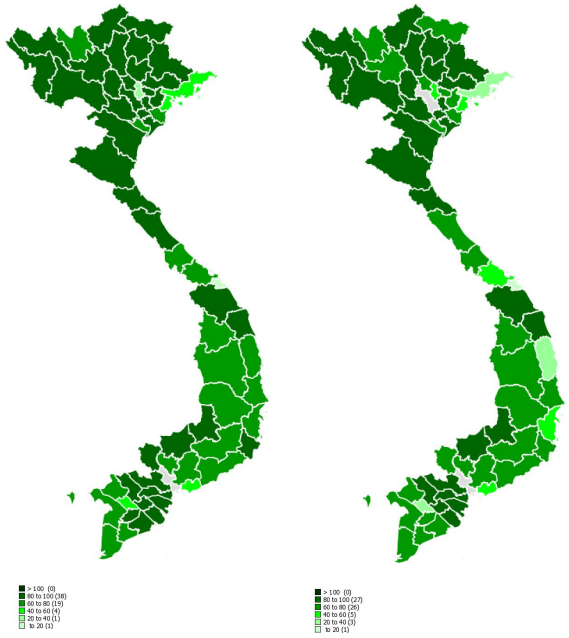


The total Vietnamese urban population has been steadily increasing since 1995, starting from around 15,000,000 in 1995 and reaching 32,000,000 in 2016. The increase looks stable and there are no outlying years or data - but the speed of urbanisation is slow. With a total population of 92.7 million in 2016, only around 30% of the population lives in urban areas, falling within the lower level of urbanisation in comparison to other countries. There are many potential reasons behind the slow growth of urban cities, some of which are outlined by the Ministry of Construction (1992), including[7]:

- Vietnam's decentralised framework means that cities are usually formed as administrative centres - less due to economic development
- Poor infrastructure (i.e. roads, electricity, transport, schools etc.) and lack of job opportunities prevented Vietnam from urbanising quicker.
- Vietnam emphasises on "inclusive growth", a method of balanced growth in order to avoid a large rural-urban disparity

Zoning into the country and looking at a provincial breakdown, the colour intensity maps below show a visualisation of Vietnam in 2007 and 2017, and how its rural population percentage have changed a lot with time. The darker the green, the more rural population there is. From first glance, colours are heavy and dark, showing a high agricultural and rural density. The colours are top-heavy, with more provinces still 80% or above in rural population proportion.

Looking at 2007, the colours of the North Mountains and Midlands region are extremely dark, in comparison to a more urbanised Red River Delta, Central Highlands, and South Central Coast regions. It is compelling to notice the change from 2007 to 2017, provinces that border the sea tend to have become more urbanised between the decades. This highlights the importance of seaports and trade in improving a province's economy and prospects. In the South East, Binh Dinh and Phu Yen started in the 60 - 80% bins and moved towards the 20 - 40% range, a huge decrease in rural population. The Mekong Delta area lightened in colour as well, but North MeKong still is above the 80 - 100% rural population bucket. The five municipalities Hanoi, Ho Chi Minh City, Can Tho, Da Nang and Hai Phong, in 2015, share 41.3% of the total urban population.[8]



Colour intensity maps showing rural population levels in 2007 (left) and 2017 (right)

[7] Migration and Urbanization in Vietnam: Patterns, trends and differentials. (2011).

[8] The Rapid Urban Growth Triad: A New Conceptual Framework for Examining the Urban Transition in Developing Countries. (2017).

5.2 Causes of Rapid Urban Growth: The Rapid Urban Growth Triad Applied

5.2.1 Demographic Transformation: Natural Increase

Natural increase rate is calculated by looking for the difference between crude death rate and crude birth rate. One reason of huge population growth (and thereby urban population growth) could be because of Warren Thomson and Frank Notestein's theories, where a country goes from high birth and high death rates, to one of high birth rates and low death rates, then finally both low birth and death rates. In the case of Vietnam, there are no huge changes in relation to natural increase rate from 2010 to 2016, and no obvious trends. Compared to levels in 1960, however, with a natural increase rate of 30.12, it has decreased drastically since then. Because of the lack of trend, perhaps this aspect plays less of a part in urban growth.

Table 2: A table showing the natural increase in each urbanisation range

Urbanisation Group	Average Natural Increase (per 1000) 2010	Average Natural Increase Rate (per 1000) 2016
0 - 20	10.24	9.11
20 - 40	11.75	10.07
40 - 60	10.07	7.96
60 - 80	7.90	10.33
80 - 100	10.80	9.75

5.2.2 Economic Transformation: Internal Migration

Inter-provincial migration has become a big trend in Vietnam. Whilst there are many forms of internal migration: urban to urban, urban to rural, rural to rural and rural to urban, we will focus on the rural-urban migration phenomenon. Such movements come from urban pull factors and rural push factors. Urban pull factors usually come in the form of higher wages, but also can occur due to an existing informal sector, urban bias, and desire to attain skilled education. Push factors occur when there are less economic opportunities, surplus labour, poverty in rural areas, natural shocks.

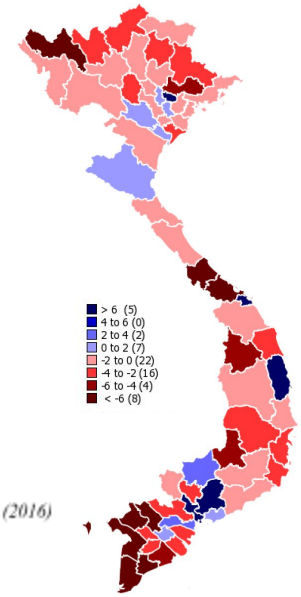
Urbanisation Group	Average Net Migration Rate (%) 2016
0 - 20	-2.196
20 - 40	-2.138
40 - 60	-1.200

60 - 80	6.567
80 - 100	6.550

Table 3: A table showing the net migration level in each urbanisation group

After grouping each province based on urban population to total population, the average net migration rate of each category was found. In Vietnam, it can be seen that provinces 60 - 100% urbanised have positive net migration rate, meaning that there is a larger influx of migrants than outflux. Not only so, but the migration rate are both around 6.6%, a very high inflow population. On the other hand, the 0 - 60% urbanised groups have a negative average net migration rate, showing a large outflux of migrants. This implies a possibility that those in higher rural areas tend to migrate towards more urban cities. It was projected that rural-to-urban migrants would "reach about 5 million people"[9] in 2019. This can be a reason behind the rapid urban growth in Vietnam, with huge inter-provincial movements.

