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## Investigating informal settlement and infrastructure adequacy for future resilient urban center in Hong Kong, SAR

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### Abstract

The growth of urban centres all over the world creates major concerns for the designers, architects and environmentalist. But the growth of Chinese cities, Hong Kong in particular is of greater concern considering the rapid population and economic growth of the country. Considering the challenge of Hong Kong city as one of the recent metropolitan cities of the world with the growing challenges of housing, informal settlement, public space and infrastructure adequacy this study is inevitable at this moment. This paper investigates, the nature of informal settlement and the adequacy of infrastructure provision in Hong Kong; and assess socio-economic characteristics of such settlement to foster the required future urban growth that is resilient and sustainable. The study adopts case study methodology, mixed methods exploratory approach of data collection and analysis. Primary source of data collection through the use of reconnaissance survey, observation, direct interaction with resident and stakeholders of selected settlements with the support of literature search (secondary data) were adopted. Data were analysed, interpreted, and results integrated to reflect the characteristics of informal settlement and infrastructure adequacy in Hong Kong urban centres for future resilience. Recommendations were made according to the research findings.

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### 1. Introduction

Achieving environmental sustainability had been a global challenge for several decades with different research approach from different researchers all over the world. But recently, smart cities and city resilient approach are identified as a global approach of solving these global environmental challenges. This paradigm-shift was also

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emphasized by the latest UN-Habitat issue paper III of 2015 and 2016 with urban housing and basic services as one of the world challenges experienced by all countries of the world (1). The sixth sub-theme of the issue paper specifically identify “Urban Housing and Basic Services” as one of the significant areas of concern; and this includes urban infrastructures and basic services, transport and mobility; energy, housing, smart cities and informal settlement. The summary of memorandum prepared by the stakeholder countries shows that the issue of infrastructure (availability and adequacy), informal settlement and achieving future urban resilient is a global challenge that requires urgent attention (1-3).

This issue of infrastructure and urban informality in city resilient of China with emphasis on Hong Kong according to (4), presents intensified urban functions, dynamic economy and optimized space structure has the influencer of the challenges experienced in Hong Kong, China. Thus, the experience of Hong Kong city is characterized with the challenges of urban open spaces, high cost of living, inadequate infrastructure, housing quality housing and housing satisfaction among other challenges (Shao & Shi 2012). The study adopts five (5) communities in China for the UNDP project on china’s urban center development. The study identified seven areas of urban challenges, ranging from natural resources, human habitat, image project and public policy among other challenges. (Shao & Shi 2012), relate the identified urban challenges in China to urbanization and resources inadequacy (infrastructure inclusive).

Infrastructure means different things to different people and professions at different times and in different context. But for the purpose of this research, infrastructure is identified as the physical, socio-economic and environmental facilities put in place for the purpose of effective functional society. This includes the sustainable facilities for the standard of living, working and recreation of the people (1). Also, the issues of informality, urban informality is ambiguous and it’s define in different ways and in different context. But for this research, informal settlement according to UN-Habitat 2006 defined it as the identified areas with functioning geographical space below the required planning standard. Planning standard adopted in this regards differs from country to country, developed or developing counties but with global criteria. Therefore, planning standard according to this paper is in relation to the context of the study area. Also, the definition also, includes settlement with evidence of illegal occupants, degraded environmental conditions, haphazard building arrangement or haphazard building use with or without infrastructure.

Considering, the global view of these challenges (infrastructure, urban informality) and its potential crisis in all countries of the world; this study investigates infrastructure adequacy in response to city resilience of Hong Kong, with the view to understand the situation of infrastructure availability and adequacy in the country. The study further presents how infrastructure and informality can be harness for future city resilience of Hong Kong. On this premises, this research answers the above questions, by identifying the nature of informal settlement in Hong Kong. Describe the infrastructure characteristics in the study area and recommend policy statement that can create future resilient urban center through infrastructure and informal settlement development. Using case study methodology, mix methods data collection and mixed method data analysis (quantitative and qualitative), findings and adequate recommendations to ameliorate the identified challenges are proposed.

## **2. Conceptual Issues and Literature Perspective**

Infrastructure is a broad word with different definitions and different classifications of it, as urban facilities and services. Infrastructure according to Fox (1994) in (5) includes the roads, water supply system, mass transportation, solid waste system, electricity, telecommunications, sewage and sewerage system. Also, Jacobson and Tarr (1995) in (5) says, infrastructures are the network of structures and frameworks that bind the modern cities and metropolitan areas together. These are the network of structures that connects the environment, the economic activities and the social activities together in any settlement. The definition of Oshikoya et al 1994 in (5), identify them also as facilities and services but classified them into two perspectives. The first classification is identified as the soft core or social infrastructure, while the second classification is the hardcore or physical infrastructure. The soft core infrastructures entails facilities and services such as health care, educational services, different types of government structures among others and are often refer to as the drivers of social and economic activities. The hard-core infrastructures identify the physical structures or facilities such as telecommunications, power, transportation system (roads, railways, ports and airports), water supply and sewerage system.

The review of literatures from (5), (1), World Bank (2013), (6), and other literatures reviewed; presents infrastructures as the combination of functioning facilities and services that enables the adequate functioning of human habitat. Also, some of the literatures categorize infrastructures in the same way and few generalize the nature of the infrastructure. Therefore, for the purpose of this study, infrastructure is describe according to (1) and the review of this literatures as the totality of the facilities, basic utilities, services and structures that allows the effective functioning of human habitat; promote the social, economic, cultural and political integration of the people.

