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URBAN SPRAWL IN DISTRICT MARDAN: A POLICY CASE ANALYSIS

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Abstract
The study focused on the aspects of urban sprawl and policy analysis related to these aspects. Data was collected online from 75 respondents. We used descriptive statistics and regression analysis to interpret the data. The results indicate that the majority of people consider urban sprawl a threat. Several factors resulting from the urbanization process, including social, environmental, and economic effects, were identified. The opinions of 61% of respondents confirm that there is a lack of proper planning in cities and municipalities for urban expansion. The regression analysis for policy implementation showed that policies are more effective in addressing environmental impacts, while impacts on economic and social factors have no significant effect on policy interventions. It also revealed that the community's perception of urban sprawl as a threat has a negative and insignificant association with policy interventions. It is recommended to educate people about the threats of urban sprawl.

Keywords: Urban Sprawl, Primary Data, Economic Effects, Environmental Effects.

Background
The concentration of the human population in an area is known as urbanization. This leads to the use of agricultural land for not only residential but also commercial, industrial, and transportation. Urbanization results in an account of a complicated set of economic, demographic, social, cultural, and environmental processes that leads to the concentration of the human population in the given area. Urbanization is related to economic development. It increases with an increase in economic development while decreases with a decrease in economic development. Various factors lead to urbanization and all these factors affect the rate and its creation with different rates in different periods. The agricultural revolution is the major factor that laid the foundation for the process of urbanization. The agricultural surplus was necessary for cities to be established. Agricultural surplus facilitates the workers in the agricultural sector to enter other job avenues thus leading to urbanization.

The technological revolution is the second factor that facilitates the process of urbanization. The invention and advancements in production methods and the establishment of factories enabled the population to move into agglomerates and thus creating densely populated areas. The third factor

that played the role in the growth of urbanization is commercial revolution consists ofsetting up of the world markets, world exchange systems and special means of communication and transport systems. The development of radical and enhanced transportation system further facilitate the process of urbanization. The invention of rails and then motor cars paved the way to transfer the goods and stuff needed from point to another thus incentives the establishment of today's metropolitan centers and urban growth. The demographic transition is the fifth factor that contributes to the process of urbanization. Demographic revolution is the result of developments in agriculture, transportation, medical science and production means. Medical sciences decreased the mortality rate by curing the fatal diseases and enhanced system against disease causing agents. At the same time birth rate didn't decrease thus leading to a large growth in the population. These additions to the population led their way to the agricultural lands and cities.

Problem Statement

Urban sprawl is closely related to urbanization in the sense that already prevalent cities get extended and new areas are brought under construction. Mostly, urban sprawl is not planned, and in Pakistan, the property rights and laws regarding housing and agricultural land are vague and ill-defined. Due to this, cities are spread without proper planning. The attached facilities could not be provided on time and the inhabitants are faced with so many problems. To see how the urban sprawl is /affecting societies, we undertook this research and noted the perceptions of the public.

Significance of the Study

This study is important in general to understand how people perceive urban sprawl and how it affects their lives. The results can be a guideline for readers and for a small contribution to theory.

Research Questions:

RQ1: Is urban sprawl a threat?
RQ2: are policies intervention needed to tackle the effects of urban sprawl.
Hypothesis:
H_{11}: People consider urban sprawl a threat.
H_{12}: Different outcomes of urban sprawl can be tackled with policy interventions.
Objectives of the Study

1. To study the concept of urban sprawl.
2. To understand the perception of the community about the effects of urban sprawl.

Literature Review

Sher Ali, Sajjad Ali, and Shabana Parveen (2020) from the analysis of the study showed that the cultivated area converted into urbanization due to population growth in the specific area of the crops of maize cultivated on 10,816 hectares in 1991 and the maize crops area decreased to 8,530 hectares in 2010. Similarly in 1990-91, the crops of sugarcane were cultivated in 10,067 hectares area and then the cultivated area for sugarcane goes down to 9,430 hectares in 2015-16.

Nguyen Min Ha, Nguyen dang Le and Pharm Trung Kien (2009). In this study seeing the affecting of income inequality from urbanization the research shows the income inequality reducing due to urbanization. From urbanization the income inequality decrease in the short and also in long term.

Due to urbanization economic growth is increasing and economic growth the income inequality in a region decrease.

Rabia Malik and Maisam Ali (2015) discussed that urbanization is a very dangerous factor to agricultural land, which is used most fertile land for urban objectives. The cities are expanding day by day and use the agricultural land in agglomerates. The foods needs of citizens can't fill from the available fertile land and resources, in this situation, people migrate from rural to urban areas and thus decreasing the agricultural land. There has been no policy to demotivate the people from shifting rural to urban areas. N. Pham Thi, M. Kappas, and H. Faust (2021) a case study in a province of Vietnam that agricultural land acquisition for urbanization reduced the rice cultivation area. But on the other hand, the survey shows that an opportunity provided for potted flower plantations to develop. In the household, some families have maintained their abilities and contain plantation vegetables, but the agricultural contributions are reduced from 45.6 percent to 34 percent for the income structure of households. For agriculture, the main object is fertile land and that fertile land can be reduced by the cause of urbanization. Aggrey Daniel Maina (2013) observed that urban-rural fringe areas are taking of benefits of conversion land to social, economic, cultural, and environmental appearance, even though the change affects some citizens in a positive way, despite overall people can't gain profit. In urban-rural fringe areas, land conversion produced opportunities and avail indigenous groups. In the newly urban-rural fringe area development of land residential are not highly facilitative in social and physical infrastructure like security, roads, sewerage system, and water supply, and as result, the minimum investment in the specific area produces problems for the environment for example soil erosion, water pollution, and waste generation. The transformation is useful for the many actors to improve their livelihood and also badly affect the environment.

Elias Danyi Kwasaana, Joyee Angnay Eli Eledi (2015) Identify that food system effectiveness is the product for food security and by the cause of uncontrolled urbanization make challenges to agricultural land around the cities. The research makes shows that the agricultural production capacities are shifted to distant villages from peri-urban communities because of urbanization, and also implication to employment issues in the agriculture sector. The government must implement planning approaches for land use to be adopted and to encourage the leaders to retain green zones for agriculture and landscape purposes in urban fringes. B. K Arsiso, G. M Tsidu, G. H Stoffberg, T. Todesse (2018) with increasing of urbanization the climate change occur in that specific area. This study specifies the change in nocturnal temperature with climate change in the progressive urbanized area. In the last two and a half decades, the built-up areas increased with a high rate since 1986, and the sharp decline is seen in agricultural land and vegetation covers and effect come on to bear land have increased. Mostly glance changes in land use land cover (LULC) are highly regard urbanization. Land use affects the climate of the related area if the area is built-up with a high rate identified from hot-pot temperature and the surrounding densely built-up and green area.

D. O Appiah, J. T Bugri, E. K Forkuo and P. K Baateng (2014) The agriculture and forest land uses are slowly losing down with time and the land using the demand for other uses are increasing. The households not taking a rational decision as to what type of work is relevant for the land and

the land remains unserviceable for the betterment of society. The landowner shows not a great hesitation for converting land use. Many landowners and formers can't achieve the useful profit from the lands and as result the award to other residential, commercial, and recreational uses to perform a maximum profit.

Shuangshaung Tu, H. Long, Y. Zang, Dazhuan Ge, Yi Qu (2017) due to urbanization the rural and villages are faced declining in traditional agriculture production, and obviously shifted the capacities to industries of tourism service, mining and successful appearance of industrial production and other multi-functional values. A leading actor is spatial restructuring that reinforced the economic and social restructuring and all these maintain socio-economic development. The spatial restructuring survives the promoting the social restricting and rural economy.

Nguyen Van Suv (2009) Since 1990 the urbanization and industrialization process are rapidly increasing and land areas that are used for agricultural purposes directly shifted for other uses. The transformation of land use from agricultural-based country to industrial and service-based country. The rapid increase of urbanization affected the social lives of some peri-urban and rural farmers which wet rice civilization are demand and for a long time, this agricultural land provided livelihood productions. The land use benefit is mainly less with compared to urbanization industrialization; therefore, the agricultural land is used in another way to produce the maximum amount of money.

Dipak R. Samal and Shirish S. Gedam (2017, 2015) Land use land cover (LULC) is a valuable subject of the earth's surface in which changes occur due to anthropogenic and natural causes. The rapid growth of urbanization and industrialization in developing countries generates serious defiance to the natural environment. The developed areas are not restrained with cities but also expand with transportation networks in the studies area.

Ashraf M. Dewan, Yasushi Yamaguchi (2009) The study assessed that land use/cover changes in the dynamics of urbanization which becoming large and in result cultivated areas, water bodies, wetlands, and vegetation are cramp. The contraction of cultivated areas, wetlands, vegetation, and water bodies causes environmental deterioration in the relating area. Economic development, elevation, and population growth are the main factors to expanding urbanization. The spatial urban changes on regular basis expand the urban areas that develop the sustainable growth with increasing urbanization the land use designing make sustainable growth in future.

Mustafa Bolca, Bahar Turkyilmaz, Yusof Kvrucu, Unal Altinbas, M. Tolga Esetlili, Bahriye Gulgun (2006) In Balcova Delta the fast-flowing and unmethodical increasing in urbanization badly affect the natural recreational areas, urban agricultural land, and wildlife habitats and the protection of these areas are must according to the international agreement. The development of urban planning may create other environmental problems. Increasing urbanization is also concerned with the acidity of the soil in a large ratio and pollution. The migrated birds don’t avail themselves of the freshwater resources and reach dangerous situations.

Xiagzheng Deng, Jikun Huang, Scott Rozelle, Jipeng Zhang, Zhihui Li (2015) According to statistics of the United Nation the urbanization rate increased, and from 2009 to 2050 there are 1.86 Billion people migrate from rural to urban areas. The ratio reached from 50 to 69 % urbanization have a positive impact on the cultivated area and encourage the people to shift to towns and protect the cultivated land and the urbanization less severe the agricultural land loss. Economic, social geophysical factors, population growth, and industrial structure are the leading factors to improve urbanization. The ratio of the urban population rises to 52.57% from 17.92% between 1978 to 2012 in China.

