“UNLOCKING DEAD PUBLIC CAPITAL”

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CERTIFICATE

This is to certify that this thesis entitled: **"Unlocking dead public Capital"** submitted by **Mr. Azwar Muhammad Aslam** is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Economics and Finance.

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Author's Declaration

I **Azwar Muhammad Aslam** hereby state that my M-Phil thesis titled "**UNLOCKING DEAD PUBLIC CAPITAL**" is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/World.

At any time if my statement is found to be incorrect even after my Graduation the university has right to withdraw my M-Phil degree.

Date 8/02/22

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Dedication

To my parents

ACKNOWLEDGMENTS

First of all, the highest words of gratitude are offered to Almighty Allah, who, of course, is the one and only source of my strength, ability and, above all, the enduring capacity which is essential for completing such a great mental job. Besides the Benefactor of the whole Universe, note of thanks must go to the Holy Prophet Muhammad, (SAW), the Mercy for the entire Humanity, who came up with the universal message for the human beings to explore the hidden treasures of knowledge, and, therefore, motivated the spirit of research and wisdom for knowledge and truth.

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Abstract

The prime land owned by the state in the cities is used to provide housing to government employees, these houses are constructed as single-storey units, which constitutes huge underutilization of land. This underutilized land, if utilized to its potential offers immense opportunities of employment and economic growth while addressing the problems i.e., excess demand for housing, commercial space and urban sprawl. We show this using the case of housing units constructed for government employees in G-6/1, Islamabad. The construction of 6 high-rise buildings, each having 450 apartments can host all the federal government employees currently allotted houses in G-6/1. These 6 high-rise buildings will consume 9 acres of land and will free up 77 acres of land in G-6/1 currently occupied by single-storey government houses (including streets etc). The auction of freed up 77 acers will generate a revenue of Rs 52.2 billion for the government. After auction, the private sector can build 36 high-rise buildings on this land having 16,200 apartments. This will decrease the housing backlog of Islamabad by 16 percent. The construction of above mentioned 42 buildings will increase the GDP by 0.09 percent along with generating huge employment. The opportunity cost, in the shape of travel cost that will be incurred if the residents of the proposed apartments were to live 34 kilometers away from the city center. We estimate that this opportunity cost is approximately Rs. 4.42 billion. The economic benefits mentioned here will accrue just by replacing single storey government houses with high rise apartments. If the entire government housing in Pakistan is replaced with high-rise apartments and the freed-up land is utilized for residential and commercial purposes benefits of mammoth proportion shall accrue to the economy.

Keywords: Dead Capital, Public Land, Underutilization, High-Rise, Public Real Estate, Construction.

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List Of Abbreviations

GDP	Gross Domestic Product
MEP	Mechanical Electrical and Plumbing works
FGEHA	Federal Government Employees Housing Authority
ADF	Augmented Dickey Fuller
PP	Phillip Pharron
ARDL	Auto Regressive Distributive Lag model
Sq. Ft	Square Foot

Chapter 1

INTRODUCTION

1.1 Introduction

Government housing in prime locations within the city is constructed as stand-alone single housing units. Which at maximum would have ground plus one floor. This kind of housing constitutes under-utilization of public land. Broadly this study seeks to examine the benefits that may accrue to the government and society at large if government housing has to be provided in high-rise apartments instead of single storey houses. Going vertical within the city has several benefits – this will increase accommodation within the city, discourage sprawl, reduce commute costs for workers, save energy. Moreover, the construction of high-rise buildings will increase economic activity and employment.

About 45-75 percent of the wealth of developing nations remains in real estate, putting them on top of the list of untapped opportunities in land, buildings, and other financial assets (Ibbotson et al., 1985). As a developing nation with housing sprawl, the situation in Pakistan is no different from other developing nations as 90 percent of the state-owned land, out of which only in the urban domain, is valued at over Rs. 300 billion is used either as rest houses or official residences, which can otherwise generate economic activity (DAWN, 2018). For Pakistan, the underutilization of sizeable state-owned land has significant consequences for social welfare and financial losses that are also under-reported due to poor data collection and accounting practices.

Among other reasons, rising real estate prices, a shrinking supply of available land, poor planning standards, inefficient land use regulations, and prevalent informal processes are significant hurdles in the way of the smooth pace of real estate development in Pakistan.

Lopsided division of the state-owned land for housing and commercial purposes has caused severe shortages of land development even in the capital, where 55 percent of the land is pronounced for residential purposes compared to only 5 percent for commercial activities (Planning_commision, 2011a). Thus, excessive demand for commercial activities in the cities is either forced out of the cities or is forced to be met in residential areas. However, housing sprawl remains the one of the indicators of underutilization but, when linked to the rising value of the state-owned land, compounds the problem because most of it is found in the city centres. Development of the city is related to the city centres; city centres attract ideas and define the city, and are considered to be the heart of the city (Haque & Nayab, 2007). These areas can be brought back to their full potential if redeveloped to meet commercial purposes and private housing demand.

The redevelopment of the public properties will not only meet the growing commercial and housing demands. It will also provide opportunities for the industries involved in the revamped process, i.e., the construction sector. The construction sector has a vital role in the development and economic uplift of the country as they are one of the major sources of economic activities, development, and economic growth (Khan, 2008). The construction sector has backward and forward linkages with other sectors and industries, and the construction sector provides stimulus to around 41 other industries (Nawaz, 2020). Therefore, any increase in construction activities will cause an increase in the demand for materials used in construction and labour, resulting in an increased employment rate in the country. As per Pakistan Economic Survey, 2019-20 construction sector has a 2.53 percent sectoral share in the GDP of Pakistan and employs 7.61 percent of the labour force. Farooqui et al. (2008) stated that roughly 30-35 percent of the employed labour force is directly or indirectly affiliated with the construction sector in Pakistan, hence having a considerable

share in the total employment, given its importance the redevelopment of these public properties in the cities will have a significant impact on the economy of the country.

1.2 Background of the study

Pakistan being a developing country, is struggling with the problem of achieving economic growth. At the same time, the assets that the state owned are largely underutilized and used for purposes that don't satisfy the economic and social needs. Public owned land is at most attractive places in the cities surrounded by commercial hubs; these lands are mostly used to host government employees, which can offer immense opportunities if used otherwise. Sector G6/1 is at the city centre hosting buildings that accommodate Government employees, and these buildings are constructed as stand-alone units on land worth millions. Converting these houses into high-rise buildings will accommodate more persons, discourage urban sprawl and the land freed up can be used for commercial and private residential purposes. The population has increased drastically, and the needs are forced to be met out of the cities, encouraging sprawls and creating a dire need for redevelopment of these underutilized properties. The redevelopment process will cause an increase in the construction activities, which will in return increase employment and cause an impact on the GDP

1.3 Objectives

To Estimate the benefits that will accrue to the society and economy if public housing is made available in high-rise apartments and the land freed up is used for commercial or private high-rise housing.

1.4 Research Question

- What will be the impact on the GDP of replacing the single-unit state-owned houses in G-6/1, Islamabad with high-rise buildings?

- How much employment will be generated due to high-rise construction?
- What savings to the economy will accrue due to the provision of housing in the Centre of the city?

1.5 Significance of the study

The findings of the study will be helpful to have an estimate about the effects of the redevelopment of underutilized public properties on society and the economy. Government and local administration will have better idea about the administration of state-owned assets.

1.6 Motivation of the study

Majority of the prime land in the cities, which could easily be transformed and used for productive purposes is lying idle due to the lack of research on the subject. Rationale behind conducting this research is to provide an estimate that this public land possesses and benefits that will follow after implementing the alternative use. The current situation of the public land in the cities and its present use is costing the governments financially and otherwise. Financially, by depriving the state of potential revenues from alternative uses and otherwise, due to the current land use the resulted increase in urban sprawl and the costs associated with it.

1.7 Organization of the study

After the introduction chapter. The next chapter, chapter 2 gives an overview of the literature review. Chapter 3 discusses the methodology of the study, data collection, estimation and conceptual framework of the study. Chapter 4 discusses the study area and the estimates regarding land, buildings and auction and economic estimates. Chapter 4 incorporates the estimation results and the estimation for the impact on the

GDP whereas chapter 5 discusses the saving to the economy and society with the provision of housings in city centres.

Chapter 2

LITERATURE REVIEW

2.1 Literature Review

While discussing dead capital, De Soto (2001)termed those assets and land as dead, out of which societies are unable to extract economic life, and such assets are only seen in their natural physical state. Instead of from a conceptual viewpoint in a way that, how much potential an asset possesses? What is the potential alternative use of the assets from which economic activity can be generated? Now buying the idea of dead capital and applying it to the way state-owned assets (in our case, state-owned land) are managed and used in Pakistan. Governments are continuously looking upon these assets in their underutilized physical form, ignoring the potential economic activities and revenue these assets could generate. It's safe to term these assets as dead public capital.

Public land ownership in and around the cities of Pakistan is very high; 90% of the peripheral land in Karachi is in public hands (Van der Linden, 1994). Public land in cities ranges between 20 to 40 percent. In Lahore, 30 percent of the total land is owned by the state. Large areas of these lands are transferred to local development authorities in the cities among these, most of the land is located in areas with high market value, which is underdeveloped. If these lands are utilized to their potential, these can ensure commercial, residential and industrial opportunities (Dowall & Ellis, 2009). Almost 10,000 acres of commercial land are under the control of the public sector. Among these, 4000 acres are occupied by five government officers' residences in Lahore, representing a substantial amount of dead capital in Lahore. If this land is redeveloped, 35 high-rise mixed-use buildings can be constructed, which will generate approximately 350,000 to 500,000

employments during the construction phase of each building (Haque, 2021). Approximately 28,454 federal government houses are owned by Federal Government across Pakistan, with Islamabad hosting the majority of these houses, i.e., 61.4 percent. These houses are used to accommodate government servants. According to an estimate, the residential market value of the federal Government-owned houses in Islamabad is approximately 1.45 trillion. If these houses are demolished and land is used for commercial activities, it would have a significantly higher value. The rental income these federal government houses could generate annually is 10.75 billion, which is the opportunity cost of providing these houses as residencies to government employees. These houses are built on the most valuable land near downtown Islamabad and are used for unproductive activities. Government is not only losing the potential revenues, but these unproductive assets are wasting precious resources in terms of maintenance costs (Haque et al., 2021). By monetizing the government officials instead of providing them with housing on state-owned land in city centers and releasing the land for redevelopment will result in an investment potential of 6 to 10 trillion. Which is equal to 30 to 50 percent of GDP of Pakistan. Releasing of the land held by the state at prime location will start a cycle of construction, innovation, entrepreneurship and community (Haque, 2015). In Punjab, the official residencies of high basic pay scale government officers have occupied the land area of 8975 kanals. This land is constructed as bungalows, and official residences, with each spread on an area of 10 to 104 kanals. Only the land on which these bungalows are constructed is worth over 403 billion rupees. The annual maintenance cost of one 5 to 25 kanals official residence is 5 to 15 lacs, and the total maintenance cost of these official government residencies in Punjab is approximately 10.5 billion rupees; the transformation cost of these buildings is not part of the annual budget hence excluded from the 10.5 billion figure (DUNYA, 2018). In Pakistan, the traditional

local municipal and development authorities do not have the essential technical expertise and capacity for effective urban planning and governance (Jabeen et al., 2017).