Choguill (1996, p.391) states categorically that the availability of adequate infrastructure is a prerequisite for urban sustainability. The study added that infrastructure is another strategy to ameliorate the challenge of environmental sustainability and in-turns contribute to the quality of living of the people. Considering the emphasizes of (6) and other literatures, there is a relationship between infrastructures and sustainable development. Consequently, there is a relationship between infrastructure adequacy, informal settlement and city resilience. Therefore, the relationship that exists between them is identified in this research and how it relates to resilient future urban center is the focus of this research.

Urban informal settlement or informal sector economy is not new, it's just a concept that is re-occurring with greater threat to achieving sustainable development and resilient city. Informality is a concept of social science research that is used with different professional jargons and circumstances. It is commonly use in different professions to mean different terms such as informal sector economy, informal settlement, informal housing and urban informality among others. Informality is defined in different ways to mean different things but they are all closely related. Informality according to Word Web is the freedom of constraint, free of formal, free of regularization or order. Also informality according to (7) is a sector set for the quest of survival instinct. It is an activities engaged in to respond to inflation, cutbacks living cost and most importantly a strategy to support formal sectors. Settlement generally, is describe as the geographical space that support living organisms and which accommodate the living, the non-living, the bio-sphere, the lithosphere and the atmosphere.

Although, informal settlements are used interchangeably with some closely related terms such as: urban informality, urban poverty, slum, slum dwellers, vulnerable group, squatter settlements, and squalor settlements among others. But informal settlement is described for the purpose of this paper in consideration of the summary of literatures such as (8-12) and (1-3, 13, 14) as the residential area with functioning capacity below the required planed quality and regularized settings.

The definition of informal settlement according to (3) and other literature review is adapted as the residential area where: 1) there is no security of tenure vis-à-vis the land, the dwelling area or the inhabiting. The occupants range from squatting to informal rental sheds or structures. 2) Neighborhoods with lack or cut off from basic facilities, services and city infrastructure and 3) housing not necessarily complying with the current planning, building regulation and often situated within the geographical or environmentally hazardous areas.

This definition includes real estate of all income levels (affluent and poor), the deprived and the excluded form of settlements that are characterized with poverty, dilapidated housing; exposed to eviction, diseases and violence. Considering these definitions and the use of informal settlements, the research of (15) emphasize the fact that informality exist in every country of the world and it's only different in types and nature. Using the term social exclusion in different region of UK, the research identifies sixteen (16) region with average unemployment of 9%, inactivity rate of 15% and average total unemployment of 24% in each selected region.

City resilience from the description of (17) is the response rate of the city to stress, adapt and absorb the changing challenges of the city. This definition includes both the individual and the institutional strength of the city to response to the city complexity, shocks, risks and unexpected disasters. The definition also includes sustainability, which is the ability of the city to maintain its functional system without losing its natural state when it's perturbed and can still renew or reorganize itself when necessary. The city description and city resilience according to (17) includes similar words such as; the capable city, the ideal city, the livable city, the planning city, the resilience city, the secure city among others. But taking to the review of literatures and the Rockefeller (18) framework of city resilience. City resilience is express as the totality of efforts, capacity and the ability (natural, individual and

institution) of the city to allow the working and living of every citizen at the required quality of life. This is inclusive of the poor and the vulnerable to survive and thrive no matter what stress or shocks they are going through.

Rockefeller (18) present an inclusive comprehensive city resilience framework with the required qualities of a resilient system based on review of literatures, case study approach and the experience of different cities all the world. The word resilience and achieving city resilience according to inclusive comprehensive framework of (18) is a complex word and it is unique to every cities. Therefore, the way resilience manifest itself differs in different places and achieving resilience differs. But the inclusive comprehensive framework according to (18) presents a fundamental attributes that can be use worldwide to approach city resilience. This includes: four (4) categories, twelve (12) indicators, forty-eight to fifty (48-50) sub-indicators and one hundred and thirty, to one hundred and fifty (130-150) variables. Adapted from the work of (18) the following is presented as the city resilient framework indicators adopted in this research. See table 1.0 below as follows:

Table 1: City Resilience Framework

<b>Categories</b>	<b>Infrastructure and Environment</b>	<b>and</b>	<b>Health and Well-being</b>	<b>and</b>	<b>Economy and Society</b>	<b>and</b>	<b>Leadership and Strategy</b>
<b>Indicators</b>	Reliable Mobility and Communication		Minimal Vulnerability		Human Finance including Contingency funds		Effective Leadership and Management
	Continuity of critical services		Livelihood and employment		Social stability and security		Empowered Stakeholders
	Reduce Physical Exposure		Safeguards to Human Life and Health		Collective Identity and Mutual Support		Integrated Development Planning
<b>Sub-indicators</b>	Enhances and Provides Protective Natural Assets		Meets Basic Needs		Promote Cohesive and Engage Communities		Promote Leadership and Effective Management
	Ensure Continuity of Critical Services		Support Livelihoods and Employment		Ensure Social Stability, Security and Justice		Empowers a Broad Range of Stakeholders
	Provides Communication and Mobility	Reliable	Ensure Public Services	Health	Foster Economic Prosperity		Foster Long-Term and Integrated Planning
<b>Qualities of Resilient system</b>	According to (18), to achieve any resilient city in the above categories, indicators or the sub-indicators above the following qualities of resilient system must be demonstrated:						
	<ul style="list-style-type: none"> <li>➤ Reflectiveness</li> <li>➤ Resourcefulness</li> <li>➤ Robustness</li> <li>➤ Redundancy</li> <li>➤ Flexibility</li> <li>➤ Inclusiveness</li> <li>➤ Integration</li> </ul>						