Jie Chen (2007) In china due to the rapid growth of urbanization the soil available for the production of grain decreasing and also badly affecting the quality of soil degradation. In urbanization, the air pollution, polluted with industrial and transportation units from industrialization the soil pollution through acid deposition and waste disposal. Urbanization is a threat to useable lands to protect grain sustainability. In large, people moving to cities make a threat to cultivated lands.

Bhagawat Rimal (2012) Land use/cover (LULC) ratio decreasing day by day due to a large attraction of people to cities/towns. Many factors which play a role to decrease the useable lands are social development, commercial development, economic development, and the improvement in physical infrastructure. A major cause of urbanization is population rate which is in a proceeding way. The population also increasing in the border areas of cities which makes a problem for the agricultural land. In the study area from 1977 to 2010, the urban area consist of 6.33% in 1977 and in 2010 the ratio increased to 51.42% with compare to useable lands brings down from60.73% to 20.27% in the mentioned period.

David Satterthaite, Gordon McGranahan, and Cecilia Tacoli (2010) Usually the urbanization mostly considered that there has a negative contract on farming land but either has a positive effect on rural areas. The people of the urbanized area have a demand for feeding, services, and goods provided by the rural citizens and make a decent income mostly from agricultural land. In the world, low-income and middle-income nations have small urbanization and neither a remarkable achievement in economies. The higher-income countries don't want to further urbanize because there is large strength of non-agricultural workers living in rural areas and providing workers to service enterprises and an industrial unit situated in rural areas.

Pukhtoon Yar, Atta Ur Rehman, Muhammad Aslam Khan, Samiullah, S. Akhtar Ali Shah (2016) From 1990 to 2010 in Mardan the built-up area increase to 1,994 hectares from 953 hectares. Mostly the peri-urban areas are urbanized due to rapid growth of urbanization, advancement in the transportation system, increasing demands for housing, and rise in land value is the important items that encourage urbanization and conversion of useable lands to built-up constructed areas. As a result, the per capita useable land is deducted by degrees however the production of grains becomes larger because of the excellent irrigation system and usage of modern types of seeds and power of nitrogenous fertilizers. For sustainable urbanized transfers make sure to push the farmers in peri-urban areas.

Muhammad Shoaib, Kashif Ali, Sajjad Ahmad, Firasat Hussain, Muhammad Ilyas, Nazim Hassan, Ikram Ullah Khan, Fida Hussain (2018) There have some problems which make dangerous environmental hardship including ecological changes, climatic change, and polluted environment. Urbanization is much potent activity in the study area. The urbanization activity also affects the ecological system and vegetation, some types of vegetation Populus Alba and Salix Alba get extinct because of early urbanization construction and changes in climate affect these species. Extensiveness in cities and high floating (water erosion) together these two terms have a negative impact on soil and forest. In the study area the total usable land is 88,734 ha in 2006-07 and after many years decreased to 60,321 ha. The land which is infertile can't meet the production of growing population needs.

Md. Arfan Uz Zaman, Bharat Dahiya (2019) Sustainable growth of cities supports more economic advancement which maintains the high income of the nation. Luckily economic growth and urbanization have been a positive relation. The urbanizes leads to play a positive role in economic growth, more populations transferred to town to maintain the economic growth in the best way while the population boosts the importance of socio-economic prosperity then the keeping capacity of the urban environment has been damaged the continuous growth of multidimensions destroys the urbanization system. As an outcome, create a certain situation for everyone to acquire a maximum profit from the urban process and share with all citizens to fight with different challenges, and friendly environment for urban design to protect sustainability.

Research Methodology

Sampling

As there is less time to complete a M.Sc. Thesis project, the online Google form was used to collect data. Attempts were made to collect more data but the response rate was very low. However, an above 50 number of responses were collected. We had posted Google forms in various face book pages, university WhatsApp groups but the response was low.

Questionnaire

We used questionnaire developed by European Environmental Organization and European Topic Centre on land use and spatial information.

Analysis Tool

We used simple descriptive analysis for analysis use and used pie charts for the purpose.

Results and Discussion

Percentage of respondents working for the type of institution:

As evident from the figure below, it says that the maximum number of respondents don't work or work somewhere that is not listed in the options. Second higher number of respondents are related with their business followed by government jobs and then NGO's sector.

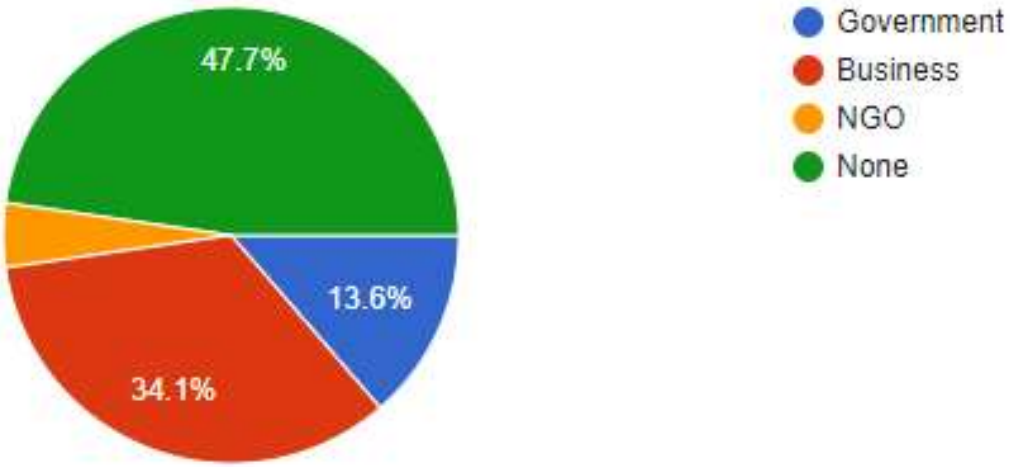

Figure 1: Type of institution respondents works for

Percentage of respondents based on type of administration level:
The data shows that maximum number of respondents are associated with administration level in country followed by region and then municipality.

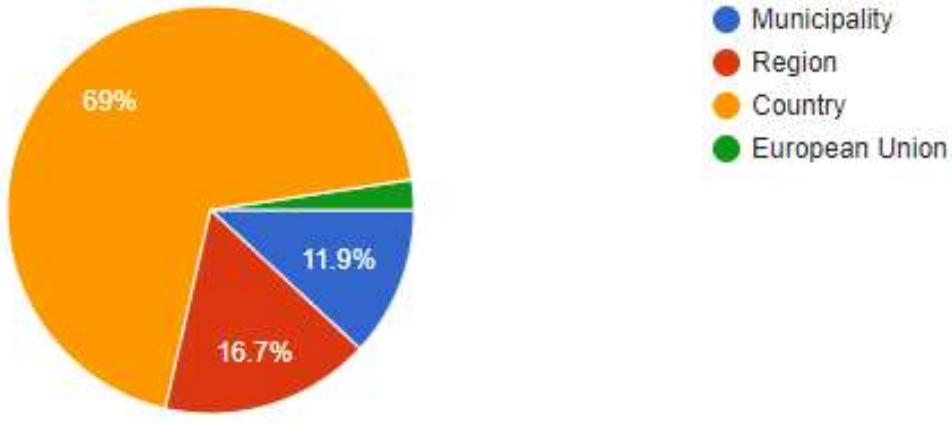

Figure 2: Types of Respondents based on types of administrative level

Name of the Country/Region/Municipality to which Respondents are associated with:
The graph shows that respondents are from Pakistan

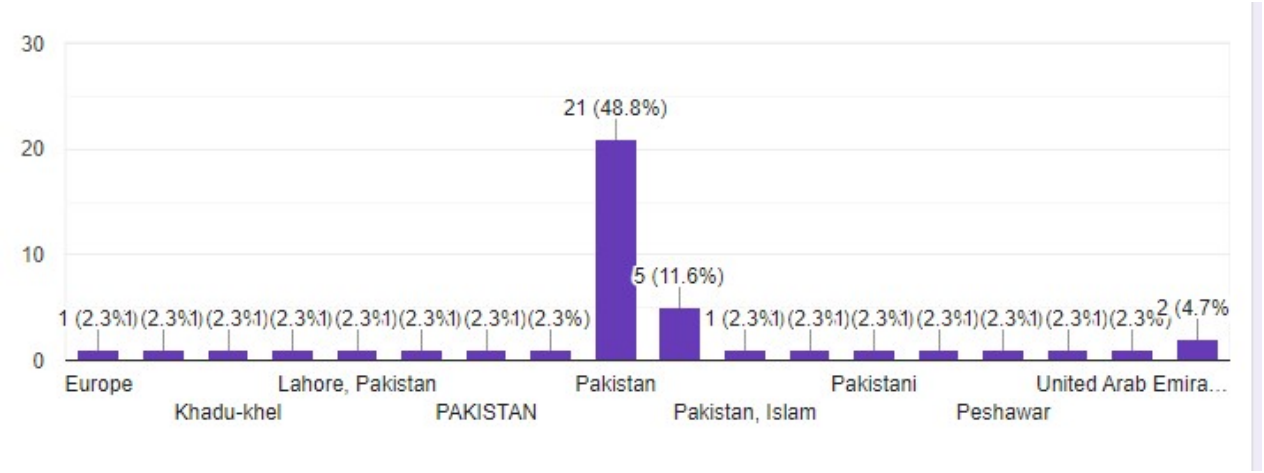

Figure 3 Name of Country of Respondents

Percentage of Respondents on if Urban Sprawl is considered a threat in their area:

61.4% of the respondents thinks that urban sprawl is considered a threat in their country/region/municipality**.**

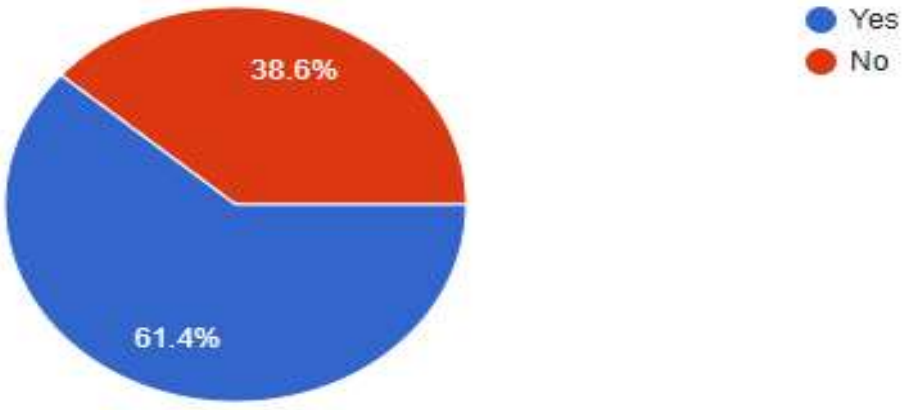

Figure 4: Percentage of Respondents on if Urban Sprawl is considered a threat in their area

Percentage of Respondents on measures to limit Urban Sprawl:
Graph shows that there are limited number of measures on national level to curb urban sprawl.

