Urban Landuse and Transportation Planning
Prof. Debapratim Pandit
Department of Architecture and Regional Planning
Indian Institute of Technology-Kharagpur

Lecture-27
Residential Mobility and Location Choice 1

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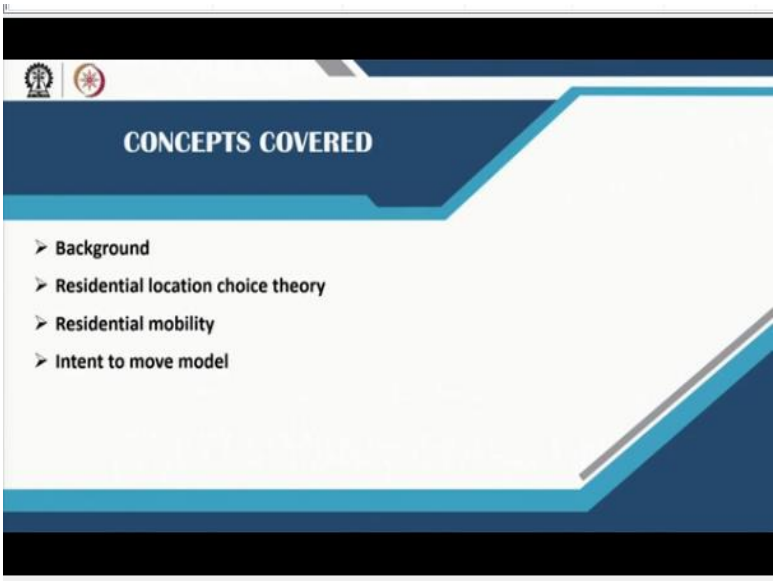

The different concepts covered in lecture 27 are background to residential location choice, residential location choice theory, residential mobility and intent to move model.

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Residential location choice: Background

Residential land use caters to two-third of the total urban land area, which makes it the most important land use to be considered when planning an urban area. Residential land use also plays an important role in travel demand management as the majority of trips in an urban area are generated from residential areas only. These trips are needed to be managed primarily during peak hours when people travel from the home to the office. So, the understanding of residential location choice process is an important part of land use and transportation modelling process.

Residential location choice process explains how an individual or household decides to choose a location or dwelling unit. For example, whether he wishes to buy a plot or house, whether he wishes to rent or own, where he wishes to move, whether he wishes to move in the same neighbourhood, within a city or outside the city and so on. Several reasons make an individual to consider a move. For example, change in job location, nearness to workplace, eviction and others.

In urban land use and transportation context, residential location choice is considered as long term choice because people do not change their location very often due to higher transaction cost associated with a location change. Also, residential location choice and households mobility pattern have behavioural linkages, because a households daily trips originate and end at their respective dwelling units. So, households dwelling unit is the central point of their daily activity space. Conversely, household change residential location when their current location does not conform to their travel behaviour.

In addition, the number of workers in a household also has a major effect on residential location choice. For example, if both the partners are working, then the work location of both have equal bearing on the choice of the residence. On the other hand, residential location choice impacts their employment location as well, i.e., work location is conditional on residential location choice. Residential location choice also impacts economic development, social structure, spatial segregation, urban structure and transport system for an area. So, residential location choice is a big component of the urban land use transportation process.

It is important to understand that, the decision to choose a particular residential location is dependent on many other decisions such as work location, tenure status, car ownership etc. For example, if a household owns a car, he is not concerned with bus availability or bus routes and is more flexible to consider locations far away from the transit routes or suburban location instead of core city areas. In the Indian context, it may be synonymous with two-wheeler ownership.