**Sources:** Adapted from The Rockefeller Foundation and ARUP 100 Resilient Cities 2014

Considering, the conceptual issues, the literature perspective and background understanding of this research. The focus of this research, the context of the study, the data collection, analysis, findings and recommendations emphasize the infrastructure and environmental aspect of the resilient framework. Infrastructure and environmental (infrastructure and informal settlement) category of the city resilience discussed above is adopted as the context of the study in Hong Kong. The study context in Hong Kong starts from general perspective to China, Hong Kong and specific case study areas of Hung Hom (PolyU campus area) and Market area of Hong Kong as the case study in Hong Kong.

### **3. Conceptualization of Study within the Study Areas (China and Hong Kong)**

The issue of infrastructure, informality and achieving city resilience in Hong Kong is associated with the intensified urban functions, dynamic economy and optimized space structure (8). This phenomenon has increase the challenge of human habitation and reduces the city resilient capacity of the country. This aspect of the study takes a look at the issues of infrastructure, informality and city resilient from the conceptual and literature perspective of Hong Kong as an extension of China republic.

Considering this identified challenges from the experience of China, some of the factors that contributes to the challenge of China's urban development is not limited to the traditional industrialization of China alone. But it also includes other factors like; China's unique political factors, economic factors, cultural factors and most importantly the China's social transition challenges (4). Also, another complicated factors that contributes to china's urban challenges is the integrated rapidly growing global economy of the country; which contributes to the challenges of urban space, inadequate infrastructure, housing quality and housing affordability.

China's city resilient capacity decreases every day and the rate of food production; is continually been threaten with about 300 million china's agrarian communities finding their ways into different urban centers (4). This is described as the effect of urbanization on china's cities resilient capacity, which decreases the food production resilient capacity of China with huge number of migration from the rural areas to the cities centers (19). According to (4) research statistics, twenty percent (20%) of china's residents will migrate into urban cities and which equals the population of the United State. China is one of the world's fastest growing cities with high quality technology that affect the development of human existence and its challenges are identified as rural-urban migration with global severity in nature (Joseph E. Stiglitz in Shao & Shi, 2012).

The growth of cities and urban centers cannot be separated from the culture of the people and the economic structure of that settlement. At the same time, the settlement infrastructure, infrastructure availability and its adequacy cannot be separated from the people's culture, socio-economic development and housing development pattern of that community (20), (21) and (22). This is simply saying that the effect of urbanization on evolution of informal settlement and infrastructure adequacy cannot be overemphasized in cities resilient of that settlement (3). In fact Stephen (22) states that the evolution of cities and its design is influenced by population; and the experience of most countries of the world shows that more than half of the world's population are living in urban centers. This emphasize the fact that, the population increase affects the design, creates increase in housing and infrastructure needs and subsequently creates pressure on housing and infrastructure if not properly managed. Also, this affects the city resilient capacity of the cities, because it further sprouts cities and urban centers into sprawl settlement and informal settlements. This subsequently creates greater responsibilities for planners in planning resilient cities with adequate infrastructure.

The twenty first century China's community starting from 2002 presents china's urban development as one of the most critical, culturally influenced cities with rapidly decreasing resilient capacity in design and building of china's community. Shao and Shi (4), adopt five community pilot studies in China (Guizhou, Taiyuan, Liuzhou, Meishan and Sanmenxia) according to UNDP funded research to validate the statement above. The areas of concerns for the city resilient capacity of China according to their findings identified seven critical areas among thirty most common challenges in development of China's urban space. Similarly, these areas of concerns according to professionals all over the world are identified as relatively prevalent problems to all countries of the world and not peculiar to China alone.

The first challenge identified is the natural resources, which includes the land resources, the relief and other natural endowments. The facts present by their study shows that the total land area idle reserved for planned development is at 1.0793 million mu (approx. 71989.31hectares), land left unused was 822,400mu (54,854.08 hectares) and land approved development but not utilized was 2.0344million mu (135,694.48 hectares). The interpretation of this land analysis presents a total land of 3.9361 million mu (262, 537.87 hectares) underutilized or idle area. This account for 7.8% of currently available land for construction and represent a waste of arable land. Also, lack of water resources is one of the shortages of natural resources identified in the country. Inadequate water resources, uneven water distribution, low efficient use and serious waste of water are part of the water problem

identified in China's community. The significant reason for this shortage of natural resources in China is inherited deficiency of natural resources relative to the rapidly growing large population of China (4).

Another, identified crucial challenge that has significant impact on infrastructure adequacy, informal settlement and most importantly the resilient capacity of china's community according (4) is the living condition of the people. This problem includes the deteriorating living environment and deteriorating living conditions that affects the quality of life in urban environment. Environmental pollution, exhaustive emission of carbon dioxide and pollutants that affects the air quality, rivers; lakes, ground waters, and causes acidic rains among others are the experience of china's community. Drinking water is not sure to be safe, waste treatment capacity is low compared to the required capacity, urban waste water and solid waste increases rapidly every day.