Taxes and borrowed money are not the only sources which government use to facilitate its citizens; immovable assets are the other. Governments are mostly inefficient in the use of these public-owned assets. Governments usually do not utilize these assets, and when they utilize them, these are either not productive or are underutilized. Looking from the lens of public spending on these assets might distract one from this underutilization because the spending that seems cheap from a budgeting point of view may be expensive from a resource use point of view. The opportunity cost of using public land is not shown in the budgetary cost. In the case of the building, amortization and rental value of the building is not measured in the budgetary cost as these lands were acquired in the past and currently are looked upon as if they possess zero value; furthermore, there is no incentive at the end of government to put these assets to most productive use, and underutilization of these assets results in the loss of potential income and welfare (Tanzi & Prakash, 2000).

Pubic real estate management means optimizing the real estate portfolios and creating value from public real estate assets. "*It can be defined as the active, results-oriented, strategic and operational management of public sector real estate assets as well as the use and making available of property, both economically and in accordance with demand, for the fulfilment of public sector tasks and with regard to the particular concerns of public sector task fulfilment and achieving objectives serving the public good*." (Pöll, 2017). Currently, public real estate management policy is primarily focused on promoting the public interest instead of aiming for profitability and economic rationality. Hence, instead of looking at profitable alternatives, administration considered public real estate as a burden and used the public real estate for unproductive activities (Vermiglio, 2011) . Public property needs to be actively managed, and there is broad consensus about the absence of active property

management observed in the public sector (Gibson, 1994). Pöll (2017) recognized the shortcomings in public real estate management, which are; the absence of real estate objectives, absence of strategies and planning, absence of transparency in real estate due to lack of information on these assets, use of accounting techniques that are outdated, less flexible and do not take depreciation into account, along with inadequate controlling methods, inappropriate performance, lacking a system that offers an economical approach to public real estate, the great influence of limits of budget and policy on real estate management. According to Lyons, (2004), the fundamental part of asset management is to look at the assets which can be efficiently exploited and effectively retained, together with identifying those assets which are best disposed of to raise revenue for reinvestment. Governments around the world are completely uninformed about good asset management (Kaganova & Telgarsky, 2018) . Simons (1994) pointed out existence of an expertise gap in the administration of Public real estate and suggested the need for a new type of planner that would help in the administration of the public real estate.

Property value, revenue and costs are required to assess the financial performance of the property along with its market value. Unavailability of data on current market value is a big concern, and it affects the effectiveness of public property management; mostly the public-owned properties are not taxed, due to which the tax authorities don't have the incentive to assess the current market values of these real estates, making the financial analysis of the property difficult (Simons, 1994). Having precise and up to date information about the land is pivotal for planning, evaluation and decision making for urban development programs and policies (Garba & Al-Mubaiyedh, 1999). Estimation of market value is based on "*Amount a willing purchaser is prepared to pay a willing seller for the asset in its current condition*." Values are often established by using comparable prices for similar assets (Bova et al., 1995). The authorities do not quote the prevailing market value of the land; instead,

they undervalue the land (both public and private) in the cities and set the prices of the land far below the market values, ignoring the location and accessibility. City development authorities and other city administrators in Pakistan practice the under-pricing of land; the market value of land in most cases is 20 times higher than the administrative price which is set by the Lahore development authority in Lahore, i.e., in 1988, 124 RS per square yard was the administrative price set by the authorities against the average market value of Rs 1554 per square yard, similarly in Karachi where reserve price was about one- fifth of the developed market value (Van der Linden, 1994).

Public ownership of land doesn't always ensure more equitable access and more productive growth and development of urban areas (Garba, 1997). Governments can influence what can and cannot be done with land and real estate assets through zoning, land use control, licenses, permits, etc. (Galal & Razzaz, 2001) and governments have direct control over public land, which is used as per the will of politicians, bureaucracy and public administration.

All the public land cannot be used for one purpose in a locality. Each tract of land and each building is unique due to its fixed location (Galal & Razzaz, 2001). Dense city centres have an advantage, as argued by Freeman et al., that in large metropolitan centres, firms have more access to infrastructure, export-related networks, services and structures of consultancy as all these facilities are at one location, so it helps firms in getting higher exports as compared to less urbanized areas (Freeman et al., 2012). Firms can also exploit spatial externalities in highly concentrated city centres known as "agglomeration economies". Krugman (1998) argued in the context of new economic geography theory that in highly urbanized zones, due to a massive amount of high-quality skilled labour, these spatial externalities exist. The presence of these specialized labours lowers the searching costs of the firms. Furthermore, the concentration of economic activity in a specific region

will help the firms in the region with the required materials, which they can get with ease and at a competitive price. (Greece, 2016).

Pakistan is facing the problem of urban sprawls due to limited residential space in the cities. One of the reasons for the limited space within the cities is aversions of the regulatory authorities to high-rise residential apartments. Cities in Pakistan are primarily designed for housing allowing only small space for other activities. City administration in Pakistan is more focused on suburban development and ignores the development of city downtowns. DHA and CDA are the largest land development companies in the country. In Islamabad, public land is developed by the public sector. These authorities build the land and allot it to public officials and employees, as these officials have an incentive in the shape of getting these houses and land, so they promote suburban development at the cost of city Centre developments and leaving the valuable land and real estate for non-productive use (Haque, 2015). This ignorance causes the public land to be underutilized and used for non-commercial purposes, depriving the state of potential revenues and development.

Due to location and high market value, public buildings and public lands in the cities have a high opportunity cost. The results of this practice prevent the major public land in cities that could possibly promote real estate development by inclusion in the market, thus creating the loss of investment potential of trillions (ibid). In Pakistan, City Planning ignored the possibility for high-rise development. It focused on promoting low-rise development in return which led to suburban development. Such development was a result of restrictions on high-rise buildings construction and policies that favor wide roads to promote the private car's movements. Such development is not without a cost as it leads to more land consumption, more transportation cost, increased commuting times, and greenhouses gas emissions. The cost that urban sprawls impose on society is twice that of having buildings near and in city centers; hence there is the need to shift from urban sprawl in favor of

densification. The problem in Islamabad that encourages sprawls and contains dense mixed-used city centers is restrictive zoning (Hassan, 2020) (Chaudhry et al., 2020) .The current constraints have restricted and contained the commercial activities, given the excess demand for commercial activities and less commercial space, these activities are forced to meet at the residential areas (Haque, 2006) . As cities are unable to meet the needs of the peoples, which have resulted in dissatisfaction among the society in the current state of the cities. As the difference between poor and rich countries stem from the productivity of the respective countries' cities. Cities in Pakistan are characterized by no down town/ city centers, cities lack purpose-built infrastructure with all the demands are forced into the only infrastructure that exist, housing, that too is inadequate. With the government presence on the prime land in inner cities restricting all sorts of activities, leading to unbalanced suburb development ultimately becoming urban sprawls on valuable agricultural land, hence government ownership of city centers should be reduced. Cities are engine of human, cultural and economic growth when decentralized, reasonable administrative units that are run with the view of promoting commerce (Haque & Nayab, 2007).

The situation in developed countries is not different from the situation of developing countries as in America, the Department of interior control and manage more than 500m acres, approximately a fifth of the total land area of the country, more is spent on this land and resources compared to what is collected by its use, a burden for the states. Better management of the land and selling the public lands that are underutilized could help in resolving the situation (Economist, 2014).

Countries around the world are forming entities for the enhancement of public entities and for better economic management of the properties. The central Government of Germany in 2005 brought together all the stakeholders administrating the public assets under a federal agency, “Bundesanstalt für Immobilienaufgaben” Federal Institute for Real Estate Tasks

(BImA). The function of BImA was the development and efficient implementation of alienation - transferring property to another entity (public or private) - strategies of low yielding properties along with managing 36000 public properties (BImA, 2020). The service France Domaine was set up in 2007 in France whose purpose was to sell, manage and enhance state-owned properties. French government sold public properties worth 2 billion euro between 2006 to 2011. Hellenic Republic Asset Development Fund S.A was established in Greece in 2011; its responsibility was to increase the return from sale and valorisation of public properties. A divestment program of about 25 billion euros value was prepared, including properties like headquarters of the Ministry of Culture, Ministry of internal affairs main building etc, sold with "sale and leaseback" mode. In the UK, the Government Property Unit was established for the effective management and sale of public properties. Public properties in the UK are worth approximately 370 billion pounds. Similar institutes were set up in Belgium, Spain, Ireland and Italy with an aim to enhance the utilization of public properties and to increase alienations of the properties for raising revenue for the state (Tajani et al., 2017).

The Ombeni et al. (2009) studied the transformation of Residential units into commercial spaces in Dar Es Salam, Tanzania. They observed that transformation had an overall positive impact; redevelopment resulted in using the space effectively than before, creating more commercial space and residential space. Along with it the, redeveloped area and surrounding locations were turned into significant hubs by integrating the living and working spaces in the urban area. 40 Acre Lansdowne Park, owned by the city of Ottawa, Canada, which is located within the city, was redeveloped under public-private partnership; the redevelopment debate of the park was initiated after an audit was conducted into the use of public resources in managing and maintaining the park. The redevelopment of the park, which was formerly a fairground, sporting venue and parking area for surroundings

residences since 1868 and was underused[1], now included mixed-used residential and commercial areas, urban park land, stadium and community use. The redevelopment process turned the park into an attractive urban destination, with 25 percent of the former park space proposed for commercial purposes. (Carew et al., 2015; Hilton et al., 2010) lately a project under the name Hellinikon is launched in Athens, Greece, which will use a disused airport and redeveloped the 150-acre plot into skyscrapers for offices, hotels, park and about 800 residences after much of delays caused by bureaucratic, political and red tape culture on the area. The project is expected to attract huge investment and tourists after completion, generating revenue, and during the construction phase, it will create 10,000 jobs (Koutantou, 2020).

