LECTURE 1.

1. Why are successful cities dense, expensive, and with few large green patches?

Cities are usually located in areas where growth and productivity of the people thrive. This is as a result of the causal effect interaction between spatial processes and spatial patterns. When a location has a good developmental potential, it attracts more industrial activities. This industrial localisation leverage on their agglomeration to maximise the land use potential by sharing facilities, innovations, services etc, which consequently helps them maximise utility and productivity.

Furthermore, these productive activities are expected to attract people, as they move closer to such are because of the economic prospects. There is in turn, a causal-effect relationship between the activity centre and households. For instance, the industries, can provide economic means for the households via employment and also provides goods and services. In return, the households can provide a market and labour for the industries. In this sense, contiguity and proximity of these activities are necessary and encourage influx of more people to the Central Building District for opportunities.

Because of how cities evolve, there is always more people at the CBD, while the population, commercial activities reduce as one moves outward, due to distance decay effect. Cost of travelling to the CBD increases as one moves outward. This encourages the conversion of green spaces into buildings because of the higher land value and needs for commercial activities, at the CBD while agricultural activities are mostly located at the peri-urban areas.

However, this trend has been found to change slightly in some developing countries as people occupy outer areas due to cheaper cost.

1. Why do cities need policy interventions?

Cities face many challenges, due to their higher population and activities. These problems are especially more pronounced in developing countries with poor coping strategies and policy implementation. Because of the density of activities, many externalities are expected. Some of these include, congestion, pressure on public amenities, increase in crime and social vices, pollution etc.

To curb excesses from the effects of these, policies have to be put in place to guide the growth and ensure sustainable city. Policies which can be formulated, might, for instance, encourage more people to live in the outskirts. Cost of parking can also be increased to decongest traffic at the centre. Transportation network can be improved upon too. A typical example is the länsimetro which spans across Helsinki through to Espoo, Finalnd. Which such in place, more and more people can live farther and still be able to work at the centre because of the shrunk distance by the metro. This helps to cushion the distance decay effect.

From the foregoing, policy intervention can help to incentivise or disincentivise people in necessary situations for sustainable urban development. Tree planting can also be encouraged to increase green areas. There have been many scenarios whereby, patches of green areas have been reserved even in a very urbanised area.

LECTURE 2:

1. What is a spatial weight matrix(SWM), what assumptions does it make, and how is it used?

A spatial weight matrix is used to evaluate the degree of similarity between values and locations. This is referred to as spatial autocorrelation and spatial weight matrix does this by exerting a neighbourhood structure on the data. These neighbours are usually defined by binary numbers – 0 and 1. With 0 as not neighbour and 1 as neighbour. It is also important to standardise the rows, afterwards.

A typical assumption of SWM is that the fewer the neighbours, the stronger the influence of a location. In GeoDa, the observations/location are characterised by rows and columns in the matrix. Here, the neighbour is 1 and the location is 0. In description of neighbour, contiguity and distance are considered. Contiguity as it the name suggests, refers to the sharing of borders. This includes the rook and queen.

The rook considers the edges while the queen considers the edges and vertices, when deciding which spatial element is a neighbour. Contiguity is directly more suitable for polygon, however, when dealing with points, assumptions can be made about their areas of influence (i.e. the Thiessen polygon). A grid polygon can also be employed but might not be suitable to large scale analysis (e.g. cadastral scale), because great details are required at such micro level which might be lost in the process of using the polygon grid and aggregating the points into polygons

Distance on the other hand, considers the distance band and k- nearest neighbour. It is also able to handle polygon and points directly.

1. What is spatial clustering and what are the various kinds of it?

Spatial clustering is a phenomenon that describes the homogeneity of groups of observations, according to their attribute values. It shows if they are clustered or dispersed. An instance of spatial clustering is the clustering of a disease or crime location data. Here, it clusters the geometries of areas with similar attributes. It can be used to understand the hotspot of occurrence of a phenomenon, other than random distribution.

They can either be positive, negative or random. Positive distribution shows that there is a cluster while negative infers a dispersion. Positive spatial autocorrelation follows Waldo Tobler’s premise that everything is relate but near areas are more related than the distant areas. Here, the clusters could be high-to-high values or low-to-low values while negative spatial autocorrelation is depicted by high-to-low or low-to-high spatial outliers.

Random shows occurrence by chance. Spatial clustering can be assessed by techniques by partitioning, hierarchy or locality-based. Such include the Global and local spatial autocorrelation. The previous captures the overall scenario while the latter zooms in to assess the local clusters.

LECTURE 3:

1. What is spatial regression?

2. What are the differences between the spatial error, spatial lag, and spatial Durbin models?