Furthermore, the challenges of inequalities in social class also affect the allocation of resources such as social safety facilities, health facilities and public education resources among other resources. These are part of the resources that are identified unequally-available to the people due to the inequality of the social class (strata). The experience of China's community in relation to the identified social class aggregates the sense of unfairness and injustice (4, 8). The resources received by the lower social strata are not in proportion to their population, which heavily influences their inability to make social transition upwards. These challenges identified through social strata are enormous and cannot be over emphasized but it can be effectively reduced, eliminated by developing an innovative allocation mechanism for public resources and fostering a fair social opportunity.

Public policies and public finance in relation to the identified city resilient of China presents the need for improvement. The clause surrounding the urban planning in the constitution are closely connected but the issue of execution among others are inadequate (4). Considering all this challenges, the City Planning Laws in China is identified inadequate, inefficient and need to be improved on. The constitutional related laws and urban planning law issues are not clearly defined and administered. Another related issues are the administrative system that constraints the social functions of urban planning. Since inceptions, the initial centralized government systems of urban planning in China are still in the process of being decentralized and some generic planning functions are being assigned to several different government departments which create ambiguity. To effectively integrate and harness this urban planning laws in China, the macro-regulating functions of urban planning must be defined by today's land requirement; today's use of land and most especially the control of right to land development must be according to today's laws. The situation of urban planning laws at the moment can be describe as degraded passive with the role of urban planning in guiding or controlling the land market considerably limited. The appropriateness of technology as the concept of urban planning is established, due attention is not giving to policy making process and implementation. To government and other officials, urban planning and planners are just like standardized file that only exist in text and drawings; which emphasize the preparation of plans rather than its implementation (4).

However, the of issue of infrastructure adequacy, informal settlement and adaptation for future resilient city in Hong Kong from the study of literature such as (23), (24, 25), (26), (27) and (28) among others. Identify urban areas, informal settlement (social housing rentals) and everyday life in Hong Kong as a significant challenge that militate against city resilient of Hong Kong.

(28), identify "eight types of squatting by illegal or irregular development of some privileged groups in colonial and post-colonial Hong Kong." The study emphasizes property right inadequacy, land law ambiguity, ambiguity of property; contracts against the rich and the poor squatters. Although, (28) use the word squatters and irregular development, but considering the definition adopted (3) in this research, the summary of review literatures and the Hong Kong government 1974 definition reference by Lai 2015. The term used (squatter and irregular settlement) is informal settlement by meaning and context. The research identifies five (5) types of squatter's settlement (informal settlements) in Hong Kong and eight types of informal settlements by illegal or irregular developments. The summary of Lai 2015 research, describes the gap between de-jure and de-facto rights and inadequacy in rationale for informal settlement or irregular development policy in Hong Kong urban centers. The research states that the policy regarding informal settlement, squatting and irregular development should be implemented across all the settlements.

Similarly, the research of (27) tends towards policy inadequacy of social housing rentals in Hong Kong. Comparing the UK social housing rental price market with Hong Kong price market, the research identifies high cost of housing with unequal quality of life (basic services) in Hong Kong social housing rentals. The research emphasize that social housing should not be capitalism in any way and consistency in provision of social housing should be seen as necessary to grant quality of life to the people. Running through the neoliberal policy divergence, the



research discusses Hong Kong inadequate city resilience capacity or the city phased out if housing policy and market price are not properly integrated. Considering, the origin of Hong Kong housing system from UK and the similarity between the Hong Kong and UK housing system. The research identify Hong Kong political factor as significant in housing success achieved so far (“Hong Kong government has political reasons to invest and take the decision they take in Hong Kong housing system”) if compared to UK (27). The study describes the period of British colonization, post-colonial era; the post war and modernization period in relation to social housing in Hong Kong and UK. Several recommendations were made, but of significance to this research is that “the delivery of public and private services and infrastructures are necessary for city resilience and livability” (27, p. 113).

The research of (26) and (23) discuss the planning approach and factors that should be considered in achieving quality of (environment, housing, infrastructure and informality) in urban life. Unlike the research of (28) and (27) that discuss the policy implications and perspective of infrastructure and informal settlement. (26) emphasize the government (policy administrator opinion) approach towards the modernist planning in the case of Wan Chai (Wan Chai North and Wan Chai South) urban district. Using six criterial, the research investigates the difference between the modern urban area and the traditional urban area (Wan Chai North and Wan Chai South). Comparing the two areas, the research point out that urban planning in Hong Kong has not taking into consideration the drift in the rational planning approach to user-oriented planning approach. Thus, the research presents inadequate city resilient capacity of Hong Kong towards resilient future urban centers in; satisfactory planning policies, shortage of public open spaces or inadequate use, inadequate facilities and urban areas for effective everyday life (26). Consequently, the research also agrees with the presence of infrastructure inadequacy and informal settlement in Hong Kong but from the few of planning approach and policies. By comparing the traditional area with modern area and using the rational planning and user-oriented planning. The research of (26) identify inadequacy in transforming everyday urban life of Hong Kong not resilient enough for future urban center.

Similarly with (26) among other literatures on planning practices and theory perspectives; (23) also considered the factors affecting urban renewal in high density city of Hong Kong. The research findings also present inadequate city resilient capacity of Hong Kong towards the re-development practices. The study identifies different urban challenges such as traffic challenge, effect of densely developed structures and the effect of urbanization on quality of living among others. The study discusses the redevelopment strategies such as sustainable redevelopment factors, urban design considerations for sustainable built environment to enhance the identified inadequate city resilient capacity of Hong Kong. The study discussion, findings and recommendations in the study include but not limited to quality of welfare planning and provisions, conservation and preservation; land strategy, community contributions; integrated design, transport arrangement among others. Significant recommendations from the study of (23) and literatures relevant to this research “states that investment in public infrastructure and social services can promote economic development, and their existence is a necessary precondition for economic growth”. Also the study concludes that “provision of various social infrastructures and public facilities help to improve the public health; quality of life of different groups, meet their modes of living, reduce social inequality, and enhance civic pride (23, pp. 141, 145). The discussion of findings and the recommendation of (23) along the focus of this research emphasize that there is a relationship between infrastructure and informal settlement, and there is a need to study the adequacy of it in an informal settlement to achieve sustainable development.