Looking at a visualisation of the net migration rate of each province, the blues represent an inflow of migrants, and the reds represent an outflow. There are parallels between this map and the map above showing the percentage of rural population. The North Mountains and Midlands are more rural, and have a strong outflow of migrants, alongside the Mekong Delta area. On the other hand, the two pericentres Ho Chi Minh and Hanoi (and other municipalities) have positive inflow of migrants. This shows that more urbanised areas tend to attract the rural population with potential push and pull factors above, leading to a cyclical loop of urbanisation and migration.



Colour intensity map showing net migration rate of each province (2016)

5.2.3 Political Transformation: Reclassification

Looking at the political and administrative aspects of urban growth, this aspect focuses upon the re-categorisation of rural areas as "urban", due to expansion of boundaries (perhaps because of urban sprawl), annexation or addition of new areas. In Vietnam, examples of this includes Can Tho city placed as a "central city-province" after a lot of its districts were annexed to form the Hau Giang province. Vinh Phuc moved Me Linh rural area to Hanoi, leading to an increase of urban share[10]. Because of the decentralised structure of Vietnam, it is likely that the boundaries between provinces often change. This is one of the reasons why the data of the Ha Tay Province existed before 2008, but now currently unattainable - it used to be a former province of Vietnam, but now it has been reclassified as a part of Hanoi.

[9] Migration and Urbanization in Vietnam: Patterns, trends and differentials. (2011).

[10] Migration and Urbanization in Vietnam: Patterns, trends and differentials. (2011).

5.3 Consequences of Urban Population on Human Systems: Characteristics

5.3.1 Overall Trends and Characteristics of Higher Urban Populations

Urbanisation Group (%)	Trained Employment (%)	Literacy Rate (%)	Infant Mortality Rate (/1000)	Average Poverty Rate (%)	Income per capita (thousand Dong)
0 - 20	15.41	92.19	17.03	10.58	2256.63
20 - 40	16.35	92.86	17.05	6.89	2626.96
40 - 60	29.74	96.48	12.62	2.34	3831.60
60 - 80	23.40	96.13	10.90	4.30	4039.00
80 - 100	37.85	98.35	8.15	0.50	4775.00

Table 4: A table showing the over trends of each urbanisation range to each 5 indicators

Looking at the consequences of urban population levels in framing its characteristics, the five indicators chosen reflect social and economic aspects, categorised into five percentage bins differing with a 20% range. At a first glance from the data above, larger urban populations have a positive relationship with trained employment, literacy rate, and income per capita, and a negative relationship with infant mortality rate and poverty rate. All the figures above reflect the average indicator percentage of each category.

Our hypothesis states “areas with a higher urban population can correlate to more economic development”, with less poverty, less infant mortality, better literacy rates, better income per capita, and better trained employment levels. The data above reflects that - but the significance of correlation must be explored. The r-value of our correlation between urbanisation level and each indicator is shown below. More detailed analysis about the meaning of each r-value will be discussed below.

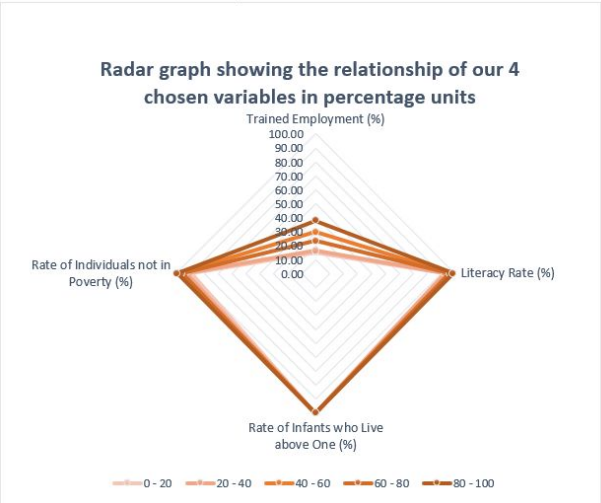
	Trained Employment (%)	Literacy Rate (%)	Infant Mortality Rate (/1000)	Average Poverty Rate (%)	Income per capita (thousand Dong)
R-value	-0.282	-0.405	0.22	0.699	0.626

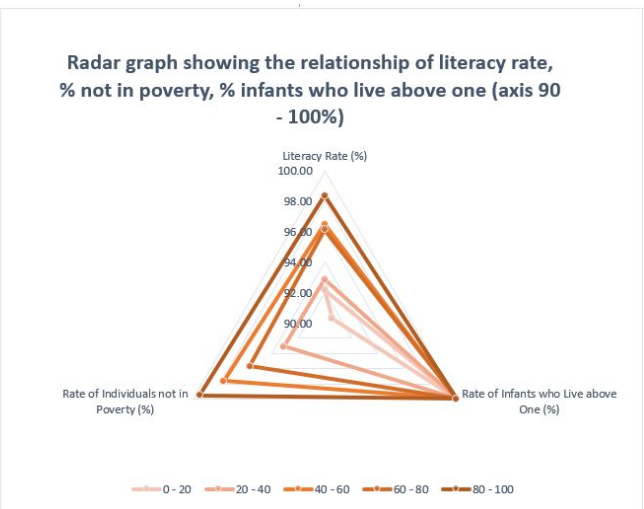
Table 5: A table showing the correlation coefficient of each variable to urbanisation %

For better visualisation, a radar graph is created below to show different percentages of each indicator at each urban population level. The data for poverty and infant mortality rate has been inverted (as they have a negative relationship with urbanisation level), in order to aid better visualisation. Income per capita is not included as the plot is in the units of percentage. The radar graph on the left shows all

four indicators, but because a lot of the data is at the 90 - 100% range, the graph on the right shows a zoomed in radar with axis from 90 - 100% for better visualisation.