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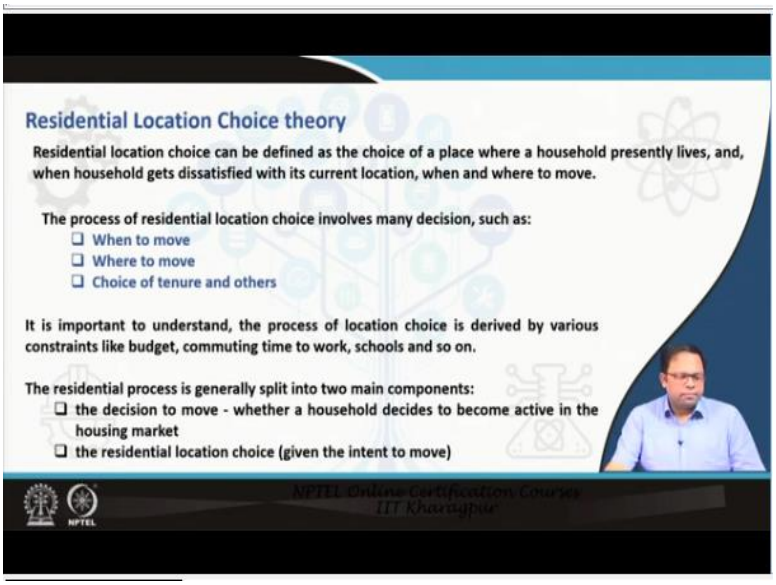

Residential location choice theory

Residential location choice can be defined as the choice of a place where a household presently lives, and when a household gets dissatisfied with its current location then the choice of when and where to move. It explains the reason why a household have chosen to live in the present location, which leads to the dissatisfaction with the current location, and when and where the household decide to move.

Residential location choice can be looked from two perspective. One is to consider the households who have recently moved in certain locations, and then analysing the pattern of location choice, reason to move, reason to choose the particular location etc. This helps in determining the current pattern of location choice. Another perspective is to consider the current population and investigate if they are willing to move, where they want to move, what are the attributes they are considering when choosing a location etc. It would help in determining what kind of location choice is preferred in a particular urban area.

Residential location choice is a bundle of choices which are taken together. It involves many decisions, such as when to move, where to move, and choice of tenure. All these decisions are important for understanding the location choice process. For example, households may decide to move immediately, or after a couple of years, or may abandon the idea of moving. Also, households evaluate different locations and then choose a location which depends on location/dwelling characteristics. In addition to these, there are other choices like building type, number of rooms, number of storeys, etc. that are also considered.

Residential location choice is conditioned by many constraints like households budget, commuting time to work, commuting time to schools, and so on. For example, if there is a kid in a household, the household tries to reduce the commuting time to school.

The process of residential choice is generally split into 2 main components. One is the decision to move i.e., whether a household decides to become an active member in the housing market or not. The second component is the residential location choice given the intent to move, i.e., once the household decides to move, then which location he considers for moving. So, these are the 2 components of the decision.

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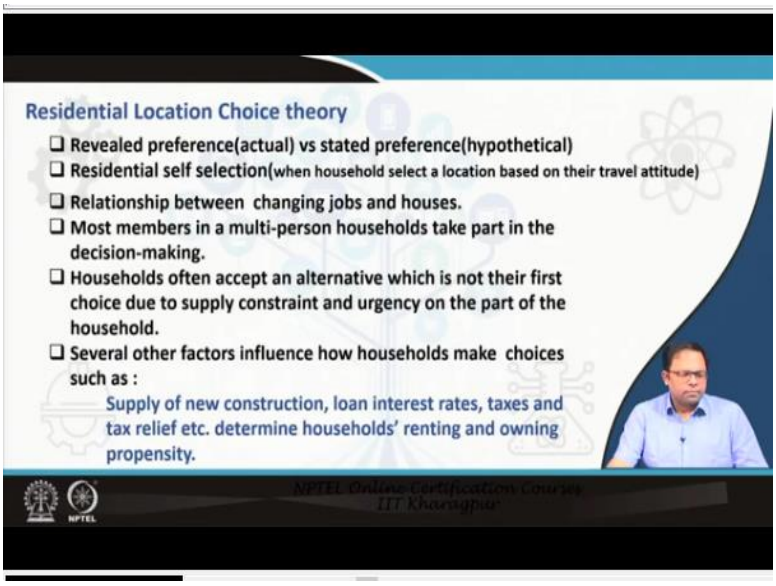

Challenges in modelling residential location choice

There are several challenges that need to be addressed or one should be aware of when modelling residential location choice behaviour. For example, residential self-selection, decision making within household etc.