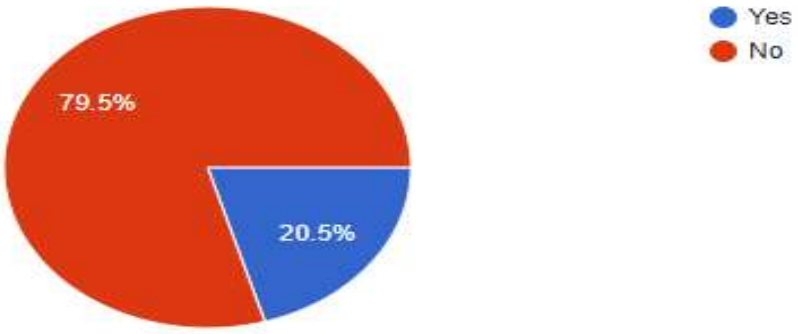

Figure 5: Percentage of Respondents on measures to limit Urban Sprawl

Percentage of Respondents on consumptions of land and soil:
The responses shows that the urban sprawl consumed a high proportion of land and soil in a specific area which affect by urban sprawl. In that case the land which is used for any other aim badly affect by urban sprawl.
Data shows the following which was submitted by respondents;

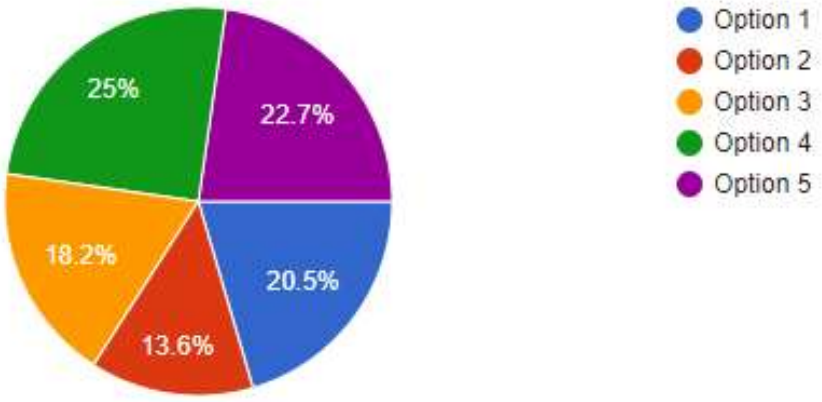

Figure 6: Percentage of Respondents on consumptions of land and soil
option=Very low, option 2=Low, option 3=Medium, option 4= High, option 5=Very High.

Percentage of Respondents on Consumption of concrete and other building materials:
A lot of building materials and consumption of concrete increase due to urban sprawl. The maximum responder shows that due to increasing urban areas the materials demand should be increase. 36.4 percentage of responder claim that very high rate of consumption of concrete materials
Data shows the following which was submitted by respondents;

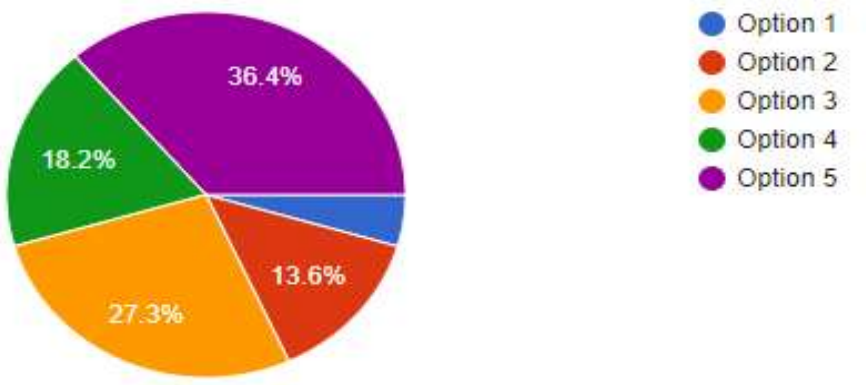

Figure 7: Percentage of Respondents on Consumption of concrete and other building materials note: option 1= Very low, option 2= Low, option 3= Medium, option4= High, option 5:=Very High

Percentage of Respondents on Consumption of concrete and other building materials:
A lot of building materials and consumption of concrete increase due to urban sprawl. The maximum responder shows that due to increasing urban areas the materials demand should be increase. 36.4 percentage of responder claim that very high rate of consumption of concrete materials.
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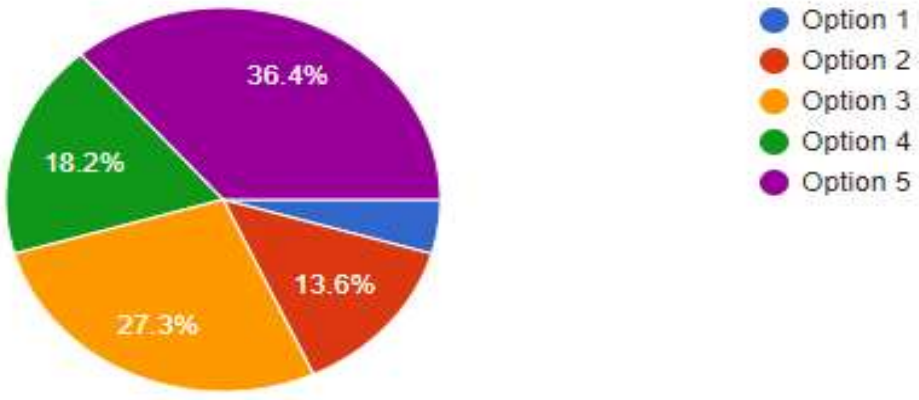

Figure 8: Percentage of Respondents on Consumption of concrete and other building materials option 1= Very low, option 2= low, option 3=Medium, option 4=High, option 5=Very High

Percentage of Respondents on Expansion of queries near to natural reserves:

32.6% of responses shows that natural resources are in a medium position which have not a great harm in the urban sprawl with a specific area. The average responder considers that the expansion of queries near to natural resources are safely protected.
Data shows the following which was submitted by respondents;

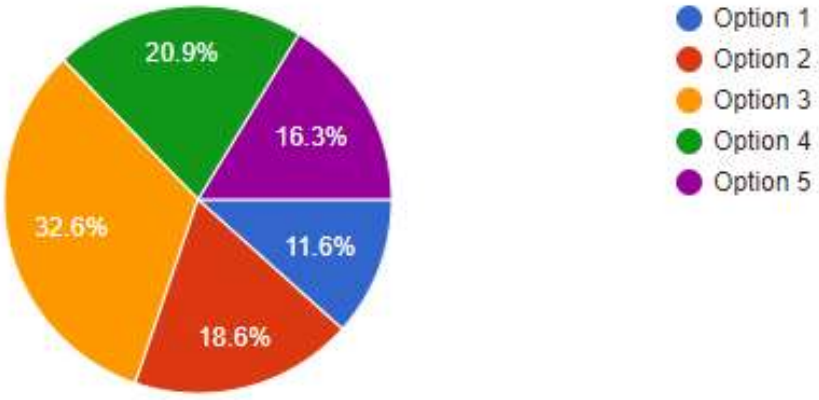

Figure 9: Percentage of Respondents on Expansion of queries near to natural reserves
option 1: Very low, option 2: Low, option 3: Medium, option: High, option 5: Very High

Percentage of Respondents on Over extraction of gravel from river beds or ridges:
In the area which have a high rate of increasing populated area the quantity of over extraction of gravel from beds or ridges maintain the ability of working to urban sprawl.25.5 percentage of respondent assumed that the extraction of gravel maintain the quality of gravel from river beds or ridges.
Data shows the following which was submitted by respondents;

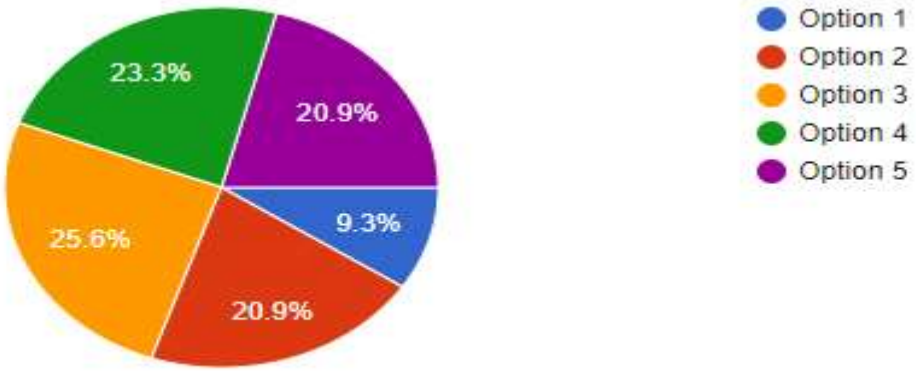

Figure 10: Percentage of Respondents on Over extraction of gravel from river beds or ridges
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High