The transformation and redevelopment in developed countries are not only limited to just public assets, i.e., buildings but the efforts are now made to regenerate the public spaces such as streets, parks, etc. Public spaces that are responsive to diverse communities are well maintained and are well designed, and such spaces can provide the cities with economic benefits by increasing property and land values in the adjacent areas of these public spaces. Other than providing economic benefits, such well-designed places attract talented workforce and entrepreneurs who are leaned to well designed, vibrant and well managed public spaces (Kaw et al., 2020). Such as in Brooklyn, by the initiative of Brooklyn Tech Triangle (BTT), the firms that started working over their increased by 22 percent, and the number of employees increased by 45 percent. Along with increasing the property value, the enhancement of public spaces attracted us 1 billion dollars of private investment in Brooklyn. Forty-five percent of the firm were surveyed, and they responded that they chose to be in Brooklyn because of the amenities and the neighbourhood characteristics that

[1] According to Pearson, 2016

Brooklyn offer (Liao et al., 2020). As the BTT was initiated, the local market also responded by adding 3.4 million square feet of manufacturing and office space. An old storage facility in downtown Brooklyn is converted into an A-class space for offices. An old tobacco warehouse has also been transformed into a retail hub and office space for commercial activities collectively the redevelopment of the storage facility and old tobacco warehouse added 530,000 of creative commercial space in Brooklyn (ibid). Other than increasing the economic benefits, the redevelopment of public spaces around the globe also increased the competitiveness of the city and also enhanced the liveability of the cities.

In Seoul, the Republic of Korea, an abandoned infrastructure of the railway was redeveloped and used as Gyeonggi Line Forest Park. The reuses of the park connected the residential areas with adjacent communities, which were previously disconnected. The reuse not only increased the vibrancy of the city but also attracted young visitors. The redevelopment of the railway infrastructure also helped with lowering surface temperature. After the completion of the project, the values of the property, which were located by the park area, increased by 6.7 percent in just one year, compared with the other 27 districts, which is twice the average increase. The commercial area, which was previously deteriorating, after the redevelopment of the infrastructure in the same area, experienced an increase of businesses by 101.3 percent and in the retail sector, the monthly average sale per shop increases by 151.3 percent (Kim et al., 2020). A cluster of old residential buildings was also repurposed into Gusandong library in Seoul, the Republic of Korea; for the local community, which was previously underserved, the library is managed and operated by the private sector who were leveraged by the municipality (ibid).

In Beijing, China, historic buildings were restored and were used adaptively along with the redevelopment of Yangmeizhu lane. These redevelopment activities had a significant impact on the area. The commercial enterprises in the area experienced rapid growth

because of the redevelopment process. Total sales revenue from commercial activities grew to US 12 million dollars in 2018, which previously in 2012 were US 151,000 dollars. Other than increased sales, the property values in the area also experienced a rapid increase, and after the completion of the project, the property values were double than before in the area. Similarly, the shops rent also tripled to RMB 6-7 per sq. m against RMB 2-2.5 before redevelopment. (Jia & Jia, 2020). The current status of deteriorating public assets not only deprives the area of development but also affects the revenue-generating ability of the government from these assets. These public spaces and assets, when redeveloped, become the source of employment and revenue generation along with increasing the value of the assets surrounding such redeveloped places. In Tbilisi, Georgia, old buildings were demolished were replaced with new buildings, those that were deteriorating were transformed, and streets were rehabilitated under the project named New Tiflis. After the completion of the project, due to the amenities and attractiveness of the area, the property values of the surrounding area were significantly increased. After the completion, the property tax revenue generated from the area is also increased (Zhvania, 2020).

Majority of the governments are not aware about the size of public wealth they own, governments that are under the debt burden own land and other assets in huge amount. Which they never considered to value and manage effectively. Countries lack a comprehensive record on public assets, failing to value them according to their market value. These traditional approaches of budgeting adopted by the public sector ensures the misuse of public assets and making the alternative use of the assets difficult. The best corporate management techniques can be adopted from the corporate sector, which includes transparency, realistic balance sheets and proper accountings. The professional management of these assets by the central governments can yield a return of 3.5%, generating 2.5 trillion dollars worldwide; which is more than total global spending in national infrastructure. When

governments are not in direct control of the public assets, they are more focused on running the country. While monitoring the performance of the assets and just intervening to implement regulations just in case to avoid market failures (Detter & Fölster, 2016).

2.2 Conclusion.

Public land is a source thorough which governments around the world can facilitate their citizens. Public land, by the authority is seen as a burden and just seen from the budgetary point of view in terms of what is being spent on these real estates, ignoring the opportunity cost. There is need for optimizing the use of public real estate, countries around the world have started to realize the potential these assets possess and are doing the needful to optimize their use. Public ownership of land in Pakistan is very high and majority of the land owned by state is in and near city centers, this land is used for providing housing to government employees. These housings are provided on extremely valuable land with immense potential of revenue generation and instead is use for unproductive use. Which the authorities kept on holding, at the cost of revenue and welfare.

Chapter 3

CONCEPTUAL FRAMEWORK, METHODOLOGY AND DATA

This section attempts to explain the conceptual framework of this study. Public land in the country is just looked upon as if it possesses no value. That is because the stakeholders that manage these lands look onto these assets from the lens that just shows their current physical form. They never attempt to visualize the transformation through which these assets can be put to their maximum use.

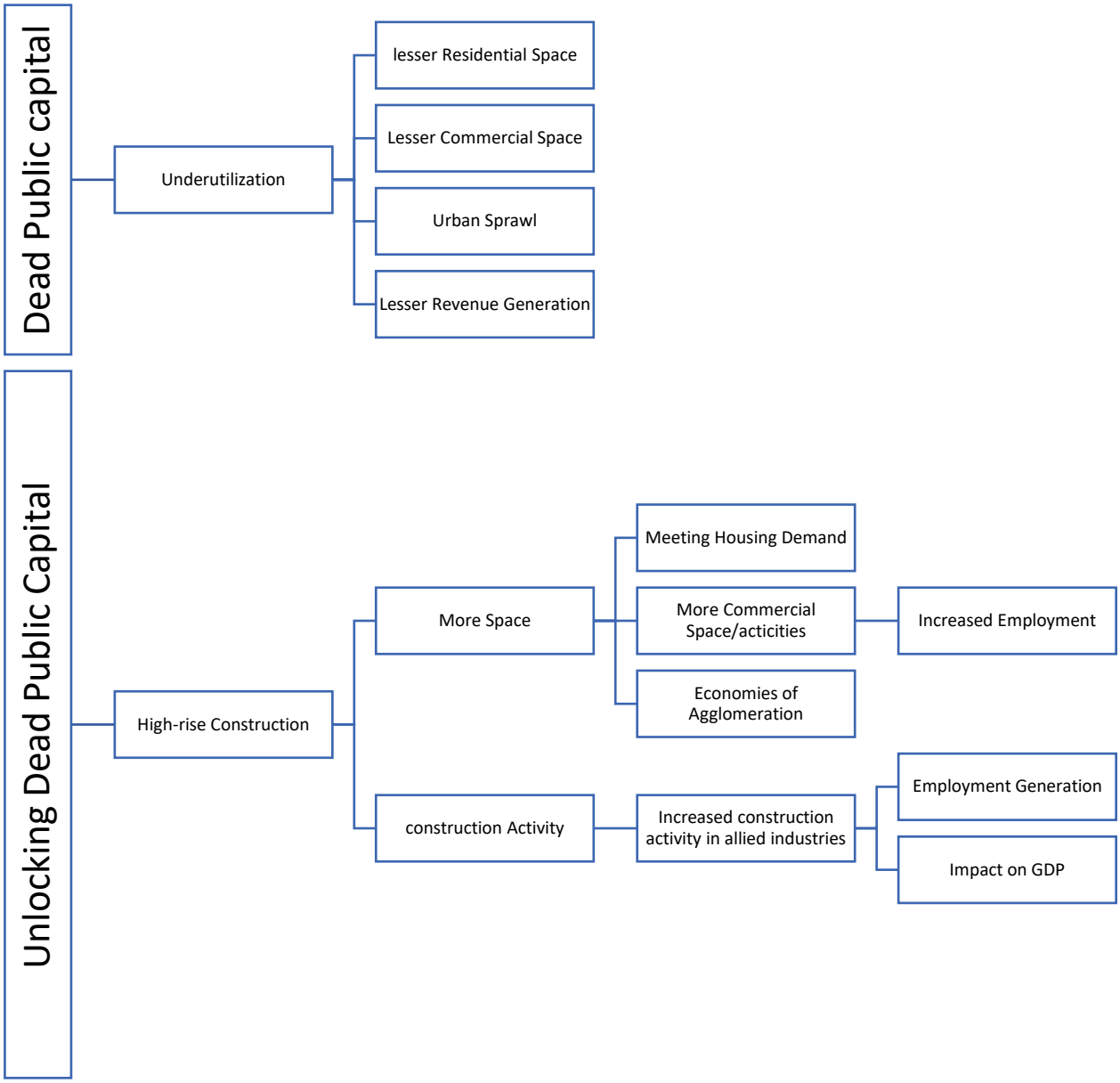
The majority of the state-owned land in cities is at city centres which are constructed as single storey houses as in our study case the land in G-6/1, Islamabad hosts single storey houses to accommodate federal government servants, which shows the state of underutilization due to the reason that these lands host less population on vast pockets of land and are not contributing in terms of economic activities. The area is not transformed with the passage of the time, which resulted in moving the residents of the city to the suburbs for accommodation and commercial spaces. Even the government is resorting to suburbs of the city for providing accommodation to its employees. This encourages urban sprawls, as activities (residential/commercial) are forced out of the cities this results in less revenue generation.

The potential of this dead public capital can be unleashed if these assets are planned and transformed according to the needs of the cities. This demands a conceptual viewpoint in managing and handling these assets with the aim of maximum utilization and revenue generation from these assets.

Better utilization of state-owned land in G-6/1, Islamabad; demolishing the current houses and constructing high-rise buildings will correspond to the aim of using the dead capital effectively. Better utilization, will provide more residential space, which in return will help

in meeting the residential housing demand and due to more commercial space and activities it will create employment opportunities. Therefore, as a result of increased density the city will benefit from economies of agglomeration.

This transformation will take place by the construction of the high-rise buildings on state-owned land. The construction activities will impact the allied industries along with generating employment and will create direct employment at construction sites. The construction of the high-rise buildings will ultimately have an impact on the GDP of the country. So, unlocking dead public capital will accrue benefits for the society and the economy. The conceptual framework is presented below using a flow chart.


Dead Public capital
Underutilization
lesser Residential Space
Lesser Commercial Space
Urban Sprawl
Lesser Revenue Generation
Unlocking Dead Public Capital
High-rise Construction
More Space
Meeting Housing Demand
More Commercial Space/acticities
Increased Employment
Economies of Agglomeration
construction Activity
Increased construction activity in allied industries
Employment Generation
Impact on GDP

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3.1 Methodology

Case study method is adopted for this study, which was considered appropriate in order to understand the current state of land use. For this research; G-6/1, Islamabad is used as case study that host single storey houses on state-owned land, allotted to federal government employees. In selecting a case consideration is not just given for it to be representative but also to the uniqueness of the case (Crowe et al., 2011). The case of G-6/1, Islamabad is representative in terms of land use and unique in terms of its location and surroundings which will help in allowing us to understand the issue. Both secondary and primary data is used for the study. For primary data Unstructured interviews have been conducted, secondary data is collected through government department and reports. The data was collected between the months of June and July 2021. This study proposes to demolish current houses and replace them with Highrise buildings. For which we need

- How many Highrise buildings can accommodate the demolished units?
- How much land these Highrise buildings will use?