Residential location choice behaviour can be understood by considering two perspective as discussed in the previous section. When the existing choices of household, the reasons to choose the current location are analysed, it is considered as revealed preference or actual choice. On the other hand, when the hypothetical choices/scenarios are presented to the household, or household states where they want to move, reasons to move, it is considered as stated preference.

Stated preference is not always realised, i.e., until unless what the household stated is executed, it is difficult to say that stated preference are the actual of preference of household. Therefore, revealed preference is better than stated preference where reliability and accuracy is more important. But in some cases, stated preference is advantageous to revealed preference. For example, revealed preference technique is incapable of predicting the behaviour in hypothetical scenarios i.e. when we want to evaluate new policies or alternatives.

There is also an issue of residential self-selection, which means household self-select the location based on their travel attitude. For example, a pro-transit household will always try to look for a location which is near to a transit corridor or near a transit station. Since, his mode (transit) choice is already fixed, based on that a particular location is chosen. So, the selection processes is somewhat biased, which is termed as the residential self-selection process. To analyse location behaviour accurately, this biasedness needs to be taken care of while modelling residential location choice.

Residential location choice is a household choice, which means that most members in a multi-person household participate in the decision making process. Since, the location change impacts every member's activity space, therefore it is not only the opinion of household head but the opinion of entire family which is taken into consideration. But it is difficult to incorporate this decision making process in the model.

Rational decision making states that individual selects an alternative which has the highest utility value among all the alternatives for that particular individual. But in residential location choice, it is not always the case. Households often accept an alternative which is not their first choice, due to supply constraint or urgency on the part of the household. For example, a household may be willing to move in a 3BHK unit in the city centre. However,

due to limited or no supply he is not able to get his preferred choice. So, he settles for the next best choice. It is important to note here that this choice becomes his actual choice. So, when the location choices are analysed, it would probably be impossible to identify the correct reason or characteristics that played a role in the choice of current location.

Several other factors also influence the way households make choices. For example, the supply of new construction/buildings, i.e., when the supply of new dwellings is more, the prices come down, then people want to move, and vice versa. Likewise, loan interest rate and tax relief influence households' moving behaviour. In addition to the decision to move, these factors determines household's renting and owning propensity.

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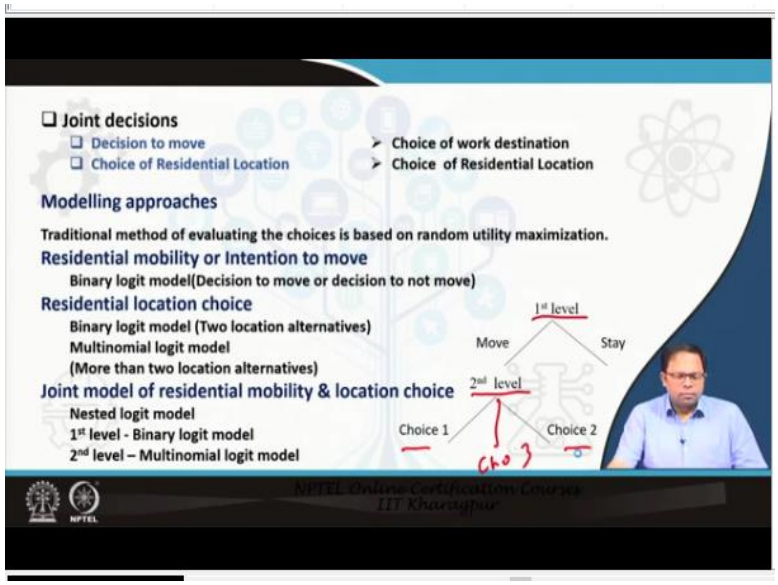

Residential location choice decision involves several other decisions that are considered simultaneously or jointly by a household. These decisions are considered as joint decisions. For example, decision to move and choice of a residential location. Because once the household decides to move, then only he starts searching for the location. If there are no choices available, he will probably not decide to move. Similarly, if choices are available, then the household will move. So, the entire decision making happens together.