Percentage of Respondents on Loss of soil permeability: The loss soil permeability is the quality of state being permeable or able to be penetrated or passed through especially by a liquid or gas. The maximum ratio of respondent considers that with in increasing the rate of urban sprawl the soil permeability affects in bad way.
Data shows the following which was submitted by respondents;

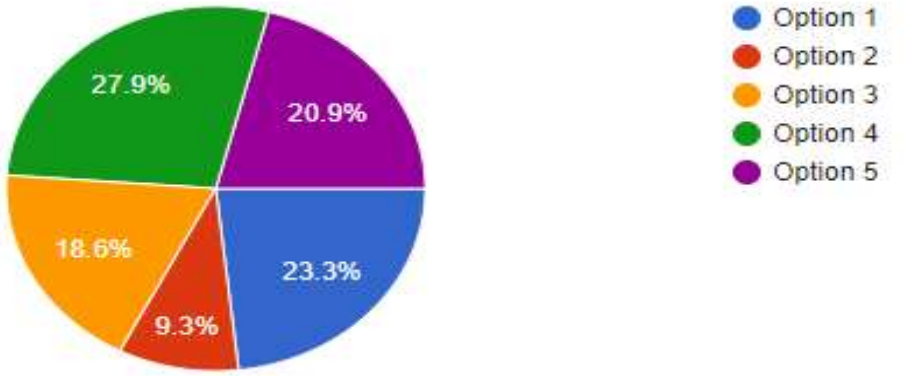

Figure 11: Percentage of Respondents on Loss of soil permeability
option 1= Very low, option 2= Low, option 3= Medium, option 4=High, option 5= Very High.

Percentage of Respondents on Loss of soil biodiversity: The maximum responder claim that urban sprawl has a positive impact on soil biodiversity with ratio of 34.9 percent. The decline or disappearance of biological diversity like habitat loss, pollution, over exploitation (extreme hunting and fishing pressure).
Data shows the following which was submitted by respondents;

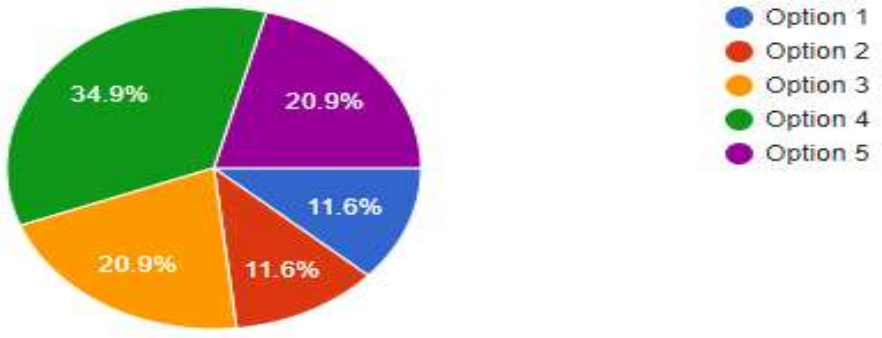

Figure: 12 Percentage of Respondents on Loss of soil biodiversity:
option 1= Very low, option 2= Low, option 3= Medium option 4= High, option 5= Very High

Figure 4.13: Percentage of Respondents on Hydrological impairment of small watershed:
The water released back into the air by plants through transpiration and by evaporation combines to form clouds and more precipitation makes hydrological impairment of small watershed. 34.9% of respondent conclude that urban has a high impact on hydrological impairment and small watershed.
Data shows the following which was submitted by respondents;

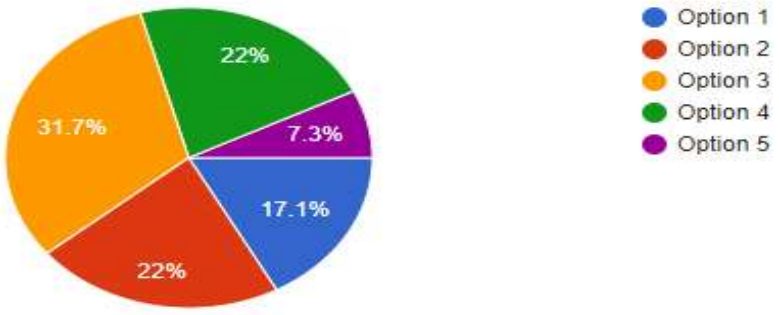

Figure 12:Percentage of Respondents on Hydrological impairment of small watershed energy:
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Growing consumption of energy:
World industrial sector increases by more than 30% between 2018 and 2050 as consumption of goods increases. The growth in end use consumption result in electricity generation increasing 79% between 2018 and 2050. The respondent shows that 37.5% of whole assess that urban sprawl have a positive impact on consumption of energy.
Data shows the following which was submitted by respondents;

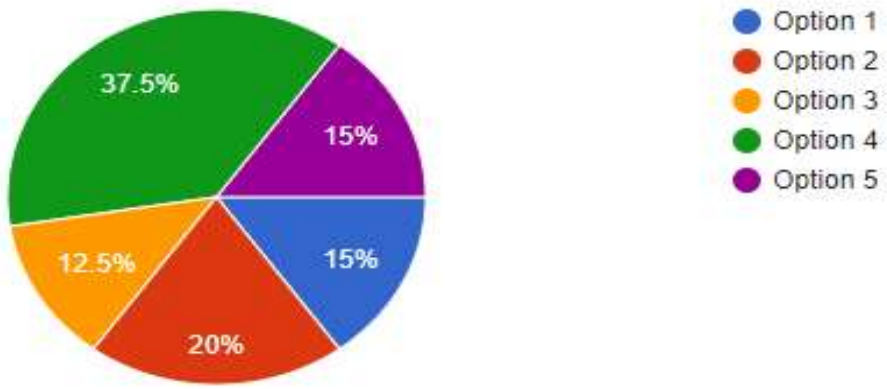

Figure 13: Percentage of Respondents on Growing consumption of energy
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Increase in travel related energy consumption:
The GDP and financial development positively and statistically significantly affected energy consumption. The respondent has an average containing value 19.5 percent which shows that with the increasing of urban sprawl travel related energy consumption also increased.
Data shows the following which was submitted by respondents;

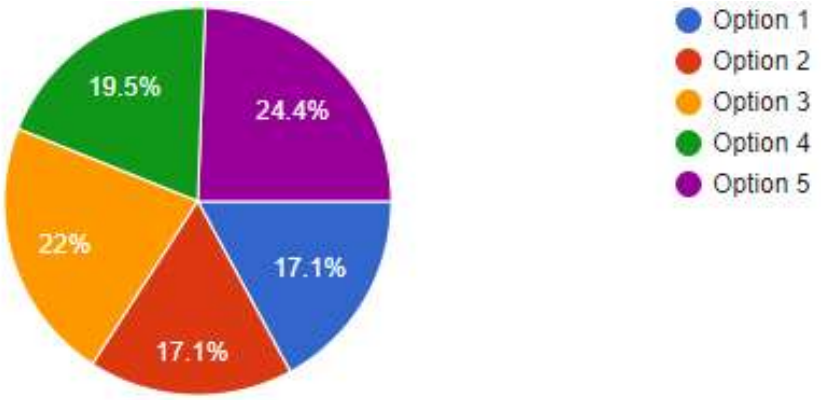

Figure 14: Percentage of Respondents on Increase in travel related energy consumption
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Growth in Co2 emissions: Global carbon emissions from fossil fuels have significantly increased with emission from fossil fuel combustion and industrial process contributing about 78% of the total greenhouse gas emission increase from 1970 to 2011. 39% of the whole respondent expresses that with increasing urban sprawl the growth in co2 emission also increased.
Data shows the following which was submitted by respondents;

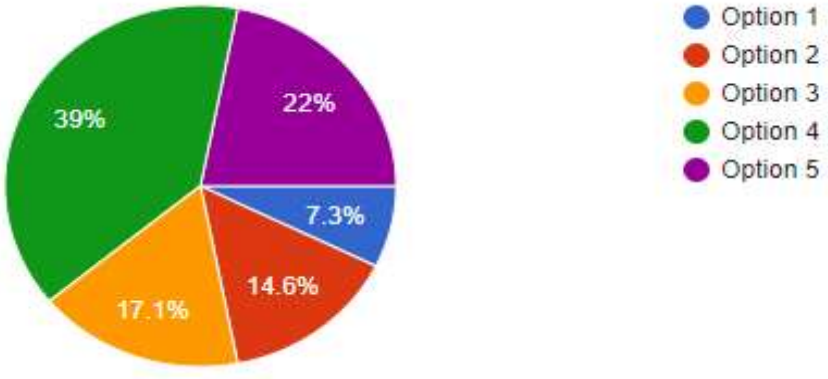

Figure 15: Percentage of Respondents on Growth in Co2 emissions
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Growing consumption of water:
Global water demand has increased by 600% over the past 1000 years. Increasing water demand follows population growth, economic development and changing consumption patterns. 40.5% of the respondent assess that with increasing of urban sprawl the growing consumption also increased.
Data shows the following which was submitted by respondents;

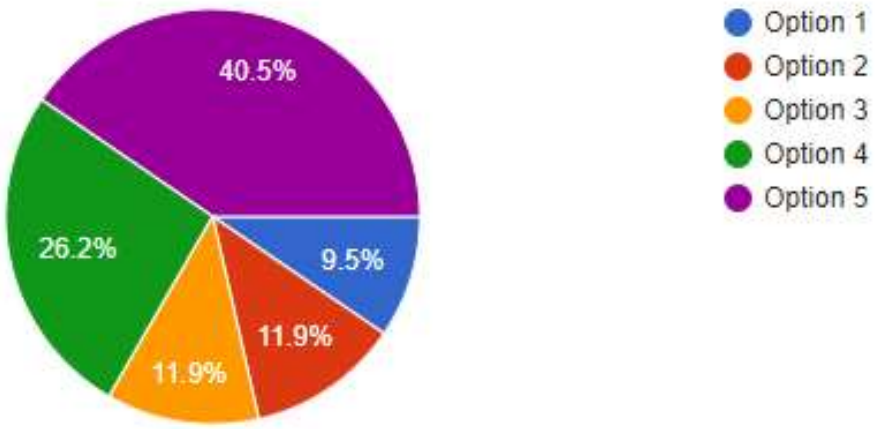

Figure 16: Percentage of Respondents on Percentage of Respondents on Growing consumption of water
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Natural, Protected Areas and Rural Environments

Percentage of Respondents on Loss of natural habitats: Habitat destruction is the process by which a natural habitat becomes incapable of supporting its native species. The organisms that previously inhabited the site are displaced or dead, thereby reducing biodiversity and species abundance. The maximum ratio of 33.3% followed by 31% are directed to consider increasing urban sprawl maximize the loss of natural habitats.
Data shows the following which was submitted by respondents.