#### **4. Study Area and Methodology**

The study area is Hong Kong SAR of China and the paper discussed the global perspective of the research aim through literatures; followed by China (i.e., Chinese mainland) and then the Hong Kong perspective to obtain specific and general information on the study focus. Using case study methodology, triangulation method of data collection and mixed method of data analysis (quantitative and qualitative method), findings were made and adequate recommendations to ameliorate the identified challenges were recommended.

The study adopts case study methodology, where specific areas of Hong Kong urban centers (Hung Hom, The Hong Kong Polytechnic University campus and Tai Po market area) were adopted for data collection and research study. The triangulation method of data collection is the collection of data through the use of two or more approach and this is essential in the study to validate and strengthen the data collected. The triangulation method of data

collection strategy adopted in the study includes the primary sources of data collection, secondary sources of data collection in more than one approach (qualitative and the quantitative method of data collection). The primary sources of data collection were collected through the use of reconnaissance survey, observation, indirect (unstructured) interaction with the resident’s and the stakeholders of the selected settlements. Also, a total number of 75 (seventy-five) structured questionnaires were administered within the Hung Hom, (The Hong Kong Polytechnic University campus) area and Tai Po Market area and a total of 67 (sixty-seven) questionnaires were analyzed. To further capture the larger view of the Hong Kong resident and stakeholders, an online questionnaire was also administered and a total number of twenty-eight (28) questionnaires were analyzed for the purpose of this study. The secondary sources of data adopted include the literature review of content and context related to literatures to the research focus. This serves as the platform for the research concepts, the data collection and data analysis used in the study.

Data were analyzed through the uses of mixed method data analysis (quantitative and qualitative method of data analysis). The quantitative include the use of tables, chart, histogram and basic statistics; while, the qualitative include the use of plates and descriptive tools used in interview interpretations. The data were interpreted, and the results of findings were integrated to reflect the characteristics of the informal settlement and infrastructure in the study area. Infrastructural adequacy and resilience of the city are determined and recommendations are made accordingly. This research was carried out to extract specific and general information and knowledge of city resilience of Hong Kong in relation to informal settlement and infrastructure planning.

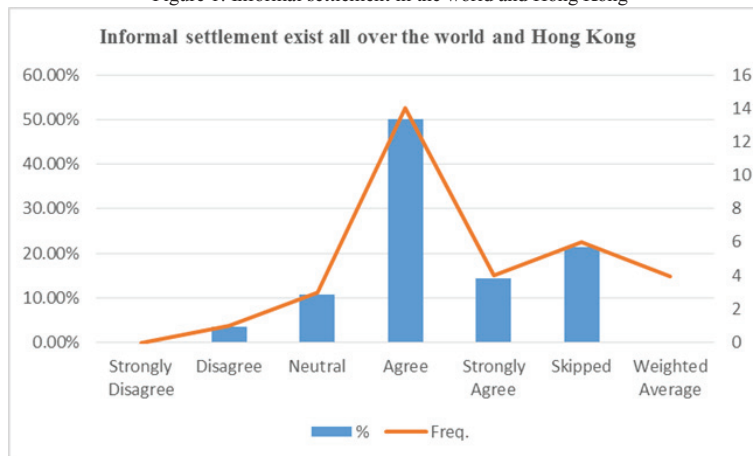
### 5. Findings and Discussion

The presentation of the research outcome covers the issues examined on infrastructure adequacy and informal settlement in Hong Kong from the literature study, the interviews and the survey conducted. The research findings are based on information extracted from the residents, researchers, professionals and stakeholders in Hong Kong and in relation to the subject of study.

#### 5.1 Informal Settlement in Hong Kong:

The findings present 50% of the respondents as strongly agreed to the present of informal settlement, 14.28% strongly agree, 10.71% are neutral about the present of the challenge (it may or it may not), 3.57% disagree about the present of informal settlement as a global challenge and present in Hong Kong, while nobody strongly disagree with 0.0% and 21.42% of the respondent are indifferent about it. The findings of this research from the data above, present informal settlement as a global challenge and a phenomenon present in Hong Kong. This also agree with the study of (3, 29) and (30) on existence of this challenge as a critical challenge that required urgent attention in Hong Kong and the World.