Other joint decisions are work location choice and residential location choice. For example, a worker living and working in the same neighbourhood, gets evicted from the current residence. Then, he would search for a residence in the same neighbourhood, if he is willing to work at the same location or cannot change the work location. On the other hand, workers

who are more flexible in choosing work locations (such as household help or tea shop worker), would prefer to choose a location for residence which involves the potential to get more work. So, these two decisions are taken together.

There are different approaches to model residential location choice. The traditional method of evaluating choices is based on the random utility maximization principle. Binary logit model, multinomial logit model and nested logit model are the most commonly used approaches for modelling residential mobility and residential location choice.

In residential mobility and intention to move model, the dependent variable or alternative is binary, which means either the household will move or not move. In such cases, where the number of alternatives are two, binary logit model is applied. Whereas, in case of residential location choice, household has multiple choices or location to choose from. When the number of alternatives is more than two, then the multinomial logit model is used. Additionally, in residential location choice if the number of locations is two, then binary logit model is used. Therefore, the model approach depends on the number of alternatives or the dependent variable. It is important to note that the multinomial logit model is an extension of the binary logit model only. Both the model approaches have the same mathematical structure.

In the above case, residential mobility and residential location choice are considered as two separate decisions. Therefore, both the decisions are presented with two different modelling approaches i.e. binary logit model and multinomial logit model respectively. If both the decisions are to be modelled jointly, then nested logit approach is applied. As illustrated in the figure, a two-level nesting structure is assumed where at first level decision to move is considered, and at second level location choice decision is considered. At first, the household decides to either move or stay. If household decides to move, he chooses among choice 1, choice 2, and choice 3. In this way, it represents a nesting structure. To determine the probability of choosing choice 1, or choice 2, or choice 3, the probability will be conditional on the probability of decision to move (or the outcome of the first level).

So, at the first and second level, a binary logit model and a multinomial logit model can be used. Both the model approaches are combined using a nested logit model.

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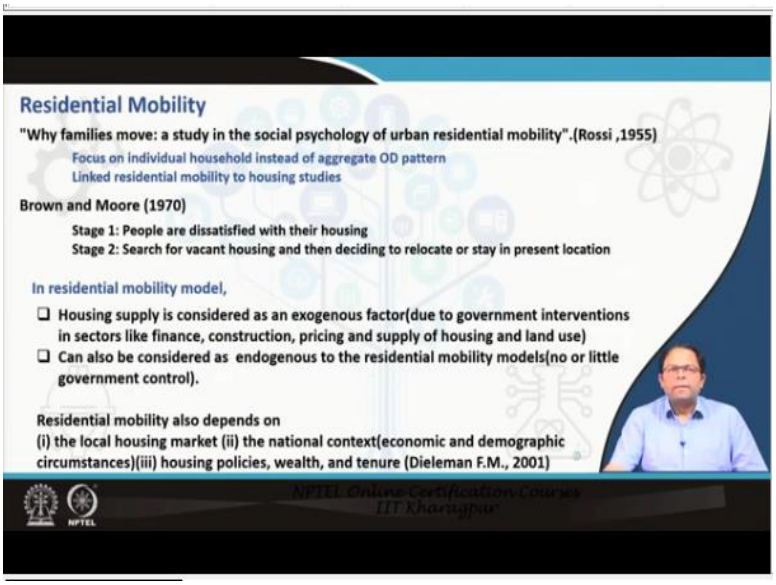

Residential mobility

The decision of residential location choice can be divided into two stages as discussed earlier. The first stage is residential mobility i.e., the decision to move or not, and the second stage is the location choice. The two most cited work in residential mobility literature is by Rossi and by Brown and Moore.