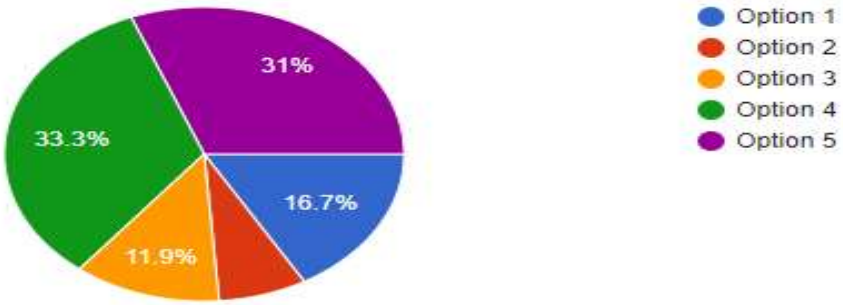

Figure 17: Percentage of Respondents on Loss of natural habitats
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Loss of best agricultural land:
The loss agricultural land is due largely to land degradation, such as erosion, which is when soil components move from one location to another by wind or water. Agricultural land is also being lost because it is being converted for other purposes like highways, housing, and factories. 39 percent of the respondent express that loss of best agriculture land is decreasing due to urban sprawl.
Data shows the following which was submitted by respondents;

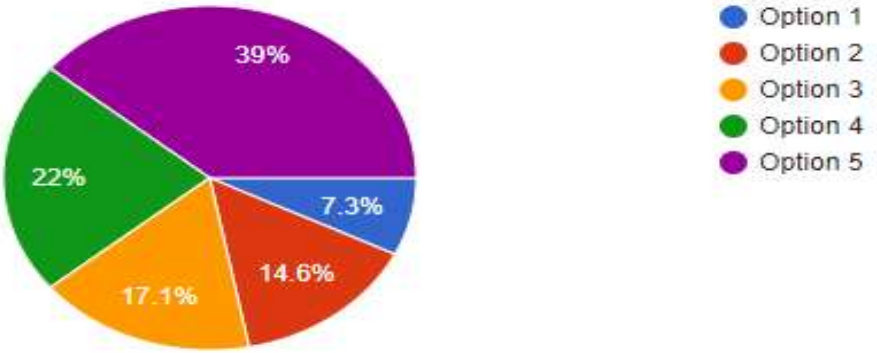

Figure 18: Percentage of Respondents on Loss of best agriculture land
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Increase in the use of water and fertilizer in less productive areas:
Fertilizers replace the nutrients that crops remove from the soil. Without the addition of fertilizers, crop yields and agriculture productivity would be significantly reduced. That why mineral fertilizers are used to supplement the soils nutrient stocks with mineral that can be quickly absorbed and used by crops. 34.1% of the respondent shows that the degradation of soil in the percentage in the use of water and fertilizers in less productive areas is increased.
Data shows the following which was submitted by respondents;

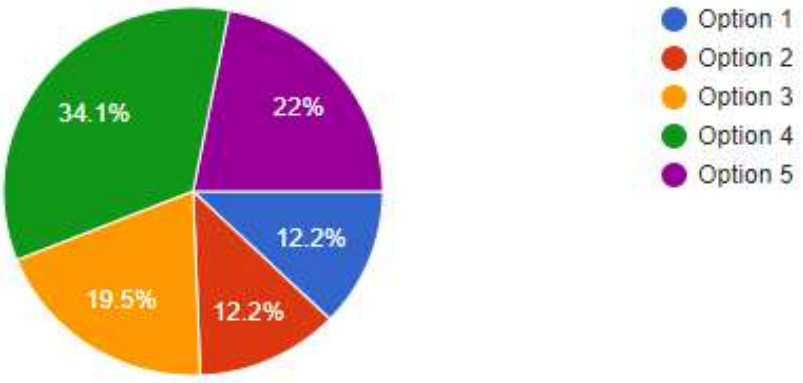

Figure 19: Percentage of Respondents on Increase in the use of water and fertilizer in less productive areas
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Increase in soil erosion in remote areas:
Although soil erosion is a natural process, it is often accelerated by human activities. Running water is the leading cause of soil erosion, because water is abundant and has a lot of power. Wind is also cause of soil erosion because wind can pick up soil and blow away. The following ratios shows that 45% of the soil erosion is increasing with urban sprawl.
Data shows the following which was submitted by respondents;

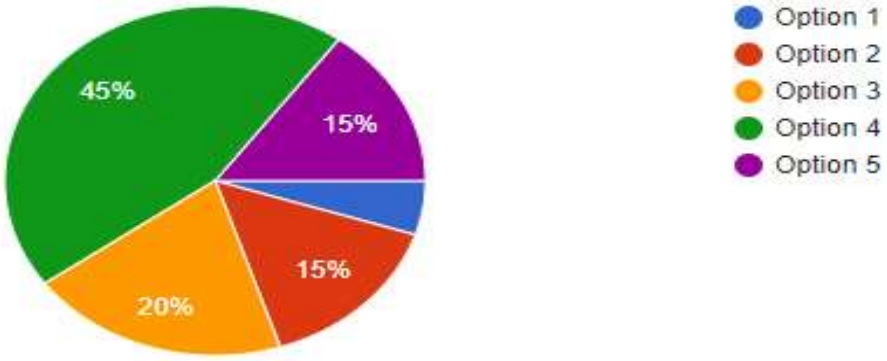

Figure 20: Percentage of Respondents on Increase in soil erosion in remote areas
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on More noise in rural areas:
Rural areas have a tradition of neighbors helping each other out because the sharp access to services can be limited compare to the faster face of city life. Means people tend to be warm and welcoming. The maximum value is 30% of the respondent that express that with urban sprawl

more noise in rural areas increases.
Data shows the following which was submitted by respondents;

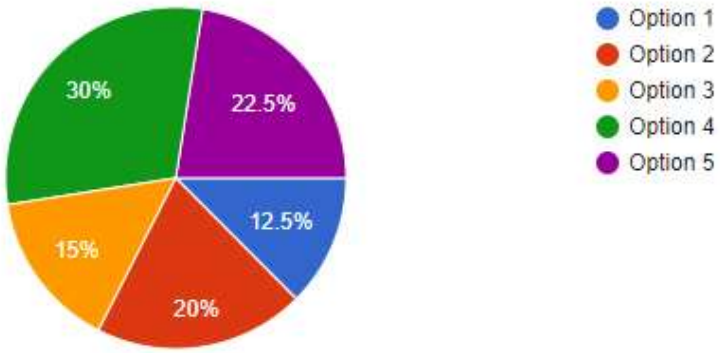

Figure 21: Percentage of Respondents on More noise in rural areas
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

The Quality of Urban Life and Health:

Percentage of Respondents on Increase in air pollution: Fuel oils, vehicle emissions and natural gas to heat homes, by products of manufacturing and power generation, particularly coal fueled power plants, and fumes from chemical production are the primary source of human made air pollution. The high ratio of 42.5 percent showed that urban sprawl has a positive impact on air pollution.
Data shows the following which was submitted by respondents;

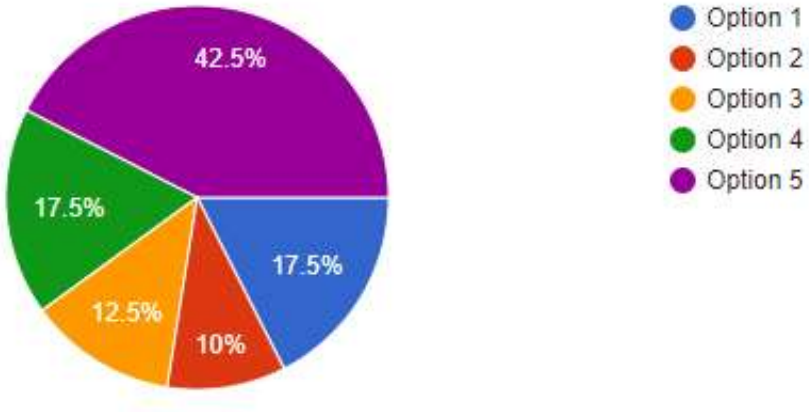

Figure 22: Percentage of Respondents on Increase in air pollution
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Increase in respiratory problems (Such as Asthma):
Airborne particles, found in haze, smoke and airborne dust, present serious air quality problems. People with asthma are at greater risk from breathing in small particles. The particles can make asthma worse. 35% of the respondent consider that with increasing urban sprawl the problems of respiratory systems also increased. Data shows the following which was submitted by respondents;

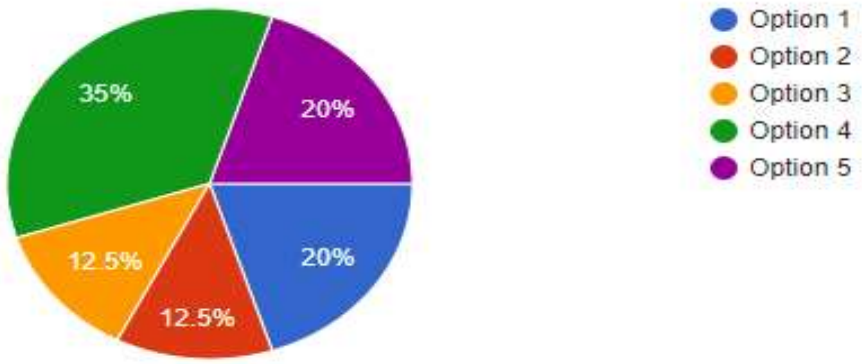

Figure 23: Percentage of Respondents on Increase in respiratory problems
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on High noise level: Excessive noise level over a long period of time will damage your hearing. This may happen so gradually and painlessly that you might notice. Millions of workers worldwide are exposed to noise level that put they're at risk. The high ratio of the respondent consists of 35% of the whole that with increasing of urban sprawl, level of high noise is increased.
Data shows the following which was submitted by respondents;