Figure 1: Informal settlement in the world and Hong Kong



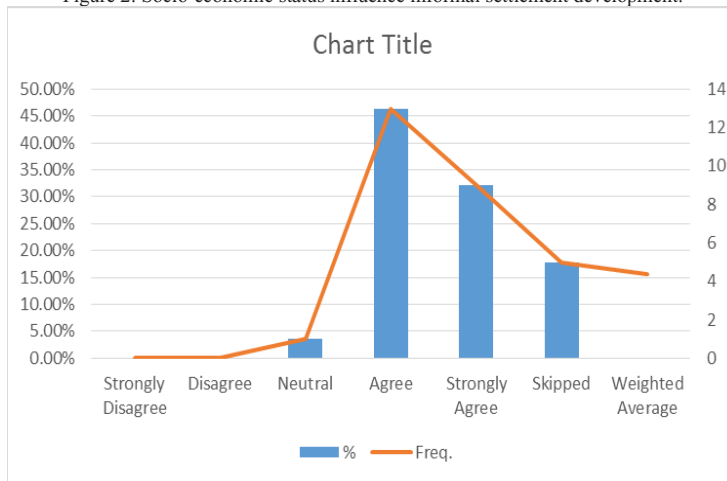


Source: Authors' Field Work (2016)

5.2 Socio-Economic Status and Informal Settlement:

The study findings of the relationship between socio-economic status and informal settlement in the study area, shows that 46.42% agreed that there is a relationship between the socio-economic status and living condition of the residents. This implies that, socio-economic status has the tendency to induce informal settlement and can at the same time ameliorate the challenges of informal settlement. Also, 32.14% strongly agree with this statement, 3.57% of the respondent are neutral, 0.0% disagree and strongly disagree with the assertion and 17.85% indifferent about the phenomenon. These findings are further validated by the study of (27, 29, 31, 32), the studies which discuss the connection of income, the financial prosperity and crisis (financial policies) in relation to the challenges of housing and subsequently informal settlement development.

Figure 2: Socio-economic status influence informal settlement development.



Source: Authors' Field Work (2016)

Also, the finding of this research was not only validated by the different literatures identified above. The Hong Kong population and household statistics analysis by district in year 2014 further validate the relationship between the resident socio-economic status and development of informal settlement. These statistics describe the relationship between income and informal settlements in the study areas with most of the low income areas identified with compact highly dense housing and informal structure characteristics. Areas like Sha Tin, Kwun Tong and Sham Shui Po among others are the high density areas with such characteristics and that record median monthly household income of 26,000, 19,000 and 18,000 respectively with the evidence of informal settlement according to the government statistics (33, 34). This further justify the assertion of this research as to why we have more informal accommodation in these areas as the income is low and housing provision becomes survival of the fittest and subsequently results into informal shelters as alternative

5.3 Types of Informality in Hong Kong:

The study identified five types of informal settlement based on literature and physical evidence of informal settlement in Hong Kong urban centers. To examine this assertion, to determine what the type of informal settlement that still exist in Hong Kong and to what extent does the people accept this by ranking it. The research findings on informality types by illegal land/building ownership (that is illegality by title document) shows 47.37% disagree, strongly disagree 21.05%, 21.05% agree, 10.53% neutral and 0.00% strongly agree. Informal settlement by haphazard building development present disagree and agree at 31.5%, strongly disagree and neutral at 15.79% and

strongly agree at 5.26%. The unauthorized types of informal settlement response present disagree and neutral to be 26.32%, strongly disagree and agree at 21.05% and 21.0% respectively and strongly disagree at 5.26%. Informal settlement by unplanned zone uses recorded 52.63% disagree, 21.05% neutral, strongly disagree and agree at 10.53% and strongly agree at 5.26%. The inadequate facilities and services informal settlement inducers according to the response present disagree at 35.00%, neutral at 30.00%, agree at 20.00%, strongly agree at 10.00% and strongly disagree at 5.00%.

Table 1: Raking the types of informality in Hong Kong

Ranking of informality types within Hong Kong	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Weighted Average
Illegal land/Building ownership (title documents)	21.05%	47.37%	10.53%	21.05%	0.00%	2.32
Haphazard Building	15.79%	31.58%	15.79%	31.58%	5.26%	2.79
Unauthorized settlement	21.05%	26.32%	26.32%	21.0%	5.26%	2.63
Unplanned zoned uses	10.53%	52.63%	21.05%	10.53%	5.26%	2.47
Inadequate facilities and services settlements	5.00%	35.00%	30.00%	20.00%	10.00%	2.95

Source: Authors' Field Work (2016)

The study findings from the responses infers that there exist informal settlement in Hong Kong but at a very insignificant rate as most response are closely related on both sides of agree and disagree. Thus, weighted average is carried out to determine the most likely occurred type's informal settlement in Hong Kong and the findings present inadequate facilities and services induced informal settlement with 2.95, followed by haphazard building at 2.79, unauthorized settlement 2.63, while unplanned zoned uses and illegal land/building ownership illegality recorded 2.47 and 2.32 respectively.

#### 5.4 Nature of Informal Settlement in Hong Kong

Informal settlement with all evidence from literature and survey above present the appearance of informal settlement in particular types that are closely related to one another. However, these responses present the nature (forms or characteristics) of occurrence of these types of informal settlement from different natures of informal settlement that exist in Hong Kong. The research findings present cage house informal settlement forms of informal settlement in Hong Kong with 30.00% agree, disagree at 25.00% and strongly disagree, strongly agree and neutral with 15.00% respectively. The shanty structure informal settlement appearance within the settlement records 31.58%, disagree 26.32%, neutral and strongly agrees share 15.79% and strongly agree 10.53%. In built informal settlement (rooftops) present 31.58% neutral, 26.32% agree, 15.79% strongly disagree and disagree with 10.53% strongly agree. Informal settlement spread within the settlement or pockets of informal settlement everywhere is obvious at 31.58% agree and disagree, 15.97% strongly agree and disagree and 5.26% strongly agree. The identified clustered of informality as both night market and other temporary cluster informal settlement records 42.11% neutral, 21.05%, strongly agree and disagree records 15.79% respectively and 5.26% strongly disagree.