After replacing and accommodating the current occupants of single-storey houses into Highrise the freed-up land area can be auctioned to the private sector. private builders can construct Highrise buildings thereon.

- How much land area will be freed up?
- How many Highrise buildings can be constructed on freed up land?
- How much investment is required for the above?

These estimates will be used to get construction activity generated and figure out the impact on GDP. To work out these we need data on following variables.

3.1.1 Variables

1. Number of government houses in G-6/1

2. The area occupied by the government houses mentioned at serial number 1
3. Size of building and number of floors
4. Construction material estimates
5. Investment required
6. Labor required
7. Market price of land owned by the state in G-6/1
8. Fuel consumption per liter
9. Maintenance cost per vehicle
10. CO_2 Emission factor
11. The elasticity of Industrial activities and construction activities

3.1.2 Data:

1. The data regarding the current number of federal government houses has been obtained from the Estate office, Islamabad.
2. The built area occupied by these houses has been calculated using the size of each federal government house as categorized in government documents and the number of houses under different categories in G-6/1 Islamabad. The built area doesn't depict the whole picture of the government land used by these houses as along with built area; these houses have open spaces set aside for movements, setbacks, etc. To have an estimate about the total land that the federal government holds and utilizes in G-6/1, google earth was used to locate and calculate the area. The identification of the area selected using google earth was also cross-checked with the map of G-6/1 and the map reported in a study conducted by (Kreutzmann, 2013). To countercheck, these locations field visit was carried out, which not only helped in verifying our map area identification but also revealed the current state of these houses.

3. For the size of the building and the number of floors that would be feasible in a building. For this purpose, architects were approached. Estimates were developed regarding the possible number of buildings that could be built in the area under study, i.e., government housing in G-6/1.
4. The estimates of the construction material to be used in the construction of high-rise buildings were obtained through interviews of quantity surveyors and contractors of high-rise buildings. The purpose of collecting the estimates of construction material is to calculate the investment required. All the estimates used are a close approximation of what would-be actual consumption of these buildings during construction. Estimates for following construction variables have been collected.
    I. Cement.
    II. Steel.
    III. Mechanical, Electrical and Plumbing works (MEP).
    IV. Finishing works (Glass, tiles, etc).
    V. Sand.
    VI. Crush.
5. To have an estimate for the investment required for the construction of these proposed high-rise buildings, interviews were conducted with quantity surveyors, contractors and building developers.
6. To have the estimates for the market price of land in G-6/1, to be use for the purpose of the estimates for auction, Zameen.com has been used to collect the value of land for sale in the surrounding sectors of G-6. After compiling the data of the properties that are up for sale, the average price of these properties has been calculated and used as the value of the land in G-6/1, Islamabad.

7. For the estimates of labor required during the construction of high-rise buildings, interviews were conducted with quantity surveyors, contractors and building developers.

For saving to the economy as a result of having housing in and near city centres, the case study approach has been used by taking proposed buildings as the study area and assuming those are constructed outside of the city near New Islamabad International airport along Skyline Apartments (FGEHA). Assuming that the occupant to which the apartment is allotted will be employed in the city, their travel cost, the opportunity cost of time and the Co2 emission as a result of commuting to the city has been calculated, which could be avoided if housing is provided in and near city centres.

8. The estimates of the fuel consumption calculated after taking the average fuel consumption by the vehicles in Pakistan. using the data of fuel vehicle consumption provided by the environment agency of Australia (Green Vehicle Guide, 2021).
9. Maintenance cost per vehicle is obtained by surveying the Auto mechanics and taking the average of the values provided.
10. The emission factor of fuel per liter is used from the study by Usman et al. (2017)
11. The elasticity of industrial and construction activity has been obtained using the following method.

Further, to estimate the impact on the GDP due to the construction of high-rise buildings. Two models are estimated. The purpose of estimated the first model is to have the elasticity of Industrial sector output with respect to the GDP. The second model provides the elasticity of the construction output with respect to the industrial sector. Equation 3.1 and 3.2 reflect the two models mentioned above.

$$\ln GDP_t = \beta_1 + \beta_2(\ln Agr_t) + \beta_3(\ln Ind_t) + \beta_4(\ln Seriv_t) + \mu_t \qquad (3.1)$$

In the above equation 3.1, GDP is Gross Domestic Product, Agr is Agriculture output, Ind is industrial output and seriv is services output. Where β_1 β_2 and β_3 are co-efficient of given variables and μ_t is the error term. β_2 is the elasticity of industrial activity required for the study.

$$\ln Ind_t = \alpha_0 + \alpha_1(\ln Man_t) + \alpha_2(\ln Cons_t) + \alpha_3(\ln Elect_t) + \varepsilon_t \quad (3.2)$$

In the above equation 3.2, Ind is Industrial output, Man is manufacturing output, cons are construction output and Elect is electricity and gas distribution output. Where α_1 α_2 and α_3 are co-efficient of given variables and ε_t is the error term. α_2 is the elasticity of construction activity required for the study.

3.1.3 Data

Annual time series data for the variables has been used for the year 1985 to 2021. The data for the variables is extracted from the handbook of statistics of State bank of Pakistan (2020).

3.2 Econometrics technique

3.2.1 Unit root Test

The first step in the estimation of any time series data is to check the data for stationarity. If the data is stationary or unit root doesn't exist, then we apply the Ordinary Least square method; otherwise, in the presence of unit root in any variable, the least square method results are spurious. The Augmented Dickey-fuller (ADF) and Phillip- Parron (PP) test is applied to check the unit root in the data.

3.2.2 Auto regressive distributive Lag approach (ARDL)

As in our case, the variables under study are not integrated of the same order but are the combination of order zero integration I (0) and order one integration I (1). So that requires the application of ARDL as we require the elasticities from long-run estimates. ARDL Bound testing approach is applied, and the long-run coefficient is estimated.

After having the required elasticities, percentage change that will take place in the construction output due to the construction of high-rise buildings is calculated and impact on the GDP is estimated using the formula by making use of the percentage change in the construction sector due to high-rise construction and elasticities estimated by the equation 3.1 and 3.2 using the formula below.

$$(1.X^{\text{coefficient}} - 1) * 100 = Y \text{ percent.}$$

When X is the percentage change with elasticity coefficient in the power and Y is the resultant change.

Chapter 4

STUDY AREA

Sector G-6 is located at a prime location of Islamabad, adjacent to sector G-5, which is the administrative Centre of the country. Offices of a significant number of federal government employees are located in this sector. G-6, Islamabad hosts one of the commercial markets of Islamabad, namely Aabpara, which is one of the busiest commercial hubs and employs' a large number of people. Blue area, the biggest commercial area in Islamabad, which has most of the high-rise commercial buildings in Islamabad, is also in close proximity to G-6. Given its surrounding and use, the land in sector G-6 is of significant value; G-6 is one of the first residential sectors[2] in Islamabad, which was planned in 1960 to meet the then residential demand of the city. It has been utilized to accommodate government employees in state-owned houses, and the rest of the area is in use of middle to low-income residents.

Sector G-6 is further divided into five subsectors, G-6/1, G-6/2, G-6/3, G-6/4 are residential areas, and the fifth is a commercial area. The focus of the study is sub sector G-6/1. G-6/1 comprises vast pockets of public land, which are used to accommodate federal Government employees along with hosting the Aabpara market. The total area of subsector G-6/1 is approximately 169 acres. Out of this, the area used for public housing is approximately 86 acres (51% of the total area of G-6/1), including streets and roads and setbacks left for the houses. The area occupied by the Aabpara market is approximately 12 acres, and the rest of the area hosts, Government institutions, Private dwellings, schools, parks etc., see Figure 1.

[2] Ali, S. S. (Ali).

Figure 4.1

Source: Google Earth

In figure 1 above, the green highlighted area is the housing on public land, blue is the Aabpara market, and the rest is for the private sector and government institutions such as

schools etc. The houses on government land are typically categorized in six categories (Different sizes and types, the top three categories, meant for the senior civil servants, do not exist in G-6/1 (except for one house for Cat-II). The government houses are allotted to the federal government employees as per their basic pay scale for their service period. The categories and houses types, along with the number of houses, are shown in table 4.1. (The houses type ranges from A to I, where A is the lowest category, and I is the highest. Type A accommodation is provided to the lowest basic pay scale employees, and the rest B, C, D, E, F, G, H are allotted from lowest to highest basic pay scale respectively, with type I used to accommodate BPS- 21).

Table 4.1 Total number of houses by category and type in G-6/1

Category	Type	PayScale	Number of houses
Cat-VI	A	BPS 1-4	703
Cat-V	B	BPS 5-6	806
	C	BPS 7-10	469
Cat-IV	D	BPS 11-15	101
	E	BPS 16-17	-
Cat-III	F	BPS 18	-
Cat-II	APO, G	BPS 19	1
Cat-I	H, I	BPS 20-21	-
			Total: 2107

Source: Estate Office, Islamabad

The entire sector G-6, Islamabad, hosts 4001 government houses; out of these, 2107 (53%) are located in subsector G-6/1.

The total state-owned land occupied by the public houses in subsector G-6/1 is approximately 25 acres. This includes only the built area - setback, spaces in front of the house's, streets etc., are excluded. Details are given in Table 1.2. If the setbacks are included along with space for streets and open space for houses, then, as mentioned earlier, the state-

owned land area occupied by these houses is 86 acres. This has been calculated using Google Earth, as shown in Figure 1 above. Category–wise detail of the built area is given in Table 4.2.

Table 4.2 Built area covered by Government houses in G-6/1

Type	Pay Scale	Built Area covered in Sq. ft per unit	Total built area covered in G6/1 in Sq. ft
G	BPS-19	1905	1905
D	BPS-11-15	1195	120675
C	BPS- 7-10	710	352370
B	BPS-5-6	452	364383
A	BPS-1-4	334	234580
		Total Area:	**1,073,913**

Source: Estate office, Islamabad & (Kreutzmann, 2013)

The houses on state-owned land are constructed as single storey independent units. It is once again worth mentioning, the land occupied by these houses carries high-market value due to its location. Given the way the land is used for a single-storey construction, it is safe to term it as pockets of underutilized land as it accommodates fewer peoples on a lot of lands and that too given rising urbanization and hence the demand for residential and commercial space. It has restricted the development of the area and the city due to; current structure of the houses and regulatory authorities' support for the use of land in its current form. Current land use has restricted the expansion of commercial activities in the area. These characteristics have converted the pockets of state-owned land into dead capital. If it is transformed and used for alternative purposes according to the changing needs of the city, it will lead to much greater social and economic benefits. Instead, the transformation that has taken place is in the shape of; encroachment of spaces left for setbacks on sides of the

dwellings, occupying the streets for personal use by the residents of these houses, constructing of 2nd floor without the requisite permission[3].