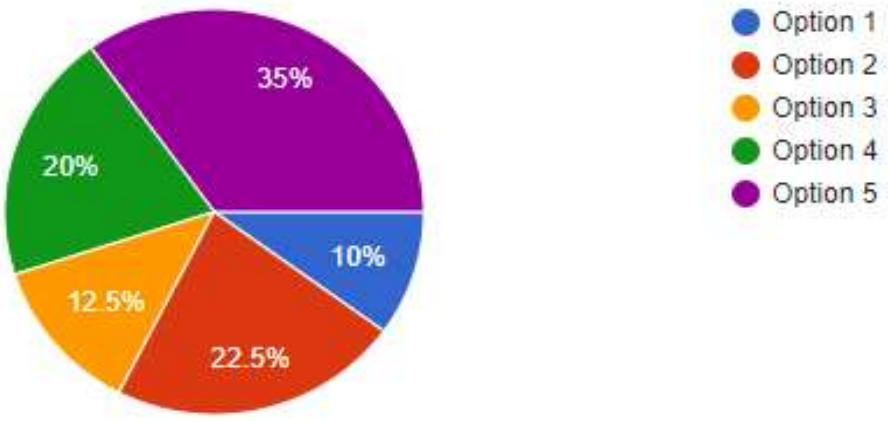

Figure 24: Percentage of Respondents on High noise level
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Traffic congestion:
Traffic congestion is a condition in transport that is characterized by slower speeds, long trip times. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream, this result in congestion. The high ratio is 37.5% of respondent which shows that with urban sprawl the traffic congestion is also increased.
Data shows the following which was submitted by respondents;

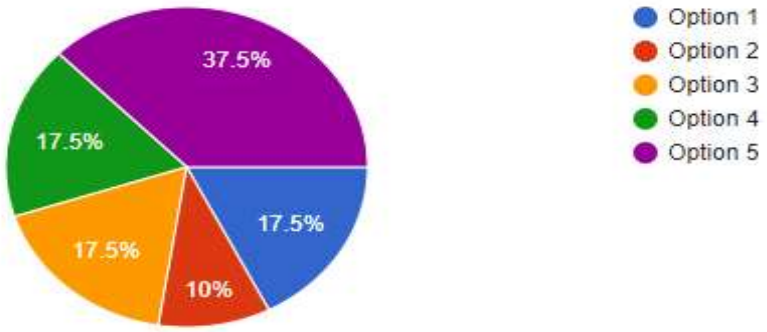

Figure 25: Percentage of Respondents on Traffic congestion
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Insufficient public transport network due to expanding urban area:
Cities in developing countries face acute pressure due to increased motorization, Urbanization and growing population. There have major problems in cities like urban transportation at the crossroads, traffic congestion and parking difficulties, longer commuting, public transport inadequacy, loss of public space. The down figure expresses the respondent ideas that there has a positive relation of urban sprawl with public transport network.
Data shows the following which was submitted by respondents;

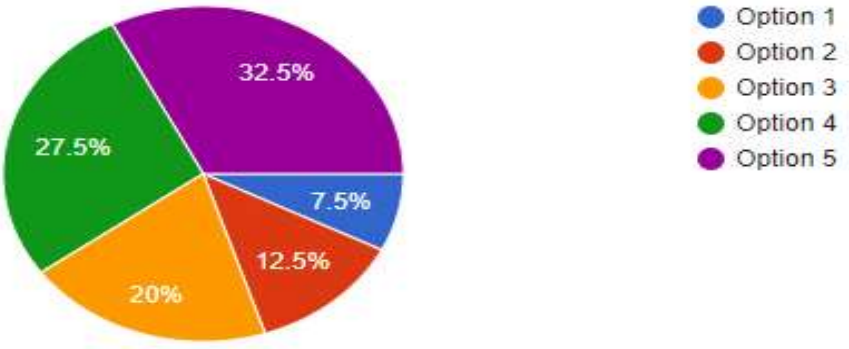

Figure 26: Percentage of Respondents on Insufficient public transport network due to expanding urban area
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Vulnerability of suburbs to major geo-hazards:
The geographical conditions that increases the susceptibility of a community to a hazard or to the impact of a hazard event like, poor air and water quality, insufficient water availability and energy consumption. The following figure argue that 32.5% of the respondent conclude that urban sprawl has an impact on vulnerability of suburbs to major geo-hazards
Data shows the following which was submitted by respondents;

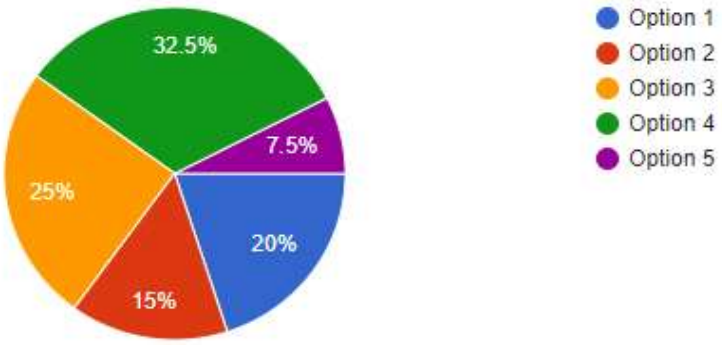

Figure 27: Percentage of Respondents on Vulnerability of suburbs to major geo-hazards
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Vulnerability of suburbs to minor geo-hazards:
Vulnerability describes the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. The ratio 38.5% shows the effect of urban sprawl on vulnerability of minor geo hazards.
Data shows the following which was submitted by respondents;

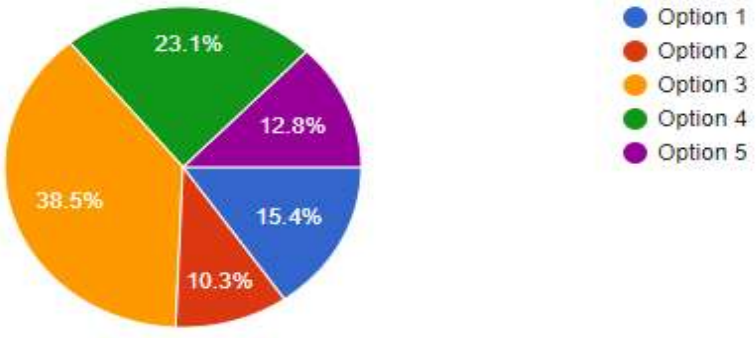

Figure 28: : Percentage of Respondents on Vulnerability of suburbs to minor geo-hazards
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Social Impacts

Percentage of Respondents on Exacerbation of social and economic division:

The major shocks in the economy like covid pandemic, great depression possesses the exacerbation effect on the economy containing over the area have oppose by the shocks which take some type of waves to slow down the social and economic division. The following chart make assess the ratio of 35.8% which shows the social and economic division.

Data shows the following which was submitted by respondents;

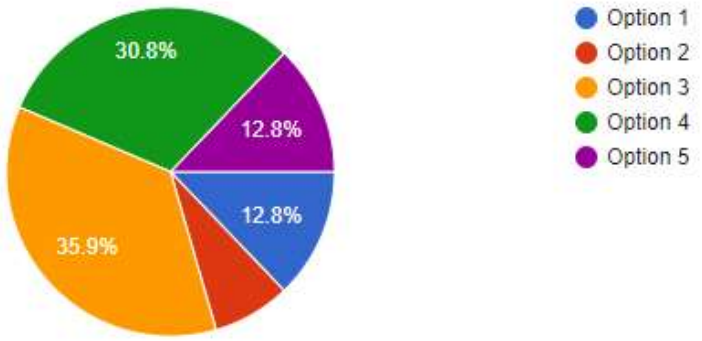

Figure 29: Percentage of Respondents on Exacerbation of social and economic division
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Segregation of residential areas:

Residential segregation refers generally to the spatial separation of two or more s0cial groups within a specified geographic area, such as a country, a municipality, or a metropolitan area. The following 35.9% of the whole samples data shows that due to urban sprawl the segregation of residential areas is affected.

Data shows the following which was submitted by respondents;

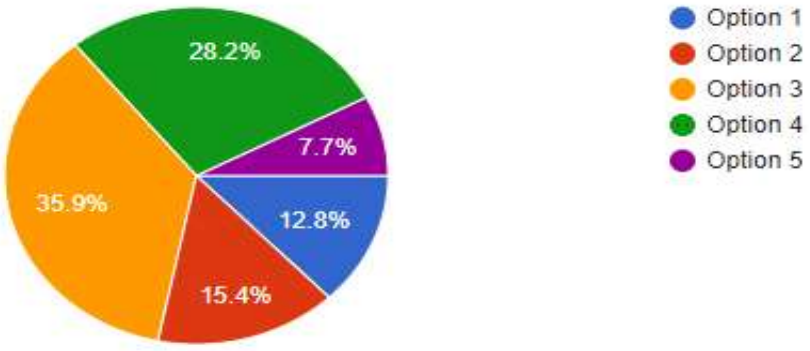

Figure: 31 Percentage of Respondents on Segregation of residential areas
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Less social interaction: Social isolation is an objective lack of social relationships or frequency of social contact. Loneliness is a subjective feeling of isolation. In urban areas a person can be socially isolated but not feel lonely. A person can also feel lonely when they ae surrounded by people. The maximum ratio of 32.5% shows that there has a positive impact of urban sprawl on less social interaction.
Data shows the following which was submitted by respondents;