The darker the lines, the more urbanised a province is. There is a clear trend that as a country becomes more urbanised, the lines tend to move more outward, reflecting better economic development. Literacy rate, rate of individuals not in poverty, and rate of infants who do not die by one in general are grouped quite closely to the corners of the radar, showing strong overall levels of development in Vietnam. Trained employment shows the largest range between urbanisation levels, where the 80 - 100% urbanised group has 37.85% trained employment, and 0 - 20% group 15.41%.

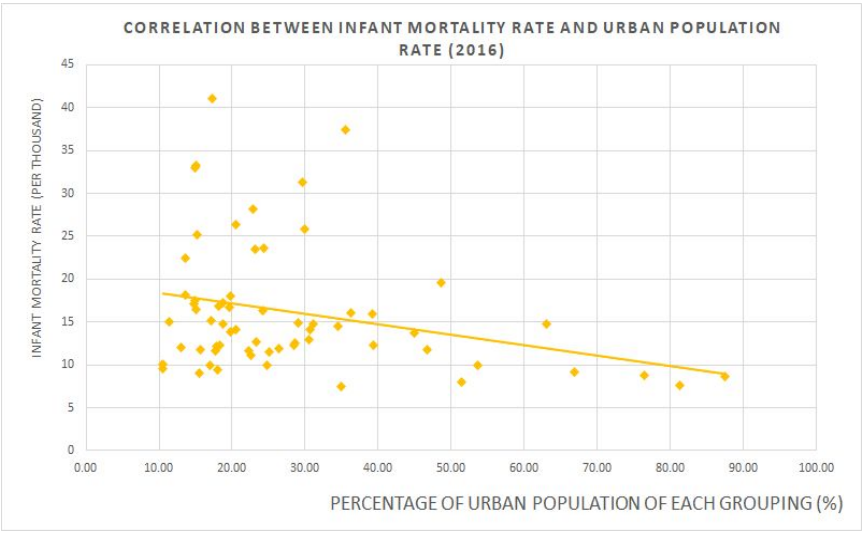




We will now go through a more thorough analysis in order to understand each variable's correlation with urbanisation, its potential reasons, and significance of correlation.

5.3.2 Urban Population and Health [11]

Urban Population Group (%)	Average Infant Mortality Rate (/1000)
0 - 20	17.03
20 - 40	17.05
40 - 60	12.62
60 - 80	10.90
80 - 100	8.15



[11] Ritter, L. A. (2007). Urbanization and Health in the Developing World.
P, A. (n.d.). Urbanization, schooling and infant and child mortality.

R-Value: -0.282

From our data, there is a clear negative correlation between the level of urbanisation and infant mortality rate. Provinces with higher infant mortality rate tend to more rural, although points are quite scattered in the 10 - 40% urbanisation range. The province with the highest infant mortality rate is Lai Chau with 41.1/1000 deaths per year, at a 17.35% urbanisation level. The points, however, seem quite flat, clustered around the 10 - 20/1000 infant mortality range. Because of this, the correlation coefficient shows quite a weak correlation of -0.282.

Infant mortality rate oftentimes is a measure that reflects the existence of diseases of poverty. Such diseases are often borne out of lack of access to healthcare, water-borne diseases due to sanitation issues and unclean water provision. Hospitals tend to be centralised in towns and cities, and provision of healthcare tend to be underdeveloped in rural areas. In the Central Highlands and North West Mountains area, the geographical access to healthcare is poor, due to long distances and mountainous areas hampering transportation[12]. This can be a factor that contributes to why infant mortality rate of the provinces in that area is between 20 - 30 deaths per thousand, with the highest average of 24/1000. Lai Chau, the province with the highest infant mortality rate is also part of this region. South East has the smallest infant mortality rate of 8.5.

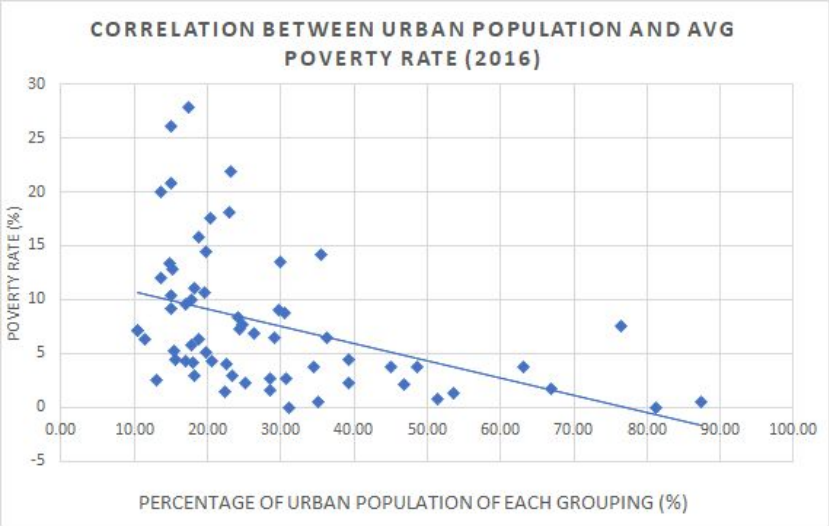
Specifically in Vietnam, the major causes of mortality is because of prematurity and low birth weight, alongside infections in the postnatal period. Other than geographical access, economic access and quality of care are two important factors, alongside the existence of traditional practices in relation to home deliveries that may be harmful to the child. Those who live in urban areas tend to earn a higher income, meaning better economic access. Furthermore, infant mortality rate and maternal educational level are intertwined[13] - more educated individuals tend to live in urban areas meaning a stronger understanding of maternal and natal health. All the data of the World Fertility Survey indicated that early childhood mortality declined as maternal education increased.