Table 2: The nature of informality in Hong Kong

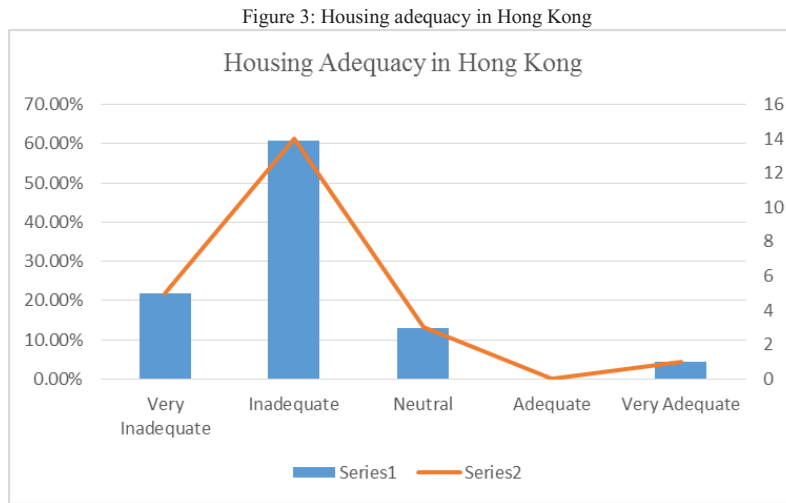
Ranking the nature of informality within Hong Kong	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Weighted Average
Cage house informal settlement	15.00%	25.00%	15.00%	30.00%	15.00%	3.5
Shanty structures informal settlement (i.e. street structures and extended structure)	10.53%	26.32%	15.79%	31.58%	15.79%	3.16
Urban inbuilt building informal settlement. (Rooftop)	15.79%	15.79%	31.58%	26.32%	10.53%	3.0
Scattered space identified informal settlement (pocket informal structures)	15.79%	15.79%	31.58%	31.58%	5.26%	2.95
Clustered space identified informal settlement (night market and temporary settlement)	5.26%	15.79%	42.11%	21.05%	15.79%	3.26%

Source: Authors' Field Work (2016)

The research findings describe the appearance of cage house informal settlement as the most visible nature of informal settlement in Hong Kong with 30.00% and 30.5 weighted average and this is followed by clustered night market or temporary nature of informal settlement with 21.05% and 3.26 weighted average; informal street structures with 31.58% and 3.16 weighted average. The least occurrence according to the findings are urban inbuilt informal settlement (rooftops) with 31.58%, 3.0 weighted average and scattered space informal settlement (pocket structures) with 31.58% agree and disagree with 2.95 weighted average.

5.5 Housing adequacy in Hong Kong

Housing adequacy in Hong Kong had been a challenge that features in different forms and connected to different development factors in different ways. This research investigates the residential adequacy as an influencer of informal settlement or how related housing inadequacy contributes to informal settlement. The study finding reveals inadequate 60.87%, very inadequate 21.74%, neutral (may be or may be not) at 13.04%; very adequate 4.35% and adequate 0.00%.



Source: Authors' Field Work (2016)

5.6 Access to Adequate Facilities and Services in Hong Kong

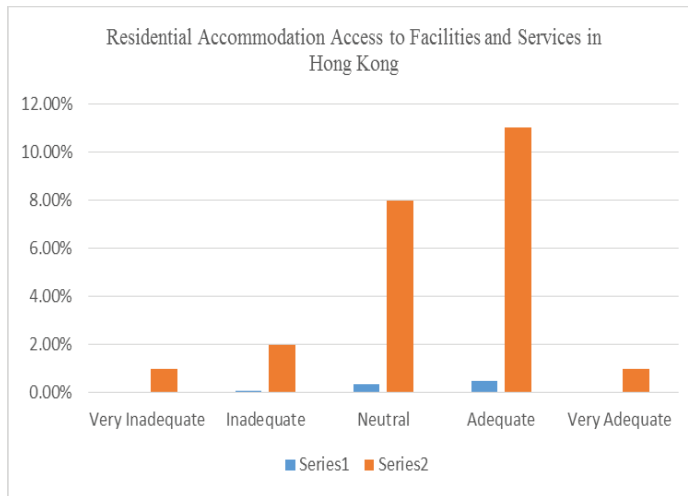
The research outcomes on access to facilities and services and its adequacy in different areas of Hong Kong shows that housing accessibility is efficient at 68.65% and 47.83% from the resident and professional and research responses respectively. Neutral from few professionals and researchers at 34.78%, inefficient at 19.40% and 8.70% resident and professional respectively.

Table 3: Access to adequate facilities and services in Hong Kong

Residents Response	Residential access to facilities-critical Services					Total	%
	Very Inefficient	Inefficient	Neutral	Efficient	Very Efficient		
<b>Total</b>	<b>1.49%</b>	<b>19.40%</b>	<b>0.0%</b>	<b>68.65%</b>	<b>10.44%</b>	<b>67</b>	<b>100.0%</b>
Professionals, Researchers and Academia responses.	Residential access to Infrastructure-Critical Services					Total	%
	Very Inefficient	Inefficient	Neutral	Efficient	Very Efficient		
<b>Total</b>	<b>4.35%</b>	<b>8.70%</b>	<b>34.78%</b>	<b>47.83%</b>	<b>4.35%</b>	<b>28</b>	<b>100.0%</b>

Source: Authors' Field Work (2016)

Figure 4: Access to adequate facilities and services in Hong Kong.