G-6/1 is very close to the city centre - Aapbara market. Therefore, the area enjoys the potential for growth in commercial activity, which at present is restricted due to zoning laws and the state's ownership of land adjacent to the market. All this has caused tremendous social and economic loss to the city, limiting its potential (PIDE, 2020). The Aabpara commercial market, which exists on just 12-acre land, its vertical expansion is restricted by the outdated zoning laws and low FAR ratios and horizontal expansion is restricted by the state ownership of land. Given the restricted growth, the market generated a revenue of Rs. 20.2 million in terms of income tax for the tax year 2018, as reported by the FBR[4]. The revenue from the area would have been much greater if the market had been allowed to evolve with the needs of the city

Currently, the 2107 housing units are located in G-6/1. These can be demolished, and the land can be used to construct high-rise buildings thereon. Six high-rise buildings, each having 450 apartments, would be required to accommodate the demolished housing units. The six high rise buildings would require an area of 9 acres. An investment of Rs. 13.4 billion would be required to construct the six high-rise buildings having 2700 apartments.

The rest of the 77 acres (86 acres minus 9 acres) public land out of 86 acres can be auctioned to the private sector for a minimum of Rs. 54.2 billion. The revenue from the auction has been estimated that land will be auctioned for residential purposes. The revenue will increase several times if the land is auctioned as commercial land. The investment of 13.4

[3] Abbasi, K. (Abbasi).

[4] FBR Tax Directory Analysis

required to construct six high-rise buildings to accommodate the demolished units can come out of Rs. 52.2 billion to be generated from the sale of 77 acres that would be set free.

After the auction of 77 acres of public land as mentioned above to the private sector, thirty-six high rise buildings can be constructed by the private sector, with each building having 450. A total of Rs 126 billion will be required for the construction of 36 high-rise buildings having 16,200 apartments. Calculations of the proposed estimates are given below.

4.1 Construction of 2700 apartments in 6 high-rise buildings to replace demolished units

The current federal government houses in G-6/1, Islamabad, are of different categories as shown in table 1.1 above; among these majority of the houses are allotted to the employees with a Basic Pay Scale of 1-6. The number of federal government houses for the BPS 1-6 are 1509 (71%) out of a total of 2107, and the rest of the houses are allotted to other categories. Now for the proposed estimates of apartments in high rise buildings in G-6/1. We have divided all the current types into just two categories, A and B, with apartment size for category A, which will be for BPS 1-10 to be 700 Sq. Ft[5] and the apartment size for

[5] As constructed in G-11, Islamabad for government employees

category B, which will be for BPS 11-17, will be 1238 sq. ft[6]. The estimates for the building sizes and the number of apartments are given below.

For BPS 1-10

Size of an apartment would be 700 sq. ft as.

One floor will have 18 apartments

One High rise Building built area = 700×18 = 12600

= 12600×1.40 = 17640 sq. ft

1.40 is the factor for spaces left for movement, stairs, corridors etc. within the building.

One high-rise 25 storey building will occupy 17640 sq. ft area

One building will host 450 apartments. Five high-rise buildings after construction will host 2250 apartments. The total number of single-storey federal government houses for BPS 1-10 currently in G-6/1 is 2005. These newly constructed high-rise buildings will host all the current BPS 1-10 single-storey houses and an additional 245 apartments.

The total built area that will be required for the construction of 5 high-rise residential buildings for government employees will be 88,200 sq. ft.

One high-rise 25 storey building will occupy a 31198 sq. ft area

[6] As constructed in Sky line apartments, New Islamabad Airport, Islamabad

For BPS 11-17

Area of an apartment would be 1238 sq. ft as.

One floor will have 18 apartments

One High rise Building ground area = 1238×18 = 22284

= 22284× 1.40 = 31198 Sq. Ft

1.40 is the factor for spaces left for movement, stairs, corridors etc. within the building.

One building will host 450 apartments. The total number of single-storey federal government houses for BPS 11-17 currently in G-6/1 are 101, and 1 house of BPS 19. Only one high rise building will be required to replace current single storey houses for BPS 11-19 in G-6/1, along with adding additional 348 apartments to the pool.

Table 4.3 Estimates of 6 high-rise buildings

Type	**BPS**	**Apartment area in Sq. ft**	**Number of high-rise buildings**	**Number of units in the buildings**	**Built Area in Sq. ft**
A	1-10	700	5	2250	88200
B	11-17	1238	1	450	31198
		Total	**6**	**2700**	**119398**

The total built area these new buildings will occupy in G-6//1 is around 3 acres.

Total built area these buildings will occupy:	3 acres
Area for setbacks and other amenities:	6 acres
Total area	9 acres

The total built area that the newly constructed buildings for federal government employees will occupy is 3 acres. To have space for setbacks, amenities, streets etc., twice the area will be required. After adding the area of 6 acres, the total area that will be required for the construction of 6 high rise buildings to accommodate federal Government employees will be 9 acres.

Table 4.4 Comparison between New and Old accommodation

	Current Single storey houses	**High-rise Buildings**
Total Number of Houses/ Apartments	2107	2700
Total Area occupied (Acres)	86	9

Above mentioned estimates in table 4.4 clearly indicate how largely these public lands are underutilized, and after demolishing the current houses, these proposed six buildings will not only host all the current 2107 federal government houses in G-6/1, Islamabad but will also add additional 593 apartments to the pool of federal government houses along with vacating approximately 77 acres of valuable public land in the area. These 77 acres of federal government land can be auctioned to the private sector.

4.2 Auction

In order to have an estimate regarding the market value of public land that would be available for auction, we used the zameen.com web portal and conducted a survey from the real estate agents. An average market price of land available for sale in G-6 and surrounding

areas was calculated, which was counter checked by the real estate agent and is used in this study.

According to our calculation, the average per sq. ft market price of land in G-6, Islamabad is approximately Rs 22,216/-. This figure is a close approximation of what the prevailing rates for residential land are. The total federal government land in G-6/1, according to our calculation, is 86 acres, out of which 9 acres is reserved for the construction of 6 high-rise residential buildings for federal government employees. The left vacant area in G-6/1, Islamabad, will be 77 acres. This 77-acre area can be auctioned to the private sector for a minimum of RS 22,216/- per sq. ft. Out of this 77-acre land, 30 % of the land is excluded for streets and road etc., then the remaining 54-acre of public land can be auctioned. The revenue that this 54-acre of state-owned land in G6/1, Islamabad, will generate after the auction to the private sector is approximately Rs 52,210,067,176/- PKR. This Rs 52.2 billion is the minimum revenue this state-owned land in G-6/1, Islamabad, will generate after the auction. Our estimates are according to the auction as residential land; when the land is auctioned to the private sector as commercial land, then the revenue generated through the auction will be much more than our calculations.

The estimates for the number of High-rise buildings that would be constructed by the private sector on 77 acres of land are given below.

4.3 Estimates for 77-acre land vacated

The pockets of vacant federal government land in G-6/1, Islamabad, which are left after constructing six high-rise residential buildings for government employees, will be approximately 77 acres (86 acres-9 acres). After the auction to the private sector, the estimates for the number of high-rise buildings that are possible in the area are given below.

Estimate for one Building

Area of an apartment would be 1238 sq. ft as.

One floor will have 18 apartments

One High rise Building ground area = 1238×18 = 22284

= 22284× 1.40 = 31198 Sq. Ft

1.40 is the factor for spaces left for movement, stairs, corridors etc. within the building.

the built area for one building is 31198 sq. ft, twice the area of 31198 sq. ft will be required for setbacks, amenities, streets, etc After including the space for setbacks, amenities, streets, etc., the total area that one building will require is 2.15 acres.

Table 4.5 Estimates for 77 acres of land

Total Area **(1)**	**Size of an apartment** **(2)**	**Total area required for one building** **(3)**	**No. of apartments in a building** **(4)**	**Number of total buildings** **(5)**	**Total Number of Apartments** **(6)**
77 Acres	1238 sq. ft	2.15 Acres	450	36*	16200

* 5 = 1 divided by 3

After demolishing the current houses and redeveloping this 77-acre state-owned land into high-rise residential buildings than according to our estimates, the number of potential high-rise buildings that can be constructed in the area is 36, with each building hosting 450 apartments of size 1238 sq. ft. After the construction of these 36 buildings, twice the built area of the buildings will still be vacant, which has been left for setbacks, amenities and movement of the residents. The total number of apartments that would be available after the construction of these 36 residential buildings will be 16200. In an area that currently hosts 2107 federal government houses after redevelopment, the number of apartments available for accommodation will be 16,200, which is a significant number.

As with increasing urbanization and along with the role that rules and regulations for buildings have played, Islamabad is facing the problem of urban sprawl. If at the time of development and afterward as the dynamics of the city were changing, high-rise construction was allowed by regulatory authorities to replace the current houses. This would have created much-needed space for residential and commercial activities. By keeping the G-6/1, Islamabad in its current physical state without assessing the potential the land of G-6/1 possesses, the regulatory authorities have contained the development of the area.

Vertical construction of the land can put the available scarce land to its maximum utilization. The current status, as shown with the above estimates, represents massive underutilization of the capital, and capital(Land) possesses the strength that could increase the labour productivity and increase the nation's wealth (De Soto, 2001). The Government-owned land, which is left after shifting the federal Government employees into high-rise buildings, can be used for alternative purposes.

The 77 acres of valuable public land out of 86 acres could be auctioned to the private sector. To ensure the smooth development of the area and to facilitate the activities, there is a dire need for changing the current rules and regulations and allowing the construction of high-rises across all the sectors with more space for residential and commercial activities. According to PIDE policy Viewpoint No.16, the housing backlog of Islamabad is 100,000, and this gap will increase by 25000 units each year, given the current annual supply of 3000. High-rise construction by the private sector will not only help in reducing the gap significantly but will also reduce the housing backlog and discourage urban sprawl. With the construction of just 36 high-rise buildings in G-6/1, the housing backlog of Islamabad will decrease by around 16%. As the estimates show, vertical expansion of the land with the construction of high-rise buildings will be the solution to the increasing housing backlog.

To ensure that the private sector promotes commercial and residential development, base zoning could be an option for the authorities, which will help in bringing transparency for the private sector regarding the rules and regulations in the areas and investment will follow. After the auction, when the area will be developed by the private sector, there will arise a possible debate for public spaces/ amenities for all the communities. This can be countered and solved by implementing incentive zoning[7] in the areas, which will encourage private investors to add public spaces and amenities on their private properties in return for surpassing the standard zoning set by the authorities. Incentive zoning as a tool is already being used by the authorities in many cities around the globe to promote public spaces on privately owned land; few of these cities are located in Japan, Canada, the Republic of Korea and the United States of America (Kaganova & Kaw, 2020). This will not only create a sense of responsibility among private stakeholders regarding providing public spaces but will also encourage inclusive development for all communities. These public spaces will be built according to the needs of existing communities. Public spaces, in addition, will create value, and when they are built and designed, considering the communities of that place as their future users, it will arise a sense of co-creation among them (Kaw et al., 2020).