The correlation coefficient shows low, weak correlation, and this can be because of the existence of urban poverty and urban slums. Although urban areas tend to have more healthcare prospects, recently in Vietnam there has been a growth of the urban poor living in the periphery and hinterlands of cities. Despite being a part of the "urban" area, their incomes tend to be low and also have poor access to healthcare.

[12] A Situational Analysis of Newborn Health and Interventions in Vietnam: Towards the Development of a Newborn Health Action Plan. (2006).
[13] Lee, H., Do, D., Choi, S., Trinh, O., & To, K. (2016). Trends and determinants of infant and under-five childhood mortality in Vietnam, 1986–2011.

5.3.3 Urban Population and Poverty [14]

Urban Pop Group (%)	Average Poverty Rate (%)
0 - 20	10.58
20 - 40	6.89
40 - 60	2.34
60 - 80	4.30
80 - 100	0.50



R-Value: -0.405

From the graph above, there is a negative correlation between urbanisation level and average poverty rate, meaning that when urbanisation level increases, the poverty rate will decrease. The data points on the graph actually does not look like a linear trendline, but somewhat a negative exponential one. There are heavy clusters among the 10 - 30% urbanisation level and 0 - 15% poverty level area, with many provinces having quite low poverty levels despite not being so urbanised. The correlation coefficient is -0.405, a weak to moderate correlation level that shows urbanisation level and poverty rate may have some sort of correlation but not significant. This can be because there are many other factors that lead to and link with poverty.

Again, looking at the regions, the Northern midlands has the highest poverty rate of 13.8%, and South East the lowest of 0.6%. Both Dien Bien and Lai Chau are neighbors in the Northwest of the North Mountains region, with the two highest poverty rates and low levels of urbanisation. Lai Chau has the highest poverty rate of 27.9%, followed by Dien Bien with a poverty rate of 26%. The lowest poverty rate is Ho Chi Minh City with 0.3%, situated within the South East region, with an 82% urbanisation level. This highlights the disparities between poverty levels in different provinces between different regions.

Although the -0.405 correlation coefficient isn't high, and only shows a moderate correlation, there can be reasons behind this. Urbanisation can reduce poverty, as it generates new opportunities for rural workers (pull factors tend to be economic and job-searching based), shifting from agricultural-based activities to industrial-based activities. Money earnt by migrants can return back to rural areas through the form of remittances, improving poverty in rural regions. Migration of agricultural workers can reduce labour supply in rural areas, leading to wage increases. Indirectly, rapid growth of urban areas leads to increased demand and market size for rural supplies and commodities, fostering economic growth and

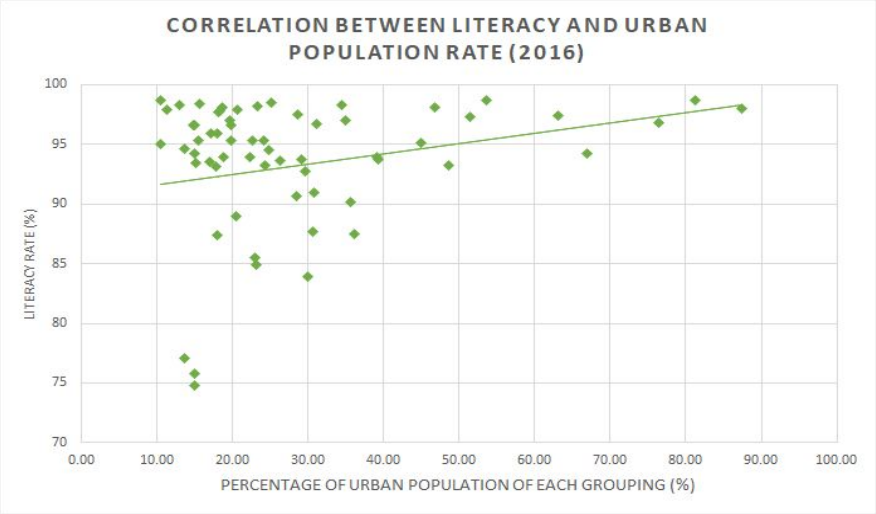
[14] Effects of Urbanization On Poverty. (n.d.).

reducing poverty. In the whole of Vietnam, actually, the total poverty rate dropped from 15.5% in 2006 to 5.8%.

Reasons behind the moderate correlation can be because of the existence of urban poverty and inequality within a province, as well as uncontrolled urbanisation. As cities develop, gentrification can occur, displacing low to middle income city-dwellers from their existing community and pushing them away due to higher property prices.

5.3.4 Urban Population and Education [15]

Urban Pop Group (%)	Literacy Rate (%)
0 - 20	92.19
20 - 40	92.86
40 - 60	96.48
60 - 80	96.13
80 - 100	98.35



R-Value: 0.220

The literacy rate is the rate, or percentage, of people who are able to read is a useful indicator of the state of education within a country. In general, the literacy rates of Vietnam is quite high, with averages above 90% for each urbanisation range. There is a positive correlation between literacy rate and urban population - the higher the literacy rate, the more urbanised a province is. However, the correlation is weak with an r-value of only 0.220. There are clusters of points at the 90 - 100% range, showing quite high literacy rates in most provinces of Vietnam. The three anomalies around the 75% line are Dien Bien (74.8%), Ha Giang (74.8%), and Song La (77.1%), all situated in the North Mountains and Midlands region of Vietnam.