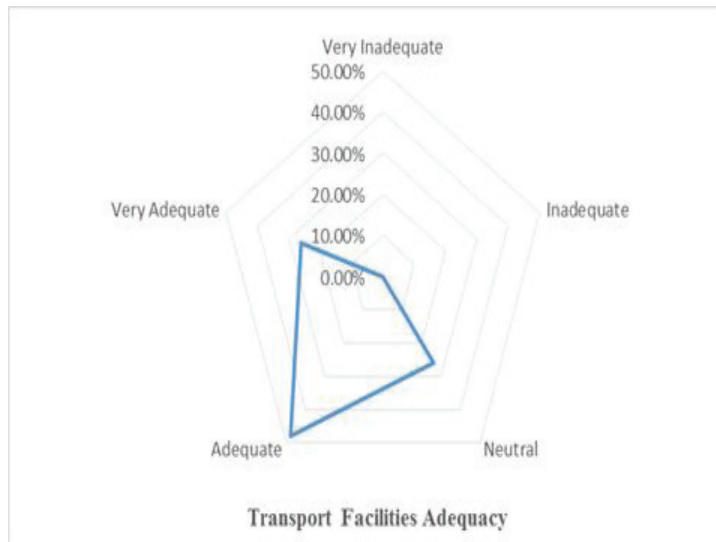


Source: Authors' Field Work (2016)

### 5.7 Transport Adequacy and Informal Settlement

Transport facilities all over the world are identified as a challenge at different capacity depending on the level of infrastructure development. Hong Kong transport as one of the best in the world has its share despite the high level of efficiency and connectivity experience within the country. Transport adequacy in Hong Kong from the research findings present adequacy 47.83%, very adequate and neutral 26.09%. However, from the findings of this research, the unstructured interview and the literature search. This research established that although there is a relationship between transport and infrastructure in settlement development (most especially informal settlement development). The high level of transport and infrastructure development has great impact on the city development, the country is developed but there still exist informal settlement within developed and adequately connected transport and infrastructure developed areas of Hong Kong.

Figure 5: Describing transport facilities adequacy in all settlement in Hong Kong



Source: Authors' Field Work (2016)

## 6. Recommendation

The focus of this research is to investigate informal settlement and infrastructure adequacy in Hong Kong for future resilient urban centers. Considering, the findings of this research from literature review, site visit, observations; questionnaires and unstructured interview with the residents. This study recommends the following and subsequently concludes as follows:

1. The public housing initiative and Newtown developments has been stopped for about two decades now; the government should go back to the building of this public housing initiative to house the high population of the low income citizens and the street sleeper.
2. The government should adopt inclusive design approach as much as possible, even though very challenging in a neoliberal system of government like Hong Kong and considering the intense disagreement going on in some development project in the country.
  - However, the government should educate the public (the citizen's) very well of their idea and make better awareness and sensitization than what is on ground now.
  - Also, the role and benefits of both the public (citizens) and the government should be clearly stated to achieve inclusive design and success of the initiated projects.
3. Also, the existing policies on criteria's for achieving some of the government's public housing provision should be review with the citizen participation forum. This condition is assumed ridiculous from the opinion of the people interviewed and it's even assumed as part of the stigmatization origin. Because, the people believe that for you to meet such criteria you must really be poor of the poor. So, the condition of allocation should not be make or presented in a way that attract stigmatization.
4. Public education and enlightenments should also be carried out to avoid stigmatization of the public housing occupiers.
5. Economic policy reforms should also be carried out to encourage equal economic development or at least reduce the gap between the rich and the poor as the country economic prospers.
6. The planning system in the country is great but should avoid crisis planning approach; projects and planning (housing, infrastructure project) should be a deliberate planned out attempt.
7. The government tolerance level should be re-viewed, the inaction or silence of the government should be avoided and these settlements should either be integrated into the housing system by face lifting them; or removing them to reduce the spread of informal settlements rather than government been silence over them. Also the selected tolerance should be avoided and some utility bills collected from some settlement and some settlement not been allowed.
8. Infrastructure condition in the country according to the research findings, and physical evidence in the country is good but should be improve in selected informal settlement areas and be integrated in a way that can aid equal economic development in the country.

## 7. Conclusion

The study concludes that informality exists in every country of the world and the nature of informality in a country or settlement depends on the development of the country. The study further reveals that the different types and nature of informal settlement that can be identified in Hong Kong are cage house, shanty street structures, rooftop informal settlement, pocket informal settlement and night market. This emphasizes the statement that informal settlement exists in different forms and severity in different countries of the world. Also, the study reveals that informal settlement is related to infrastructure and the improved development of infrastructure does not necessarily refer to the absence of informality as the case of Hong Kong reflect this. The research again points out the role of socio-economic capacity in relation to informal settlement development. This is evidence in Hong Kong as the present of informal settlement is identified in some specific location of Hong Kong and while majority of the country is developed but yet there exists informal settlement in some specific location of Hong Kong. That is, the unequal element of economic capacity and distribution of economic resources also contribute to the identification of informal settlement in the country.

The nature of informal settlement and the adequacy of infrastructure provision in Hong Kong and assess to socio-economic characteristics of such settlement to foster the required future urban growth is high; that is resilient and sustainable. But it's not resilient and sustainable enough for the future capacity of Hong Kong considering the factors discussed above. The increase population growth, economic development with widen gap between the poor and the rich. The high cost of living, the current trend of unaffordable housing and non-availability of housing among others in-respective of the infrastructure development will keep inducing informal settlement and subsequently reducing the capacity of the country to foster sustainable and resilient future urban center.

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