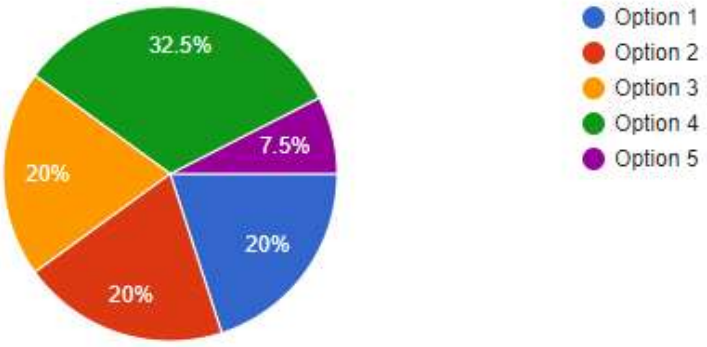

Figure 30:: Percentage of Respondents on Less social interaction
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Concentration of poor-quality neighborhoods in the inner city:
Neighborhoods of concentrated poverty can isolate residents from the services and supports they need. Neighborhoods of concentrated poverty isolate their residents from the resources and networks they need to reach their potential and deprive the larger community of the neighborhood's human capital. The figure analysis has been put off drawing the 30% of the ratio possess urban sprawl Have an effect on concentration of poor-quality neighborhoods in the inner city.
Data shows the following which was submitted by respondents;

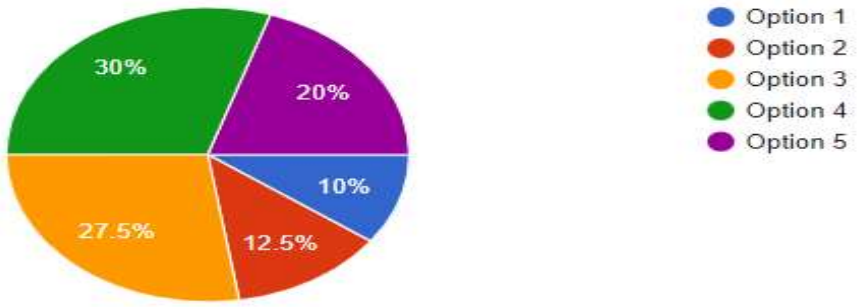

Figure 31: Percentage of Respondents on Concentration of poor-quality neighborhoods in the inner city
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Economic Impacts

Percentage of Respondents on Increased household expenditures on commuting from home to work over longer and longer distances:

Many commuters enjoy the time they spend in car before after work. For many it offers an opportunity to relax and mentally prepare for the day ahead which increase the household expenditure on commuting from home to work over longer and longer distances. 32.5% of the whole sample shows that urban sprawl has positive effect.

Data shows the following which was submitted by respondents;

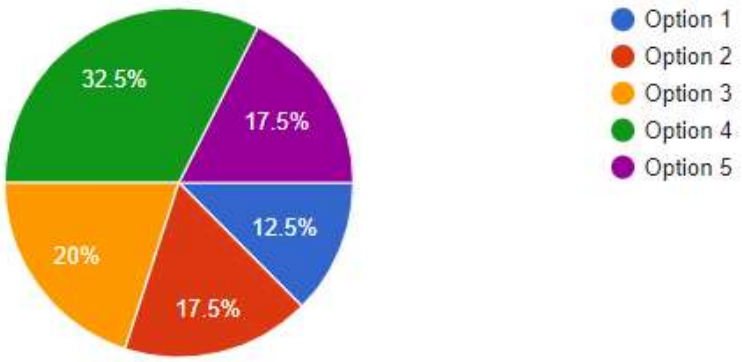

Figure 32: : Percentage of Respondents on Increased household expenditures
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Cost of the congestion for business in sprawled urban areas with inefficient transportation systems:

When urban areas expand in territory, densities commonly decrease and land uses are spread over a larger area. Conventional wisdom suggests that as urban areas sprawl, transportation cost and travel time increase. The ratio of 33.3% shoes the negative impact of urban sprawl.

Data shows the following which was submitted by respondents;

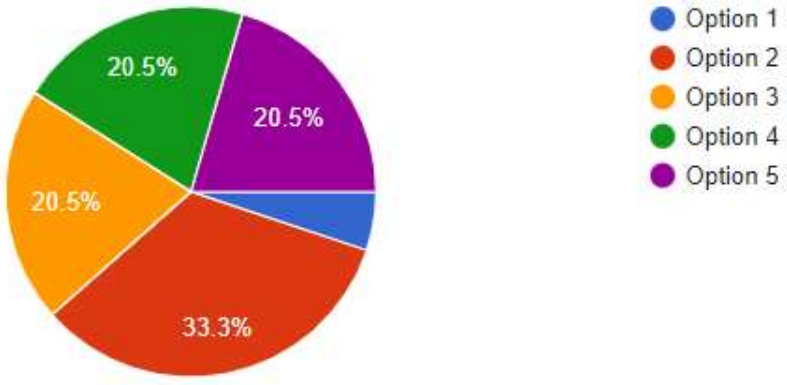

Figure 33: : Percentage of Respondents on Cost of the congestion for business
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Additional costs of the extension of urban infrastructures:
Urban infrastructure is a specific substructure, or subsystem of urban structure which supports production and development of the study. Urban growth is therefore utilized as an indicator for the country or an area economic condition as well as development. The ratio 32.5% argued that additional cost of the urban infrastructure.
Data shows the following which was submitted by respondents;

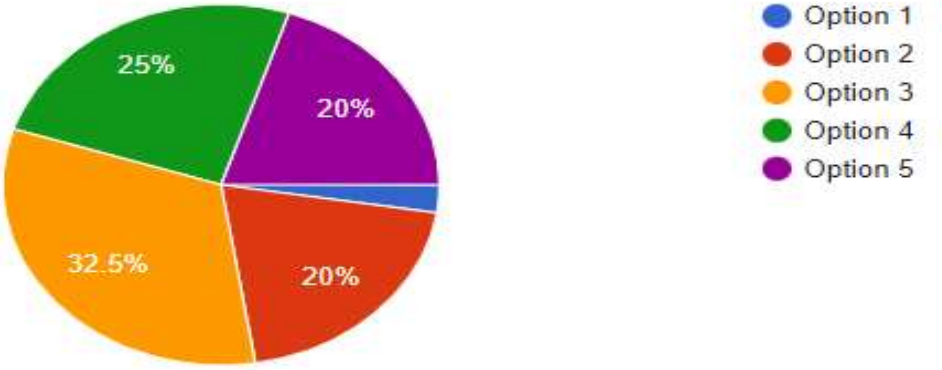

Figure 34:**:** Percentage of Respondents on Additional costs of the extension of urban infrastructure: option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Suboptimal use of abandoned industrial areas (brown fields):
generally, brownfields sites are exist in a city or town industrial section or location with abandoned factories or commercial buildings. 28.2% of the sample shoes that suboptimal use of abandoned industrial areas.
Data shows the following which was submitted respondents

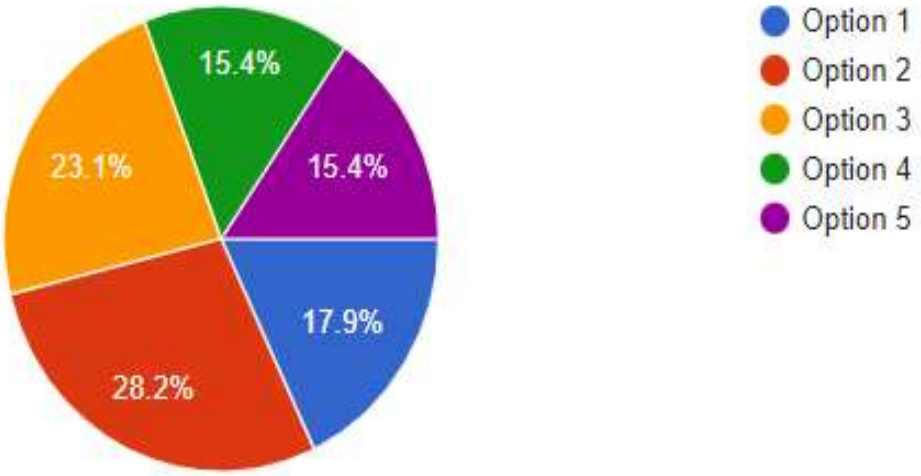

Figure 35: : Percentage of Respondents on Suboptimal use of abandoned industrial areas
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on No savings in provision of water and sewage facilities:
The most significant challenges currently facing water distribution system are aging infrastructure, increasing demand for potable water, maintaining potable water quality. And by the expansion of urban sprawl these challenges are increasing day by day.
Data shows the following which was submitted by respondents;

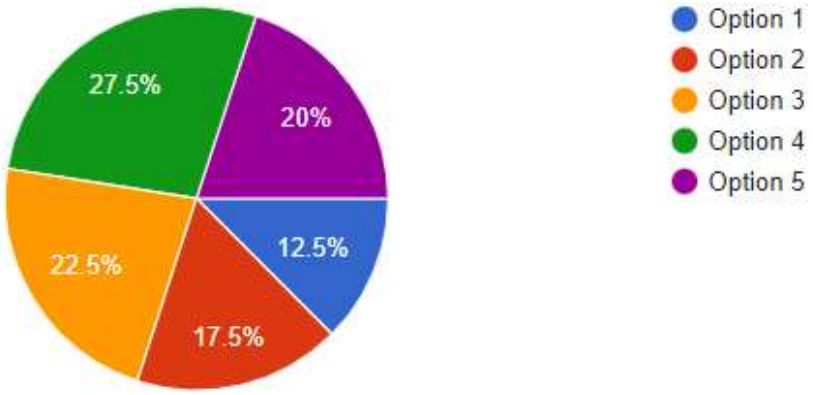

Figure 36: Percentage of Respondents on No savings in provision of water and sewage facilities
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Local stakeholders' measures:
Percentage of Respondents on Development of long term integrated plans promoting sustainable development and the limitation of urban sprawl:
Although some would argue that urban sprawl has its benefits, such as creating local economic growth, urban sprawl has many negative consequences for residents and the environment like higher water and air pollution. The average sample ratio shows that urban sprawl has an impact on development of long-term integrated plans promoting sustainable development and the limitation of urban sprawl
Data shows the following which was submitted by respondents;