4.4 Economic activity

The economic activities that are generated due to the construction of high-rise buildings are discussed below.

During construction phase of high-rise buildings, construction activities will employ both skilled and unskilled labour. The labour required for a single high-rise building during the construction phase at the construction site is given below in table 4.6.

[7] Incentive zoning permits the developers to voluntarily surpass the standard zoning (F.A.R etc) in exchange they have to deliver additional amenities and public spaces on their own sites.

Table 4.6: Labour required for one high-rise building

Skilled Labour	
Type	**Quantity**
Project Management Staff	
Project manager	1
construction manager	2
Site Engineer (civil and MEP)	20
Quantity Surveyor	3
Land surveyor	5
Supervisor	15
Matt	30
Store Man	5
Administration	5
Procurement	3
Finance	3
Skilled Labour	
Masons	65
Steel fixers	50
Carpenters	46
Scaffolders	45
Electrician	15
Mechanics	17
Plumber	15
A.C technicians	10
Unskilled Labour	
Helpers and Labour	300 500-600*
Total (Skilled and Unskilled labour)	**655****

Source: Contractors/ Building developers.

*Unskilled labour can go up to 600 in the concrete and slab installation phase of the building.

**excluding the unskilled labour employed during the slab installation phase.

4.5 Labor required for 42 high-rise buildings

When 42 high-rise buildings are constructed on state-owned land in G-6/1, Islamabad simultaneously, it will employ around 27,510 unskilled and skilled labour force for the time period of construction. During certain phases of construction (concrete and slabs), due to labor-intensive work involved, the total number of labors required will increase to 48,510

for 42 high rise buildings. These 42 buildings include the 6 buildings to be constructed for the government employs and 36 buildings to be constructed by the private sector. This labor will be employed for an average period of three year. As the construction sector is a labour-intensive sector and as per Pakistan economic survey 2020-2021 cconstruction industry employs a 4.70 million labour force out of a total employed labour force of 61.71 million.

4.6 Estimates for investment and construction material

Estimates for the construction of 6 residential buildings for federal government employees by the government and construction of 36 buildings by the private sector are discussed below.

4.6.1 Estimates of construction material for 42 high rise buildings

Estimates for construction material that will be consumed during the construction of 6 residential buildings in G6/1 Islamabad are given below in table 1.8. where a unit represents a measurement unit in which the material is quantified. The cost of cement, steel, sand and crush are measured at current market prices. Market prices for different construction materials are given in table 1.9 below. The estimates for finishing work and Mechanical, Electrical and Plumbing (MEP) works are estimated according to the estimated cost incurred. These materials can't be quantified like steel and cement, so the average cost that is incurred while installation of these materials is used. The cost of cement, steel, sand and crush are measured at current market prices. Market prices for construction material are given in table 4.8 below

The estimates of construction material were critical as without these, the total investment wouldn't be estimated. The show the increase in industrial outputs of these industries as 40 or so industries are associated with the construction sector[8].

Estimates for the consumption of construction material during construction of 42 buildings are given below in table 4.7.

Table 4.7 Construction material estimates for six buildings

ITEM	Unit	Quantity	Cost
Cement	Bag	3617371	2,297,030,490
Steel	Ton	15623	2,030,959,980
Mechanical, Electrical and Plumbing (MEP) works	-	-	3,223,746,000
Finishing works (Glass, tiles, etc.)	-	-	3,868,495,200
Sand	CFT	5901094	147,527,359
Crush	CFT	11802189	590,109,437
Construction material estimates for 36 buildings			
Cement	bag	34027123	21,607,223,407
Steel	Ton	146957	19,104,407,280
Mechanical, Electrical and Plumbing (MEP) works	-	-	30,324,456,000
Finishing works (Glass, tiles etc.)	-	-	36,389,347,200
Sand	CFT	55509174	1,387,729,342
Crush	CFT	111018347	5,550,917,369

[8] Pakistan Economic Survey, 2020-21

Table 4.8 Material current market price

Item	Cost/unit
Cement	Rs 635/bag
Sand	Rs 25/CFT
Crush	Rs 50/CFT
Steel	Rs 130,000

4.6.2 Investment

The investment that will be required for the construction of each high-rise buildings is given below in table 4.9. The investment is composed of the

- Material cost required during construction.
- labor cost.
- Taxes, profit and overhead costs (management costs and all expenses)

Table 4.9 Investment each single high-rise building

Type	BPS	Apartment area in Sq. ft	Number of apartments in the buildings	Built Area in Sq. ft	Investment required (Rs)
A	1-10	700	450	17640	1,981,324,800
B	11-17	1238	450	31198	3,504,159,360

The investment that is required for the construction of one high rise building for BPS 1-10 is approximately Rs 1.9 billion, and for the construction of one high rise building for BPS 11-17 will be approximately Rs 3.5 billion.

The total investment that will be required for the construction of 6 high rise buildings constructed by the government are given below in table 4.10:

Table 4.10 Total Investment required for six high-rise buildings

Type	Apartment area in Sq. ft	Number of buildings	Number of apartments in the buildings	Investment (Rs)
A	700	5	2250	9,906,624,000
B	1238	1	450	3,504,159,360
Total		**6**	**2700**	**13,410,783,360**

The total investment that will be required for the construction of 5 high rise buildings of type A is Rs 9.9 billion, and for type B, the required investment is approximately Rs 3.5 billion. The total investment required for the construction of all six high-rise buildings that will be constructed to accommodate the current federal government houses occupants in G6/1 Islamabad into high-rise buildings is Rs 13.4 billion.

According to our estimates, the minimum revenue that the government will generate from the auction of 77-acre of federal land in G-6/1, Islamabad, is Rs 52.2 billion. The auction will provide the government revenue to provide investment that is required for the construction of the above-mentioned buildings in table 1.7. and the government will still be left with a surplus of 38.8 billion rupees which the government can used for other activities.

Investment required for construction of 36 high rise buildings

The investment that will be required for the construction of 36 high-rise residential buildings on an area of 77 acres which will be vacant after shifting the federal Government employees in G6/1 into high-rise buildings, is given below in table 4.11.

Table 4.11 Investment required for buildings on 77 acres of land

Apartment Size (sq. Ft)	**NO. of buildings**	**No. of apartments**	**Investment for one building**	**Total investment required (Rs)**
1238	36	16200	3,504,159,360	126,149,736,960

The amount of investment that will be required for the construction of 36 high-rise buildings on an area of 77 acres is approximately 126 billion; given the size of the investment, the government is mostly unable to fund such vast amounts given the budget constraints. Here is where the private sector is needed. The government can generate revenue by auctioning the land and let the private sector regenerate the area.

Total Investment:

Total investment required by the government and private sector for the construction of total 42 buildings is given in the table below.

Table 4.12 Total Investment required for 42 buildings

No. of buildings	No. of apartments in one building	Total number of apartments	Total investment required
42	450	18,900	139,560,520,320

Total investment of 139 billion will be required to redevelop G-6/1, Islamabad by replacing current single storey units into high-rise buildings on the state-owned land.

Chapter 5

ESTIMATION AND IMPACT

This section reports the estimation results and interpretation. The econometrics technique of both models, along with their interpretations, are discussed below.

5.1 Unit-Root Test

At the outset, it is necessary to identify the order of integration of the study variables to avoid spurious regression outputs. For this purpose, this study applied the Augmented Dicky-Fuller test (ADF) (Dicky and Fuller 1979) and the Phillips-Perron (PP) test (Phillips Perron, 1988). The results of the ADF and PP test of the unit root of the selected study variables are presented in the Tables 5.1 below.

Table 5.1 Unit root with intercept

	Level		**1st Difference**		
Variables	**ADF**	**PP**	**ADF**	**PP**	**Order**
LnGDP	-3.39	-3.38**	-4.48***	-4.46***	*I (1)*
LnAgri	-1.50	-5.45***	-7.65***	-7.82***	*I (1)*
LnInd	-3.14**	-2.83*	-4.23***	-4.22***	*I (0)*
Lncons	-0.72	-0.51	-5.32***	-5.38***	*I (1)*
Lnelect	-1.89	-2.61	-6.53***	-6.85***	*I (1)*
Lnman	-2.5	-2.17	-4.65***	-4.64***	*I (1)*
LnSeriv	-1.498028	-2.45	-3.62***	-3.43**	*I (1)*

Table 5.2 Unit Root with Intercept and Trend

	Level		1st Difference		
Variables	**ADF**	**PP**	**ADF**	**PP**	**Order**
LnGDP	-2.01	-2.01	-5.08***	-5.05***	*I (1)*
LnAgri	-1.81	-1.49	-7.93***	-14.47***	*I (1)*
Lnland	-1.51	-1.41	-4.63***	-4.63***	*I (1)*
Lncons	-3.01	-3.01	-5.17***	-5.23***	*I (1)*
Lnelect	-2.32	-2.07	-6.64***	-12.91***	*I (1)*
Lnman	-1.74	-1.87	-4.76***	-4.76***	*I (1)*
LnService	-3.66**	3.20*	-3.85**	-3.76**	*I (0)*

Notes: *, ** and *** denoted that they reject the null hypothesis at 10%, 5% and 1% significant levels, respectively.

The ADF and PP tests are applied, first with intercept and then with intercept and trend, as shown in table 5.1 and table 5.2. The results of the ADF and PP unit root test in table 0.1 shows that Industrial output is stationary at level. GDP and agricultural output are stationary at the level as per the PP test but non-stationary as shown by the ADF unit root test. Construction, manufacturing, services and electricity and gas distribution are non-stationary at the level and are stationary at first difference hence are integrated of order one. The results in table 0.4 according to ADF and PP unit root test shows that all the variables with intercept and trend are non-stationary at the level and are stationary at first difference hence integrated of order one I (,1), except services output which is stationary at the level and integrated of order zero I (0). ADF and PP unit root tests with intercept and Intercept & trend shows mixed order of integration.

As per the analysis on the basis of ADF and PP unit root tests, it is clear that variables are integrated of mixed order. In the mixed order of integration, the appropriate method for the estimations of the variable that are under study is the Autoregressive Distributed Lag Model (ARDL), developed by Persaran and shin (1999) and Pesaran et al. (2001). As the variables

are integrated of different order so we can't use Ordinary least square and we use ARDL in this case as it is the appropriate technique to apply on such variables. Use of Ordinary least square will yield spurious results.

5.2 Model 1

In this sub-section, the results of model 1 are interpreted and discussed. In model 1, our dependent variable is Gross Domestic Product (GDP), and independent variables are Industrial output, industrial Output and Services output. All the variables are in log form before proceeding to the ARDL bound test and long-run estimates. It is essential to check the optimum lags of the model. For this purpose, we have used Hannan-Quinn information criterion (HQIC) and Schwarz information criterion (SBIC) for lag selection, which is one as shown in table 5.3 below.