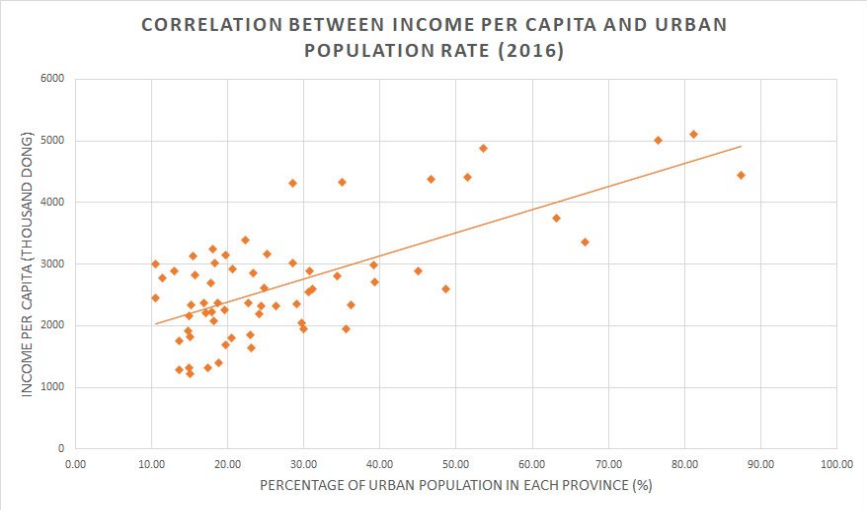
Differences in education quality can be the driver behind rural-urban migration. In rural areas, education tend to be less effective in comparison to urban areas. According to Konuk, Turan and Ardali's paper cited in footnotes, a few reasons include "insufficient national standards, insufficient resources, lack of office support for transportation, teachers and administrators". Such differences can drive movement from rural to urban areas, and can show reasons behind why urban areas tend to have higher literacy rates in comparison to less urbanised areas.

[15] Key Gap Indicators of Development: Geography. (n.d.). Konuk, N., Turan, G., & Ardali, Y. (2016). THE IMPORTANCE OF URBANIZATION IN EDUCATION.

However, the r-value of 0.220 is very weak and shows little correlation. Because of this, perhaps other factors related to education (number of children enrolled in school, graduation rate, higher education opportunities etc.) should be taken into account instead of the baseline "literacy rate".

5.3.5 Urban Population and Income Per Capita [16]

Urban Pop Group (%)	Income per capita (000s Dong)
0 - 20	2256.63
20 - 40	2626.96
40 - 60	3831.60
60 - 80	4039.00
80 - 100	4775.00



R-Value: 0.699

From the graph of income per capita in 2016, we can see that there is a positive correlation between income per capita and urbanisation rate, which means that when there is more urbanisation, people tend to have more income. The r-value shows a moderate to strong positive correlation, with a value of 0.699, and the data points above show clusters quite tightly around the trendline with little to none outliers or anomalies. Looking at the table, each urbanisation range leads to a significantly higher income per capita, and each province seems to follow this correlation quite fittingly.

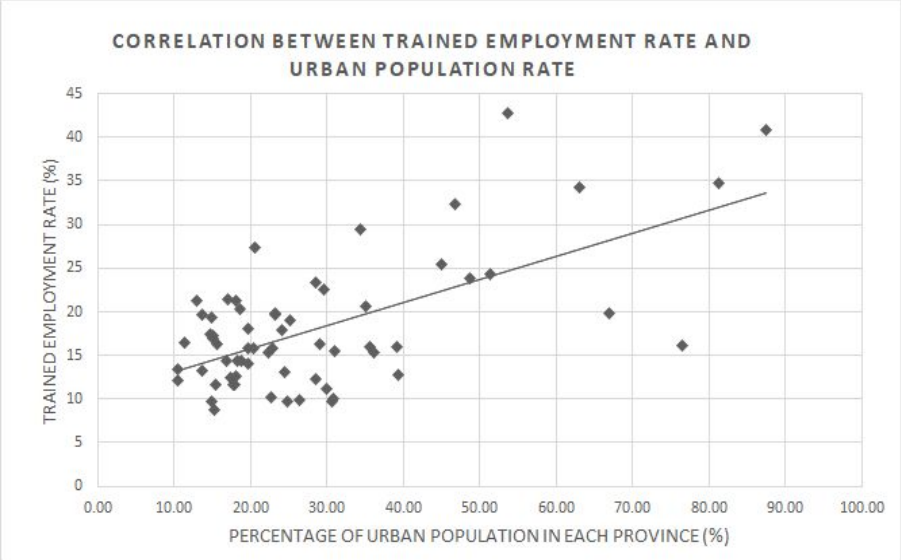
A strong pull factor of urban cities are its economic prospects and higher expected income levels - as seen in the trendline above. Assuming that movement between rural and urban areas is completely flexible and free (and that there are no moving costs), workers will always look for the highest wage under the Harris-Todaro Migration Model. Labour will continue to move until wage rate reaches an equilibrium between the two regions. Under the Todaro assumptions, for someone who makes very little income in agricultural sectors, even with the likely prospect of unemployment, the expectation of earning a higher income is worth the risk. Because the movement of labour causes wage rate to rise in areas of out-migration (less labour supply) and fall in areas of in-migration, and people tend to move out of rural areas and enter urban areas, the reward of rural-urban migration is that wages in both areas will rise together. Comparing the data of the income per capita average of Vietnam, in 2010, the general average was 1,387 thousand Dong, and that more than doubled into 3,098 thousand Dong in 2016. All regions more than doubled in income per capita within that period, from the most rural (North Midlands and Central Highlands) to the most urbanised (South East).

[16] Danby, C. (n.d.). Todaro Migration Model: A Graphical Exposition with a Numerical Example.

With an r-value of 0.699, it shows a moderate to strong correlation that higher urbanised areas have higher income per capita. This may be because urban cities tend to be more industrialised. Whilst agriculture sectors tend to include subsistence farming and very low and unreliable income (prone to natural disasters and exogenous shocks), urbanised areas are more secondary-sector based - on machinery, retail, creation of electronics etc. Price of such products tend to be higher, and workers tend to earn a higher wage in general.