Rossi, in his seminal work ‘why families move: a study in social psychology of urban residential mobility (1955)’, shifted the focus from the aggregate pattern of mobility and OD pattern to disaggregate or individual level analysis. Earlier, for example in Lowry’s model, aggregate pattern of origins and destinations were considered. Rossi considered individual household and how they look for new dwellings. Moreover, his work placed residential mobility within the subject of housing studies. Also, this was the first paper which linked transportation with housing, or land use to some extent as well.

The other seminal work in the residential mobility is by Brown and Moore. They divided the mobility process into two stages. In the first stage, people become dissatisfied with their housing. When they get dissatisfied, household enters into the second stage i.e. they start looking for vacant housing and decide to locate or stay in the present location. This decision is based on the stress threshold and budget constraints.

In most residential mobility models, housing supply is considered as an exogenous factor because housing is very difficult to predict. Housing supply or where new housing will come up depends on many different factors such as government interventions in sectors like

finance, construction, pricing, supply of housing and land use. So, based on government policies, real estate developers decide on building houses. In addition to that, it depends on the market equilibrium and the supply-demand dynamics. Therefore, modellers take it as an exogenous input into the model which means that the locations of housing available in an urban area are known.

Housing supply can also be considered as an endogenous to the residential mobility model or land use transportation model. Here, it is assumed that the government does not have too much control on the housing market. So, real estate developers are free to build wherever they want, based on supply-demand gaps, land prices, or other factors.

Residential mobility also depends on the local housing market, the national context (economic and demographic circumstances), housing policies, wealth and tenure. So, these are macroeconomic decisions which influence the residential mobility for a particular area.

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Conceptually, residential mobility can be defined as a change of residential location, in or out of an area. The need to change the location happens to satisfy the changing needs of the household. For example, when the household size increases, the requirement of space also changes. In order to satisfy the space requirement, the household may change the location.

Household can move from one city to another, within the same urban area, or same neighbourhood. So, long-distance mobility, generally termed as migration, to mobility within a neighbourhood, are considered under residential mobility. In a land use and transportation

model of a particular city, households who are moving from different cities to this particular city (long distance mobility), will contribute to the total number of people added to the city. However, once they have arrived, then the choice or movement within the city is part of the residential mobility model which is used to predict the residential choice/residential mobility of people inside a city.

Many researchers also distinguish the intention to move and actual mobility because both these terminologies differ conceptually. Intention to move refers to desire, thinking, plan, inclination, willingness or expectation about future mobility. Whereas, actual mobility happens when there are no barrier to act on willingness. To analyse the intention to move and actual mobility, the question posed to the individuals also differs when the household survey is undertaken. For intention to move, questions such as '*are you willing to move? Why are you willing to move?'* and so on can be asked. Once the actual mobility happens, households can be asked – '*why have you moved here?'*. Then, the reasons, parameters, and other factors influencing the moving process can be determined.

Sometimes, households express their desire to move, but they do not move. There are several reasons that explain such behaviour. First, people are resistant to move. Second, they are attached to their current house. Third, when people stay in a neighbourhood, they develop neighbourhood ties, make friends, and carry out activities together. Fourth, changing location can lead to physical, social and economic disruption. Finally, mutual trust also deters decision to move. Collectively, all these factors are termed as social capital. So, social capital has a bigger role to play in a person's intention to move and actual mobility.