Table 5.3 VAR Lag order selection criteria Model 1

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	232.375				5.10E-11	-12.3446	-12.2832	-12.1704
1	417.039	369.33	16	0	5.7e-15*	-21.4616*	-21.1546*	-20.5908*
2	432.156	30.234	16	0.017	6.10E-15	-21.4139	-20.8613	-19.8465
3	440.536	16.759	16	0.401	1.00E-14	-21.0019	-20.2038	-18.7379
4	457.166	33.26*	16	0.007	1.20E-14	-21.036	-19.9922	-18.0754

After checking and selecting optimum lags for the model, we will now check model 1 for the long-run relationship between the variables using the ARDL bounds testing approach. Where null hypothesis is there is no co-integration. The null hypothesis is rejected on the basis of F-statistics; F-statistics is compared with the lower and upper bound values at 10 %, 5%,1% significance levels. If F- statistics is greater than the upper bound value, we reject the null hypothesis, and if the value of F-statistics is smaller than the lower bound value, we accept the null hypothesis. The model is inconclusive if the F-statistics value falls in-

between upper and lower bound values (Belloumi, 2010). The results of the bound test for model 1 are given in Table 5.4 below.

Table 5.4 ARDL Bound test Model 1

Significance Level	Critical Value		F-Statistics
	Lower Bound	Upper Bound	
10%	2.59	3.45	
5%	3.1	4.09	13.54
1%	4.31	5.54	

Table 0.4 above shows that the F-statistics is 13.54, which is greater than the upper bound value of 5.54 at a 1 % level of significance, therefore rejecting the null hypothesis of no co-integration. Depicted that variable are co-integrated with the dependent variable. Now the long-run estimates using ARDL are reported in table 5.5 below.

Table 5.5 Long Run Estimates for Model 1

Variable	Coefficient	Std. Error	t-Statistic
lnAgr	0.266	0.034	7.88
LnInd	0.121	0.025	4.799
Lnseriv	0.601	0.025	24.46
C	1.109	0.163	6.804

All the variables are significant at a 1% level of significance as the P-value of all the variables in the table above is below 0.01. As the co-efficient in table 0.5 shows that, a 1 percent increase in industrial output will lead to a 0.12% increase in the GDP. The service sector has the highest impact on the GDP as a 1 percent increase in services output will

result in a 0.60% increase in the GDP followed by agricultural output, which shows that an increase of 1 percent in the agricultural sector will increase the GDP by 0.27%.

5.3 Model 2

In this sub-section, the results of model 2 are interpreted and discussed. In model 2, our dependent variable is Industrial output (ln*Ind*), and independent variables are Manufacturing output, Construction output and Electricity and Gas distribution output. All the variables are in log form before proceeding to the ARDL bound test and long-run estimates. It is important to check the optimum lags of the model. For this purpose, we have made use of the Hannan-Quinn information criterion (HQIC) and Schwarz information criterion (SBIC) for lag selection, which is one as shown in table 5.6 below.

Table 5.6 VAR Lag order selection criteria Model 2

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	188.757				7.9e-09	-9.93281	-9.85606	-9.71512
1	355.008	332.5	25	0	1.6e-11*	-17.568	-17.1075*	-16.2619*
2	373.655	37.293	25	0.054	2.0e-11	-17.2246	-16.3804	-14.83
3	401.342	55.374	25	0	2.50e-11	-17.3698	-16.1419	-13.8868
4	445.329	87.974*	25	0	2.5e-11	-18.3962*	-16.7845	-13.8246

The optimum lag for model 2 according to AIC and HQIC is 1, and this study has applied ARDL bound test approach for the estimation of long-run co-integration between variables. The results of the test are given in the Table 5.7 below.

Table 5.7 ARDL Bound Test Model 2

Significance Level	Critical Value		F-Statistics
	Lower Bound	Upper Bound	
10%	2.37	3.2	
5%	2.79	3.67	26.80
1%	3.65	4.66	

Table 0.4 above shows that the F-statistics is 26.80, which is greater than the upper bound value of 4.66 at a 1 % level of significance, therefore rejecting the null hypothesis of no co-integration. Depicted that variable are co-integrated with the dependent variable. Now the long-run estimates using ARDL are reported in table 5.8 below.

Table 5.8 Long Run Estimates of Model 2

Variable	Coefficient	Std. Error	t-Statistic
LNMAN	0.715	0.045	15.7
LNCONS	0.150	0.043	2.24
LNELECT	0.149	0.025	5.76
C	0.795	0.293	2.70

According to the long-run estimates as per the ARDL approach shown in the table above, construction output is significant at a 5% level of significance. Manufacturing output and Electricity and gas distribution output are highly significant at a 1 % level of significance. As the co-efficient in table 0.5 shows that, a 1 percent increase in construction output will lead to a 0.15% increase in the GDP. The manufacturing sector has the highest impact on the GDP as an I percent increase in manufacturing output will result in a 0.72% increase in the GDP followed by electricity and gas distribution output, which shows that an increase of 1 percent in this sector will increase the GDP by 0.14%.

5.4 Impact on GDP of Pakistan:

Estimations in the construction sector are derived by the commodity flow approach on the basis of expenditure that the establishment(contractor/sub-contractors) undertaking the construction incur in purchasing the construction material. The investment that is required by the private sector for the construction of 36 high rise buildings is 126,149 million. And the investment required for the construction of 6 high rise buildings by the government is 13,410 million. So, the total investment for 42 high rise buildings will be 139,560million.

According to Pakistan economic survey 2020-21, the contribution of the construction sector in the GDP is Rs 918,849 million. Assuming that the proposed 42 buildings will take three years for construction. Then the total investment will be spent on construction of the high-rise buildings in three years. Total investment is divided into three equal portions then the investment we have out of total investment of 139,560 million for the construction activity of first year is Rs 46,520,173,440 (46,520 million). Adding 46,520 million into construction output of 918,849 we have 965,369 million.

$$\frac{965{,}369 - 918{,}849}{918{,}849} \times 100 = 5.1\ \%$$

Then the percentage change that will occur in the construction sector due to the construction activity of Rs 46,520 million in one year is 5.1%.

$$(1.051^{.15}\text{-}1) \times 100 = 0.748\%$$

As we know from the estimates of model 1(equation 3.1), that a 1% increase in the construction activity will increase the industrial sector output by 0.15%.

This shows that, if all things remain constant than an increase of 5.1 percent in the construction activity will lead to an increase of 0.75 percent in the industrial sector.

As we know from model 2(equation 3.1), a 1 percent increase in the industrial activity will increase the GDP by 0.12 percent.

$$(1.00748^{.12}-1) \times 100 = 0.089\%$$

This shows that, if all other things remain constant, then the increase of 0.75% in the industrial activity will increase the GDP by 0.09%.

So, by the above calculation, the construction activity in one year of constructing 42 buildings will lead to an increase of 0.09% in our case in the GDP of Pakistan if other things remain the same. As the investment made on the construction activity will be same for the next two years till completion of construction of 42 high-rise buildings. So, the impact on the GDP that in the next two years this construction activity will have will remain the same that is 0.09%. The collective impact on the GDP in three years will be 0.27%.

Summary:

The impact on GDP is estimated by using two econometric model in which our variable of interest are Industrial output elasticity and construction output elasticity. Which are estimated using ARDL approach after applying the prerequisites of Timeseries data. The investment in the construction sector is taken as a proxy through which the percentage change in the construction sector is estimated which is 5.1% this is further translated into industrial change by making use of industrial output elasticity, the increase in industrial output will be 0.75 %. The 0.75 % change in industrial output will result in an increase of 0.09% in the GDP on annual basis for the period of construction of these buildings

Chapter 6

SAVINGS DUE TO LESSER TRAVEL

If housing is provided in the cities, it has several benefits, such as less travel cost, less commuting time, and less pollution, along with access to all the amenities that are available in the city. This study attempts to estimate the savings that will occur as a result of having housing in and near city centres by calculating the commuting cost, opportunity cost of time and greenhouse gases emissions that results when housings is provided at suburbs of the city which ultimately could be avoided if housing is to be provided in city centres. The aversion of the state towards providing accommodation in city centres encourages urban sprawls to which the cities of Pakistan are prone.

As there is limited space in the cities and the aversion of regulatory authorities towards high-rise construction resulted in promoting single storey houses construction. Which has further made the available land in the cities scarce. Assuming that the proposed 42 high-rise buildings in G-6/1 are constructed out of the city near Islamabad international Airport along Skyline Apartment which are under construction by FGEHA for federal government employees.

The 42 high-rise buildings will have 18,900 apartments in total. These apartments will be transferred to private and government sector after construction. Assuming that all the residents of these 18,900 apartments are employed in and around the city centre, Aabpara G-6, Islamabad. So, they will have to commute to the city for work.

Assumption for the study:

1. The number of apartments is the number of people for the study, as each apartment will have someone to go for work to the city. This study will exclude the commutation of other family member and will treat 18,900 individuals as sample size.
2. Assuming that the sample individuals just have to make one round trip in a day which is to the city Centre for job, ignoring any other visit for any purpose to the cities.
3. All the individuals will commute to the city in their personal vehicles (Cars).
4. There will be 8 working hours in a day, five working days in a week, 22 working days in a month and 264 working days in a year.

6.1 Travel cost:

Assuming that all the residents of the apartments under study are employed in and near Aabpara G-6, Islamabad. Then as per the estimates using google maps, distance of one trip to the city will be 34 Km and for one round trip they will travel a distance of 68 Km. The time it takes to commute to the city for one trip is 36 Minutes on average and 72 minutes for one round trip if traffic runs smoothly.

The formula for the calculation of travel cost is given below

- Dividing the distance by 100 = X
- X × fuel consumption per 100km = Y
- Y × by fuel cost per liter = Travel cost

To have an estimate of the fuel consumption by car, we used official estimates provided by Australian governments[9] and after taking the averages of fuel consumption of the vehicles (Cars) that are available in Pakistan, average fuel consumption per vehicle is 8.9 litres per 100km. The cost of per litre petrol as of 18/08/21, is 119.80 RS. Distance of one round trip is 68 km. Using the data, the estimates of the travel cost are given below.

Travel cost for 1-person round trip:

$68/100 = 0.68$

$0.68 \times 8.9 = 6.1$

$6.1 \times 119.80 = 730.78$ RS

The cost for 1 person for one round trip in a day from apartment to workplace is Rs 730. Given that individual will have to travel to the city 264 times in a year for work. Then the annual travel cost of one round trip every day in a year for going to work for one person is Rs 192,720.

As 18,900 individuals under the study, will travel to the city centre for work than the annual travel cost of all 18,900 person will be 3,642,408,000. If housing was to be provided in the city these 3.6 billion rupees would have been saved.