5.3.6 Urban Population and Trained Employed Workers

Urban Pop Group (%)	Employed and Trained Workers (%)
0 - 20	15.41
20 - 40	16.35
40 - 60	29.74
60 - 80	23.40
80 - 100	37.85



R-Value: 0.626

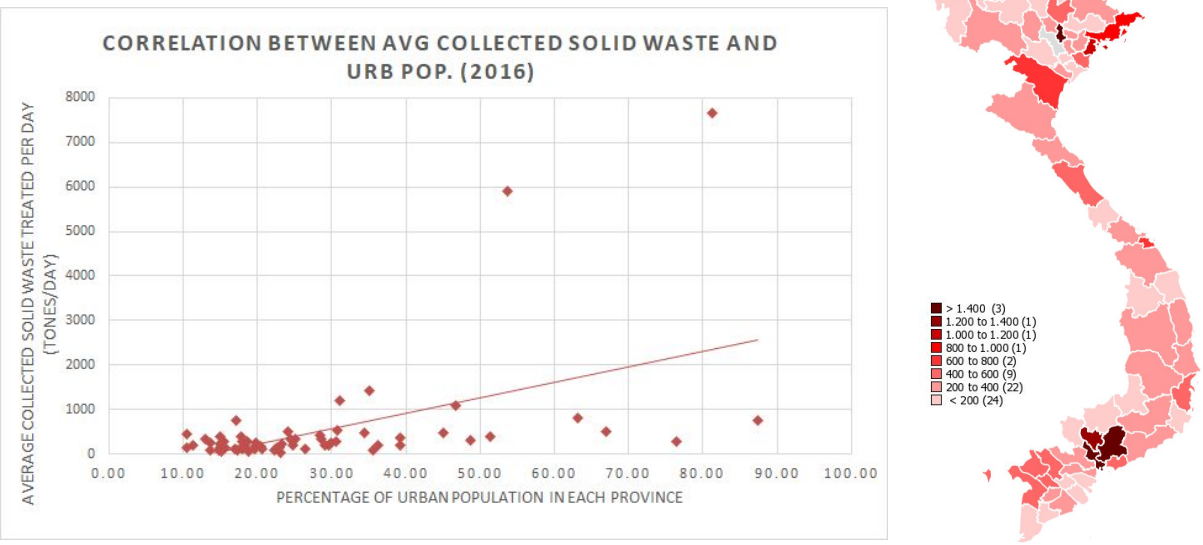
There is a moderate to strong positive correlation between urban population level and trained employment rate of workers. This means that the more urbanised an area is, the more workers tend to be trained and attain skills. In this case, the r-value is 0.626, showing a pretty strong correlation between the two variables. Again, most of the data points are clustered within the 10 - 20% trained employment rate region, showing that Vietnam still has a lot of potential improvement space in the future. Some outliers include Hanoi, with the highest trained employment rate of 42%, but an urbanised level of only 55%.

Whilst most agricultural jobs do not require highly-skilled know-how and training, entering industry (which tend to be centralised within urban areas) means it is necessary to gain more knowledge and skills. For example, specific knowledge necessary in the health care of technology sector. However, with cities that are trying to shift from Industry 3.0 to 4.0, a growth in demand for skilled, trained labour have developed - alongside an increase in supply. Many foreign direct investors also struggle when wanting to employ high-skilled workers in Vietnam, making Vietnam a less competitive and attractive FDI location. Vietnam still has a lot of space for improvement as can be seen from the graph above. If Vietnam wants to move from a labour-intensive, cheap-cost structure into a more innovative, less agricultural and industrial-reliant economy, policies should attempt to increase skills and technical education.

5.4 Bad Consequences of Urbanisation[17]

From the analysis, there are positive effects that occur due to urbanisation: better literacy rates, lower infant mortality rates, more jobs and higher income per capita, and more training and less poverty. However, uncontrolled urbanisation and lack of urban planning can lead to a lot of negative external costs to consumers and producers. We will focus on environmental degradation and pollution, and the growth of urban poverty.

5.4.1 Environmental Degradation and Pollution



Colour intensity map showing amount of waste produced by each province (2016)

One large negative externality of urbanisation is pollution and environmental degradation. Overcrowding, congestion, industrialisation leads to a large production of solid waste that needs to be processed or gotten rid of. Solid waste can be categorised into organic (spoiled food, leaves, manure, dead bodies of animals) and inorganic (glass, paper, metals, rubber, electronics etc.). [18] Looking at the graph, there is a positive correlation between the level of urbanisation and average solid collected waste - and in this case, the r-value is 0.505, showing a moderate correlation between the two variables. The map shows a visualisation of where solid waste is formed, the darker the colour, the higher concentration of waste. It can be seen that the two urban poles HCMC and Hanoi and its peripheries produce the most solid waste. HCMC generated 7650 tonnes/day, and Ha Noi 5906 tonnes/day, almost 20 - 50 times the amount of other rural provinces in Vietnam.

As urban areas develop, consumption increases especially on processed food, clothing, paper etc. On the production side, negative externalities include the production of plastic waste due to the growth of the packaging industries, industrial and chemical waste, and construction waste. Treatment of this waste can create a lot of pollution and is hazardous to the environment. Incineration and burning at landfills is

[17] 10 things to know about the impacts of urbanisation. (2018).
[18] Truong, N. (2018). Solid Waste Management in Vietnam.

still a common practice in Vietnam, alongside landfilling (most common in municipals such as HCMC and Hanoi). An influx of migrants from rural areas into urban cities leads to more overcrowding, more consumption and thereby more waste production, leading to more environmentally degrading waste disposal methods.

5.4.2 Urban Poverty

Insufficient urban planning leads to widespread urban poverty, especially in the two urban poles Ho Chi Minh City and Ha Noi. It is estimated that 40% of the world's urban expansion is in slums[19], and because of the congested and poor sanitary conditions of slims, this increases the possibility for diseases to spread. The rapid urban population growth brings risks to urban poverty, where those living in informal settlements may face overcrowded housing, lack of safe and reliable food and water supplies, lack of sanitation and access to healthcare, and poor waste collection.

In Vietnam, there is a higher rate of poverty among migrants than residents in urban areas[20]. According to the International Institute for Environment and Development "Urban Poverty in Vietnam", "the migrant poor account for about two thirds of all poor" in HCMC and Ha Noi. Most face poor pay, unstable jobs, risk of eviction in the apartments they stay, and rising high prices due to higher demand in urban areas and development.