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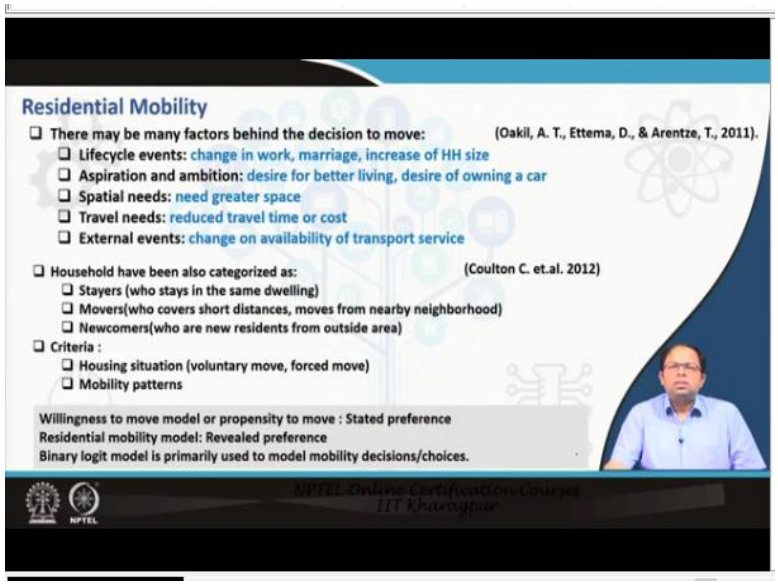

There are many factors behind the decision to move. The first group of factors are related to lifecycle events like job change, a person getting married, or change in household size. For example, a child is born in the family that may lead to change in spatial need. So, this could be the reason to trigger the location change. The second group of factors are related to aspirations and ambitions like desire for better living, or desire to own a car. For example, a person staying in a poor neighbourhood gets a job and wants to move to a good neighbourhood. Spatial needs such as the need for greater space is another factor that influences a person's decision to move. For example, a household requires more number of rooms, so he may move to a bigger house. Travel need such as reduced travel time or cost also influence the decision to change the location. For example, a household's workplace location is too far from his housing, and he is willing to change the residential location to reduce the travel time or cost. In addition to the above factors, external events such as a change in availability of transport service, congestion pricing also influence the decision to move. For example, if a metro system comes up in the city, a person may feel like moving to an area near to the metro station because his office is located near a metro station.

Many researchers have also categorized household types like stayers, movers, and newcomers. 'Stayers' are those who stay in the same dwelling. For example, household living in an apartment complex, will like to stay in the same building itself. They may just change the floor. 'Movers' are those who cover short distances or mostly from a nearby neighbourhood. 'Newcomers' are those who are new residents from outside areas.

The type of move also plays a role in a person's decision to move. It can be a voluntary move or a forced move. Forced moves can be defined as involuntary moves that are beyond the control of household such as end of tenure period, eviction, or disaster. Voluntary moves happen due to change in mobility pattern, change in household lifecycle etc.

There are different kinds of models to determine these things. For example, willingness to move model or propensity to move model can be developed based on a stated preference survey. Residential mobility model can be developed based on revealed preference survey. So, a household survey is conducted to determine when households have moved to the location, what are their socioeconomic characteristics, was there a change of job, or what is their target job and so on. In most cases, a binary logit model is used to model the mobility decision and choices.

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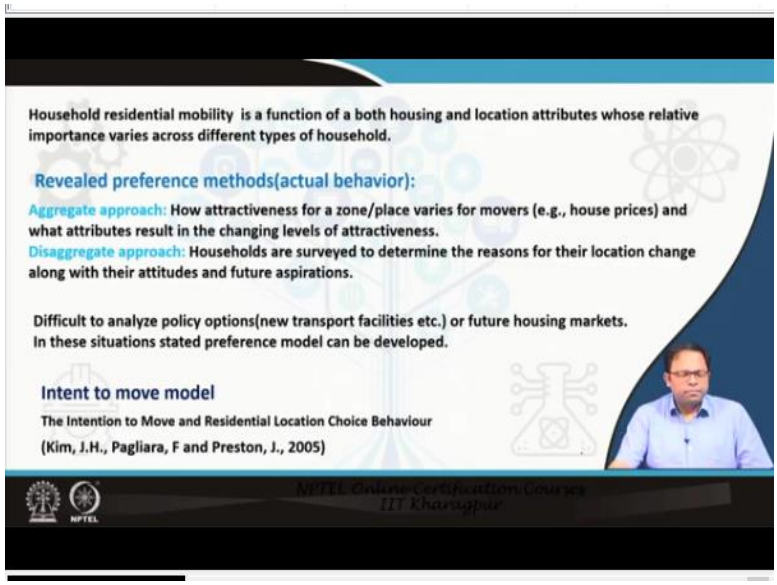

Household residential mobility is a function of both housing and location attributes whose relative importance varies across different types of household. These attributes can be determined by stated preference or revealed preference method as discussed in the previous section.