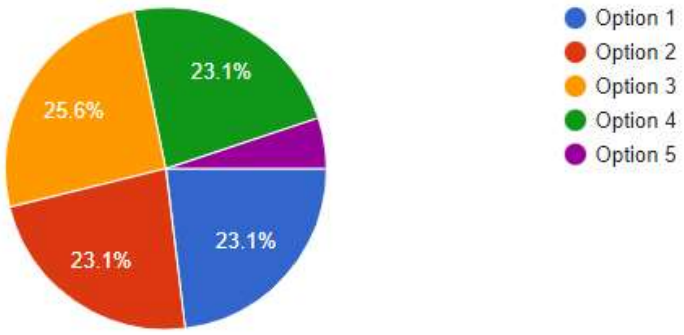

Figure 37: Percentage of Respondents on Development of long-term integrated plans
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Policies for the re-use of derelict brownfields sites and renovation of public spaces to assist in the creation of more compact urban forms:
Advantages of building on brownfield sites is more sustainable as existing develop land is being used. City expansion is curbed as the site is already within the city this stop the loss of county side and reduces journey times as the city is more compact.
Data shows the following which was submitted by respondents;

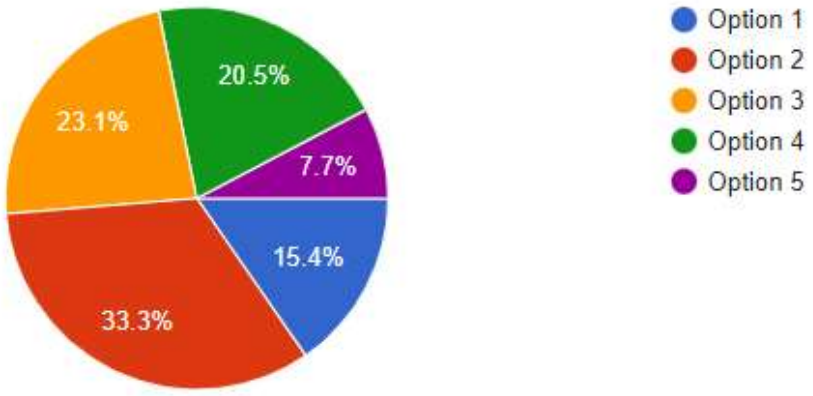

Figure 38: : Percentage of Respondents on Policies for the re-use of derelict brownfields sites and renovation of public spaces to assist in the creation of more compact urban forms
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Policies for avoiding the use of greenfield sites and complementary urban containment policies:
That influence the cost of transportation that shows the ratio of 28.2 percent of the whole urban sprawl because of policies for avoiding the use of greenfield sites and complementary urban containment policies.
Data shows the following which was submitted by respondents;

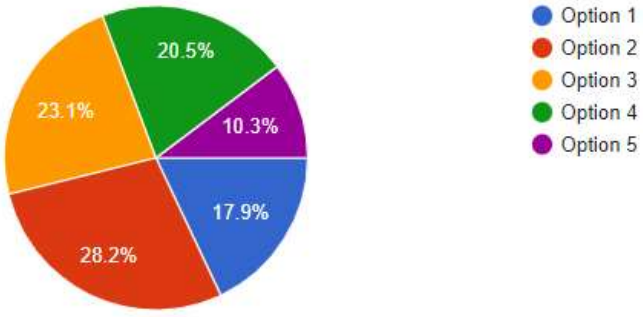

Figure 39: Percentage of Respondents on Policies for avoiding the use of greenfield sites and complementary urban containment policies
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Identification of the key partners including the private sector and community, as well as local, regional and national government and their mobilization in the planning, implementation and evaluation of urban development:
Private sector actor is perceived as playing a role in urban governance, they influence whether urban areas develop in inclusive and sustainable ways. The ratio of the following sample shows that there have a rarely effect of urban sprawl identifications of the key partners including the private sector and community, as well as local, regional and national government and their mobilization in the planning, implementation and evaluation of urban development.

Data shows the following which was submitted by respondents;

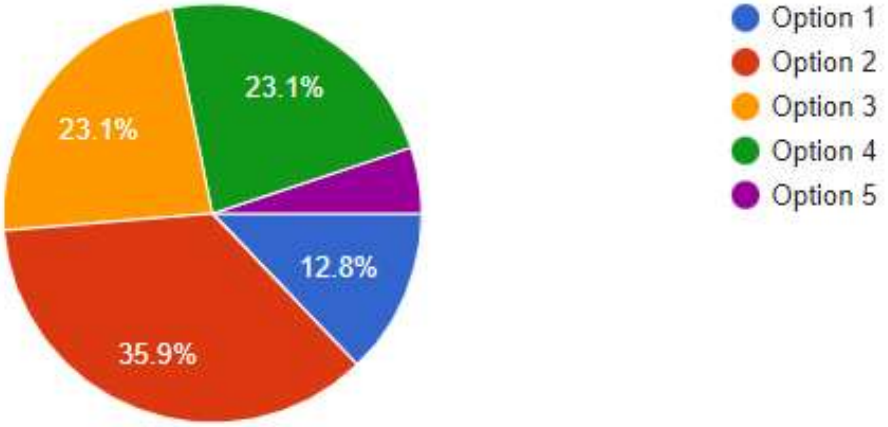

Figure 40;; Percentage of Respondents on Identification of the key partners including the private sector and community, as well as local, regional, and national government and their mobilization in the planning, implementation and evaluation of urban development
option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Percentage of Respondents on Management of the urban-rural interactions via co-operations and co-ordinations between urban authorities and rural and regional authorities in promoting sustainable development:
In short understanding rural urban linkages matters because it provides the basis for measure that can improve both urban and rural livelihood and environments. The ratio shows that 32.4% of the area are interacting with each other.
Data shows the following which was submitted by respondents;

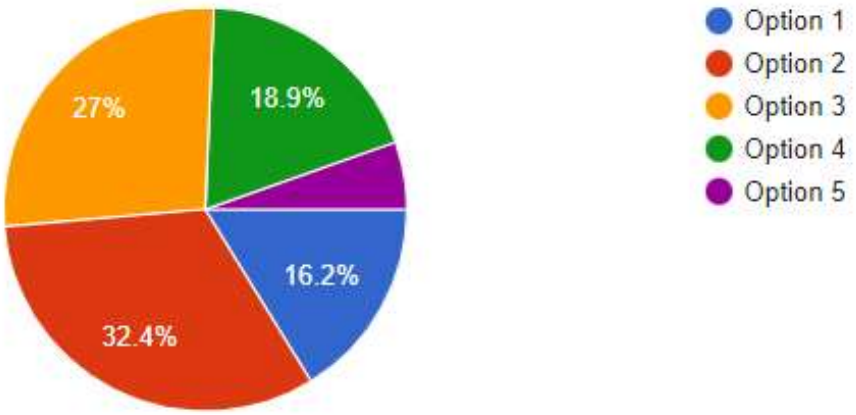

Figure 41;Percentage of Respondents on Management of the urban-rural interactions via co-operations and co-ordinations between urban authorities and rural and regional authorities in promoting sustainable development.

Alpha Value Check and Scale Generation

The responses taken from respondents were in likert scale. The reliability check for various aspects of the scale was calculated in STATA-17. Unstandardized items were used for generating standardized scale. The alpha for environmental impacts scale was 0.935, for social impacts 0.633, for economic impacts 0.743, and policy interventions it was 0.785.

Regression Analysis for Policy Interventions

The policy interventions were regressed for different aspects of social, economic, and environmental impacts, the threat perception, too was an independent variable. The value of the coefficient of determination shows that 60% variation in policy intervention tools is dependent upon the independent variable. Of all the independent variables, there is a highest need for policy intervention is case of environmental effects. This shows that environmental effects are better tackled by different policy interventions.

Table No. Policy tools for Urban sprawl as dependent on urban sprawl impacts

policy_tools	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
eco_ipmact	.154	.119	1.30	.199	-.083	.392	
soc_impact	-.136	.107	-1.26	.211	-.35	.079	
env_impact	.755	.098	7.70	0	.559	.951	***
threat	-.07	.156	-0.45	.653	-.381	.24	
Constant	.673	.471	1.43	.157	-.266	1.612	

Mean dependent var	3.250	SD dependent var	0.880
R-squared	0.605	Number of obs	75
F-test	28.832	Prob > F	0.000

Akaike crit. (AIC)	132.947	Bayesian crit. (BIC)	144.535

*** p<.01, ** p<.05, * p<.1

option 1= Very low, option 2= Low, option 3= Medium, option 4= High, option 5= Very High.

Conclusion

Urban sprawl can be defined as unrestricted growth in urban areas. Although there are many different approaches on how to measure urban sprawl, the common opinion is that urban sprawl can have many adverse effects, including social and economic issues. As the world cities are growing urban sprawl is getting worse, the erratic city growth is damaging the environment, sprawl is due to people moving to the suburbs as their income rise cheaper, faster, and more comfortable cars are the incentive, density restrictions and zoning regulations encouraged the trend. Means that more traffic jams, emissions and air pollution, less green space for nature and biodiversity are the main problems with urban sprawl. There have many factors which motivated the way to transfer for the better environment to urban areas, which are religion-based decision, cultural factors, access to appropriate housing, increasing number of jobs in suburbs, commuting networks, improvement in infrastructure, land rates, insufficient planning efforts, increase in living standards and population growth are the major factors that convincing for the urban sprawl. Economic growth or development pushes the population to urban areas which the individuals more empowering and independent but urban sprawl has negative effects which make the life more uncomfortable that are concentration of poverty, increase in energy consumption, pollution, shortage of financial resources, changes in social life, increase in public costs, health effects and psychic problems.

Recommendations

1. The study recommends a proper mechanism for the spread of population adjacent to cities and the attached amenities.
2. Agricultural land must be protected for coming generations and non-agricultural land may be devoted to cities.

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