According to Trading Economics, the percentage population of Vietnamese dwellers living in slums in the percentage of urban population is 27.2% (2014)[21]. An example of a slum in HCMC would be the Ma Lang Slum, tucked within a district known for its crime (drug dealing), low-income families, poor safety standards with infrastructure prone to fires and breakages. The combination of competition of resources in urban areas, inequality and poor urban planning leads to a loss of opportunity for rural migrants looking for a better life in urban areas.

6. LIMITATIONS

6.1 Data Based Limitations

1. *Language Restrictions:* On the General Statistics Office of Vietnam, the "Statistical Methodology" page is provided in Vietnamese, and not translated in English. Therefore, we are unsure of how "urban population" and "rural population" is specifically defined and calculated. Similar to the 5 variables, we are unsure how the variables are measured, but simply rely on it as we believe that the GSO is a reliable resource and data source. All surveys are conducted in Vietnamnese too, so certain biases that may arise from surveying may not be observed.
2. *Incomplete Data:* Data may not be complete for all years, and certain provincial level of data is not provided. For example, the poverty census is conducted once every two years, restricting the amount of data we can use when comparing across years (though our focus is merely on 2016

[19] Scott, J. (2015). The risks of rapid urbanization in developing countries.
[20] Thanx, H. X., Anh, T. T., & Phoung, D. T. (2013). Urban poverty in Vietnam – a view from complementary assessments.
[21] Vietnam - Population living in slums (% of urban population).

data). Ha Tay provincial data has also been merged with HCMC, as it has ceased its provincial status since 2008.

6.2 Assumption Based Limitations

1. *Defining "Urbanisation":* There are definitely many aspects of urbanisation we have not taken into account. Simply defining "urbanisation" as "percentage of urban population" is restrictive and narrow in our study. Instead of looking at a static percentage of urban to total, we could have looked at the change of people in urban areas year-by-year. We could have taken into account how one defines an "urban area" - existence of Central Business Districts, economic levels, proportion of agricultural sector to industrial sectors in a province etc.
2. *"Correlation does not imply causation":* A strong concept and reminder in statistics, even if there is a moderate-to-strong correlation, this does not reflect causation or a relationship at all. There can be a lot of other confounding factors that impact a variation. Because there is no causal relationship, regression cannot be run, and it is difficult to provide policy recommendations as we cannot say, for example, that "more urbanisation leads to less poverty".
3. *Better choices of indicators to represent certain aspects:* For example, the literacy rate and infant mortality rates do not seem like a good reflections of "education" and "health". As Vietnam is improving as a country, these aspects have improved drastically and represent more extreme cases of underdevelopment. We could instead look at graduation rate from higher institutions (universities), quality of treatment in hospitals or regional healthcare centres for a better range of data. However, we are restricted by the data provided, as provincial-level data is difficult to attain.

7. POLICY RECOMMENDATIONS

7.1 General Policies for Rapid Urban Growth

Generally, trends show that Vietnam faces upward growth trends in urban areas over the next few years. In order for urban areas to prosper, urban growth needs to be in control. Some policy recommendations are listed below in order to allow for healthy growth of cities and urban areas.

7.1.1 Accommodating for Overurbanisation through Developing Secondary Cities

With the rapid urban growth of the two urban poles in Vietnam: Ho Chi Minh City and Ha Noi, alongside the three other municipalities, the cities will become more overcrowded, congested, and begin harmful processes of gentrification and uncontrolled urban sprawl. To accommodate for that, governments can increase the attractiveness of other provinces and regions in Vietnam, and promote secondary cities through creating investment incentives (tax holidays, special economic zones, tax reductions and exemptions etc.) attracting employment opportunities.

For example, the Asian Development Bank is currently conducting a "Secondary Cities Development Project"[22]. Focusing on Central Vietnam, with Buon Ma Thuot (Dak Lak Province), Tam Ky (Quang Nam Province), and Ha Tinh Province, building the secondary cities with specific urban and economic planning. For example, in order to increase connectivity, economic and geographical mobility, roads will be created and upgraded into Buon Ma Thuot. There is also environmental management plans such as preventing floods and improving drainage are crucial parts of the project[23], as the risk of environmental damages are high in those provinces. By mitigating the risks and improving economic prospects, this can lead to encouragement for investors to move into these newly planned areas. This may also incentivise counter-urbanisation those living in overcrowded areas of HCMC and Ha Noi.

7.1.2 Inclusive Growth: Creation of Infrastructure (Social and Economical)

The main idea behind inclusive growth is to prevent the widening of inequality gap between provinces - encouraging growth not only in urban areas but also rural. One way to consider would be to first improve social infrastructure in less-developed provinces. This includes health care provision - not just quantity of healthcare centres and geographical access, but also quality of hospitals and services and economic affordability, and education - providing platforms for students to attain a solid educational background. Outside of social infrastructure, economic infrastructure should also be promoted. This includes increasing connectivity and geographical mobility through improving roads between provinces. The Highlands are often geographically filled with mountain plateaus of irregular elevations and forms - because of this, it forms natural barriers to communication between provinces.

One policy consideration could be applying Japan's "One Village One Product"[24], and Thailand's "One Tambon One Product" programme[25] to Vietnam. With one "tambon" (a local governmental unit in Thailand) supporting a locally made and marketed products, and with 7,255 "tambons" in Thailand, the government provides both local and national promotion to these local products. That way, all regions in Thailand can attain growth, including rural regions that would otherwise not be provided an opportunity. A programme like this, applied to Vietnam, can encourage "inclusive growth" in all provinces of Vietnam. With its diverse culture and social differences in South, Central and North Vietnam, this programme can not only provide a platform for entrepreneurial spirit in rural areas, but can create many distinct and diverse products from each district and province. In the Japanese framework which is quite different, community villages would choose products that are considered to be the "highest value added", and this staple product's revenue gained will be returned to the village to improve the standard of living. Such a policy and format can be applied into the case of Vietnam, increasing inclusive growth.