The above calculations are made after excluding the maintenance cost of vehicle that they will have to bear just by traveling for work. If the maintenance cost is included then a vehicle, on average, needs maintenance after every 4000 km[10] road travel, and each trip to

[9] (An Australian Government Initiative | Green Vehicle Guide, 2021)

[10] This figure for maintenance cost and after how much distance maintenance is need is obtained after surveying auto mechanics.

the workshop cost 3500 RS on average in terms of the oil change, filter change and clean-up. The annual distance a person will travel from an apartment to his office is 17,952 Km.

If a vehicle travels a distance of 17952 Km and a visit to workshop is required after every 4000 Km than total number of visits to the work shop in a year will be 4 and each visit will cost Rs 3500. Total cost of maintenance annually for one person is Rs 14,000. Calculating that for 18,900 vehicles than the annual maintenance cost of the vehicles under our study is RS 264.6 million.

Annual Trip cost	=3,642,408,000
Annual Maintenance cost	= 264,600,000
Total cost	= 3,907,008,000

The total cost including the cost of round trip to the city centre and maintenance cost of all the 18,900 residents of the proposed high-rise buildings if they are constructed outside the city is 3.9 billion. All these could be avoided by constructing these buildings in the city.

6.2 Opportunity cost of time:

The time it takes to travel to the city could be availed in other productive activities, to have an estimate about the opportunity cost of the time in monetary term, opportunity cost is calculated by per capita gross national income[11]. Annual per capital is converted into hourly per capita with a day of 8 hours and is considered to be the opportunity cost of an hour. Following the assumption for the study, for a round trip between office and apartment Each person will spend 1.2 hours per day and considering that they will have to go to work 264 times in a year than a single person will spend 317 hours annually just for traveling to work

[11] As used for calculating opportunity cost in PIDE Sludge series, No. 2 Housing Finance.

and back home. Hourly per capita GNI is Rs 86. Then the annual opportunity cost of the time spent in traveling in monetary terms for single person is Rs 27,262, which is calculated by multiplying the hourly GNP with total time it takes while traveling in a year. The annual opportunity cost of the time it takes to travel just for work of all the 18,900 residents of these 42 high-rise buildings will be Rs 515,251,800.

Total travel cost	=3,907,008,000 Rs
Opportunity cost of time	= 515,251,800 Rs
Total opportunity cost	= 4,422,259,800 Rs

The total opportunity cost of not providing housing in the city centre from our study area is Rs 4.42 billion. Keeping in mind that this cost is calculated just from the sample of 18,900 that too ignoring other trips to the city and exempting the visits by the family members, the average household size of Islamabad according to population census 2017 is 5.86. Among these there will be visits for taking health care, shopping, education purposes etc. This cost will be much higher if all these factors are taken into account. The urban sprawl has increased commuting time and distances and still there is shortage of housing and other urban activities. Through the redevelopment of spaces within the cities instead of developing new spaces the needs of the city can be ensured (Haque, 2020). With the releasing of the land owned by the state and redevelopment by private sector will not only the underutilized land will be used to its potential but the needs of the cities and its residents can also be ensured, which at present are ignored given the management of these assets.

6.3 CO_2 Emissions

The longer travel distances due to housings at suburbs not just impose monetary cost but also pollutes the environment due to Greenhouse's gas emissions from vehicles. In an effort to quantify the emission of CO_2 from the vehicle as a result of traveling from Skyline apartments (FGEHA) to the city centre for work, assumptions used in calculating the travel and opportunity cost are imposed and methodology for the quantification of CO_2 is adopted from Usman et al. (2017)

The formula for quantification of CO_2 emissions from vehicles is given below.

Emissions (kg/day/vehicle) = emission factor of petrol (kg/L) × petrol consumption (L/Day)

Total Emissions (Kg/day) = Emissions(kg/day/vehicle) × No of vehicles.

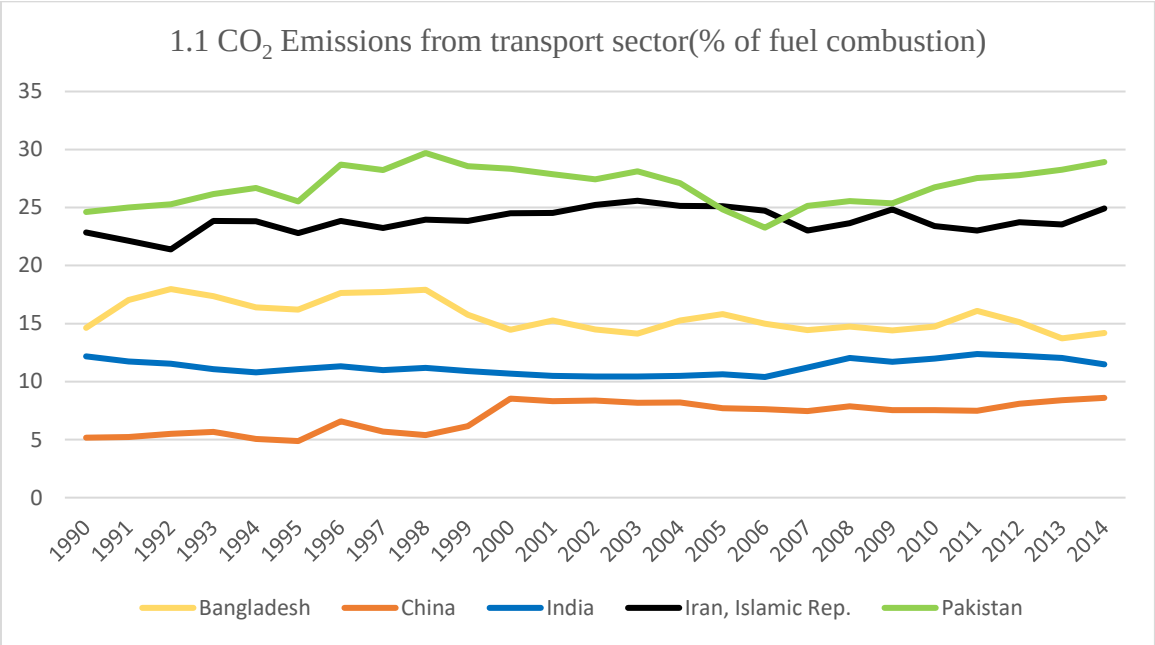
Total numbers of vehicles 18,900. The emission factor of petrol is 2.3 kg/L as given in Usman et al. (2017). Fuel that is consumed during one round trip is consumption is 6.1 litres per vehicle per day for a 68 Km round trip

Emissions (kg/day/vehicle) = 2.3 × 6.1 = 14.03

Total Emissions (Kg/day) = 14.03 × 18,900 = 265,167 Kg

One round trip of all the residents from the apartments to the office will add 265,167 kg of CO_2 emissions per day to the environment. The annual emission of CO_2 will be 70,004 tons in the environment. Alone the road transport sector adds more pollution to the air than any

other activity (Qadir, 2002). The carbon emission from the transport sector is the highest in Pakistan among neighbouring countries, as shown in graph 1.1 below.



source: world bank

The cost of not providing housing in the city is conveyed through the sample of buildings that are proposed for G-6/1. All these costs can be saved if housing is provided in the city centers which will also help in discouraging the urban sprawl. The Monetary savings will be RS 4.2 billion which will be saved in terms of commuting costs and the opportunity cost of time that will be spent while traveling is RS 515 million. The cost to the environment in term of CO2 emissions can also be ignored by the provision of housing in the city centers.

CONCLUSION

The total land in G-6/1, Islamabad, is 169 acres, out of which 86 acres are occupied by the state for providing accommodation to federal government employees. The rest of the land is occupied by the private sector and facilities such as schools etc. The total numbers of houses on 86 acres of land are 2107. If the federal government demolishes the current houses and redevelop the area first by accommodating the existing houses into high-rise buildings and auction the rest of the land to the private sector for high-rise development. Then according to our estimates, the federal government will have to construct six high-rise residential buildings. Which, after construction, will be able to host the current occupants of federal government houses. The six high-rise buildings will require an area of 9 acres, and they will host 2700 apartments. These apartments will be of two categories, category A for BPS 1-10 with an apartment size of 700 sq. ft and category B for BPS 11-17 with an apartment size of 1238 sq. ft. The total investment that will be required for the construction of these six high-rise buildings is Rs 13.2 billion. After allocating nine acres for federal government buildings, the area left out of 86 acres will be 77 acres. The state can auction this land to the private sector for high-rise development. The price of the land in G-6, Islamabad, according to our estimates is 22,216 rupees per sq. ft. After leaving 30 % of the land for streets and roads out of 77 acres, the left area is 54 acres. The revenue that the state can generate by the auction of 54 acres of the land is Rs 52.2 billion, a significant amount. Now the state can finance the construction of six high-rise buildings by the revenue generated by the auction of the land in G-6/1 and will still be left with Rs 38.8 billion of surplus. This way, the current houses are also hosted into high-rise buildings, and billions of rupees are generated along with the land vacant for further development.

The private sector can construct 36 high-rise buildings on the land in G-6/1. These high-rise buildings, after construction, will host 16200 apartments. Given that the housing backlog of

Islamabad is 100,000 with an annual supply of 3000 houses, these 16,200 apartments will reduce the housing backlog by 16%. The total investment that the private sector will require for the construction of 36 high-rise buildings is Rs 126 billion.

The construction of proposed 42 high-rise buildings (six by the state and 36 by the private sector) will have a positive impact on the GDP, increasing it by 0.09 percent in a year. The construction of these buildings will provide employment to 27510 skilled and unskilled workers during the construction phase on the construction site. The number of labourers will increase to approximately 48510 during certain construction phases, which requires labour-intensive works.

By the provision of housings in the city centres, the saving that will occur is also calculated by the case study approach. When housing is provided out of the city, then according to our estimates, the residents of the study area have to bear an annual total travel cost of Rs 3.9 billion just for going to work in the city. The opportunity cost in monetary terms of the time it takes to travel to the city for work is Rs 515 million. Hence the total opportunity cost of not providing housing in and near city centre is Rs 4.42 billion and the environment cost in shape of greenhouses gas emissions to the environment from the study sample are 70,004 tonnes annually. All these costs and emissions are saved when housing is in and near city centres.

Policy recommendation:

The government owned stand-alone single storey houses, constructed for providing houses to government employees may be demolished and replace with high-rise buildings. The construction activity that will ensue will increase GDP by 0.09 per annum for three years collective impact of 0.27 and will increase employment by 27510 during the construction phase which will go up to 48510.

This activity may be repeated for government housing in the entire country. this would have an enormous impact on the GDP and employment

1. Forming a centralized record of state-owned land across Pakistan. Including different ministries, State owned enterprises etc.
2. Forming an independent body with professional asset management experts. For managing the land keeping in view the location, value and need of the area.
3. Releasing the land held by the state- and state-owned enterprises within city centers for high-rise redevelopment.

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