All these measures are crucial because over-urbanisation can be avoided if rural areas provide more opportunities for growth. By mitigating rural-push factors through provision of more economic prospects, rural-urban movement can be reduced, leading more overall development in Vietnam.

[22] Nguyen, B. (n.d.). Viet Nam: Secondary Cities Development Project.
[23] Vietnam Secondary Cities. (2013).
[24] One Village One Product Market. (n.d.).
[25] WHAT IS OTOP? (n.d.).

7.2 Specific Policies Based on our Results

Considering that our paper shows only a spurious relationship and correlation instead of relationship and causation, there could be other confounding variables that are associated with the correlation. However, we will choose to give some policy recommendations in relation to the variables that have a moderate-to-high correlation coefficient (r-value above 0.5), as although correlation does not prove causation, correlation does not *disprove* it either - there is still a possibility that one leads to another. This includes policies that can help increase income per capita in rural areas, improve skilled training in rural areas, and reduce urban solid waste production (especially in HCMC and Ha Noi).

7.2.1 Reducing urban solid waste production

In the five municipalities, solid waste composition at landfills mostly come in the form of organic waste (55 - 77% of all solid waste in landfills), and the production of plastic (10 - 15% of all solid waste in landfills)[26]. At the household and consumption level, plastic is used prominently and substantially, with plastic bags, packaging of imported goods, wapping of foods etc. generates an increasing amount of plastic waste every year. This waste either goes into landfills, or into the ocean, leading to damage to the environment and biodiversity. There are two issues that need to be dealt with: preventing and reducing urban solid waste, and how to process the waste that already exist.

In terms of preventing and reducing urban solid waste, plastic can be targeted due to its damaging and its long-lasting lifeline when placed into the sea. On the consumer side, governments can consider charging consumers a certain price if they want to purchase a plastic bag. Plastic straws can also be drastically reduced, and containers can be switched to paper (which is easily biodegradable). On the production side, a quota or cap can be placed on the amount of solid waste production a firm can produce, or a tax or fine if waste production exceeds a certain limit. Governments can work with producers and make agreements on using substitutes for plastic, such as paper (which is easier to recycle).

Promotion of research and development of clean technology is a policy idea that can be applied in Vietnam in order to process landfills (76% of Vietnam's waste goes to landfills). With the existing waste-to-energy sector that creates a two-fold benefit[27]: processing existing waste in landfills as well as creating energy, the government could invest more in supporting innovation of renewable tech. Currently, there are policies by the government that supports mechanisms for power generation through waste, alongside certain incentives towards waste treatment. However, this method is not powerful enough and still has a lot of space for growth.

7.2.2 Increasing job opportunities in rural areas alongside skilled labour

Creating Special Economic Zones (SEZs) in rural areas can attract more foreign direct investment (FDI), and therefore more job opportunities in rural areas. With "18 coastal economic zones" and "325 state-supported industrial parks", incentives such as tax holidays, zero-tariffs, tax exemptions and reduced fees are the main tools of attractions for Vietnamese FDI. By promoting SEZs in rural areas, this can

[26] Truong, N. (2018). Solid Waste Management in Vietnam.
[27] Das, K. (2018). Vietnam: Opportunities in the Waste-to-Energy Sector.

promote higher income jobs and encourage rural workers to stay in rural areas. However, provincial governments must consider advantages and selling-points for investors to come into rural areas - perhaps targeting natural resource-seeking FDI, or FDI which demands cheap labour. That way, pull factors of urban cities may be less attractive if economic opportunities are provided in their hometown.

In order to improve *skilled* labour in rural provinces, the quality of education must be improved, or technical / vocational training centres implemented. In rural areas, "it is estimated that 47% of non-farm jobs are informal", according to Asian Development Bank[28]. Because rural workers tend to be of lower income, investing in formal institutions may not be helpful due to its high price of training. Governments can instead consider first identifying skills that are suitable and necessary in that certain province, then creating free workshops and seminars where the skills can be taught, widening economic prospects and job opportunities. Specific vocational training models can be shaped to mould needs of a province, and governments can provide free training courses in order to teach such skills.

8. SUMMARY

Vietnam is at a stage with rapid urbanisation and industrialisation, growing to become a new tiger country. The conversion of large areas of agricultural land has led to many households to shift their traditional livelihoods and lifestyles. On the one hand, the shift aids Vietnam's transformation from an agricultural-based economy into an industrial and service-based one. In this paper, we first explore the rapid urban growth of Vietnam, defining urbanisation of each province by using "percentage of the population living in urban areas to the total population". All data used in the graphs and correlations are taken from the General Statistics Office of Vietnam.

Focusing on 2016, we correlate the urbanisation level of each province to 5 different indicators to explore the characteristics of urban areas. With the social indicators: infant mortality rate, literacy rate, and poverty rate, the correlation coefficient gave weak-to-moderate results, from 0.2 - 0.4 but all followed our hypothesis. More urbanisation correlates to lower infant mortality and poverty rate, but higher literacy rate. On the other hand, the economic indicators income per capita and trained employed worker rate showed moderate-to-strong r-values of 0.6 - 0.7, also following our hypothesis: more urbanisation correlates to higher income and more trained workers. Because there is a weak correlation between social indicators and urbanisation, we cannot say that urbanisation correlates to better economic development, but there is a stronger correlation with economic factors above.

There are some negative consequences of urbanisation - such as urban poverty and urban waste production. Urban policies we recommended range from general policies (urban management and planning, secondary city building, and inclusive growth), to specific policies (reducing plastic production and consumption, creating SEZs). Overall, different levels of urbanisation holds special correlations with different economic and social factors, and though they do not reflect causation, they are interesting aspects to ponder on as Vietnam rapidly develops as a country.

[28] VIE: Making Markets Work Better for the Poor Phase 2-Improving Vocational Training for Vietnamese Rural Workers. (2012).

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