In revealed preference method which is dependent on actual behaviour, researcher/modeller/analyst can either go for aggregate approach or a disaggregate approach. In aggregate approach, how attractiveness of a particular zone or place varies for the movers, and what attributes result in the changing levels of attractiveness is determined. For example, average housing prices for a particular zone. If the average housing price for a location

changes, area attractiveness also changes, which influence the decision to move. In disaggregate approach, households are surveyed to determine the reasons for their location change, along with their attitudes and future aspirations. So, different zones can be surveyed to find out what has changed in that particular zone, how many people have moved there and so on. This would help in determining the overall movement pattern in that particular urban area.

In revealed preference method, it is difficult to analyse a new policy intervention. For example, new transport facility is to be developed in an urban area, what impact it will have on the residential mobility. Similarly policies related to the housing market like availability of new housing units in an urban area in a certain locations and what effect it will have on the intention to move. So, these impacts could only be captured if such hypothetical scenarios are presented to the household in form of survey questionnaire to ask household's willingness to move.

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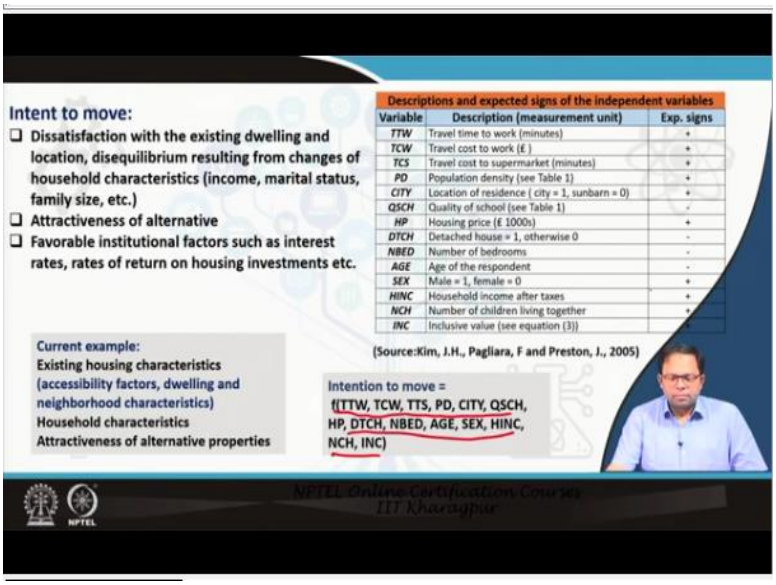

Intent to move model

In order to understand the intention to move model and other aspects discussed in previous sections, let us consider an example of intention to move model developed by Kim, Pagliara, and Preston in 2005. In this model, the intention to move is due to the dissatisfaction with existing dwelling and location. This dissatisfaction arises due to disequilibrium resulting from changes in household characteristics (like income, marital status, and family size). It is also due to the attractiveness of alternative (what are the alternatives available and what

attractiveness it has got), and availability of favourable institutional factors like interest rates, rate of returns etc.

The intention to move is expressed as the function of different parameters as mentioned in the slide. Based on this theoretical construct, the importance and effect of the parameter on the person's decision to move can be evaluated. The description of the variables and expected impact on the intention to move is given in the table.

In the present example, existing housing characteristics such as accessibility factors for that particular area, dwelling and neighbourhood characteristics are considered. These factors are specific to zones. In addition to these factors, the household's characteristics and attractiveness of alternative properties are also considered. Household characteristics include age, gender, number of children, household income. Housing characteristics include parameters like the number of bedrooms, housing price and other characteristics like detached housing or not. Neighbourhood characteristics include attributes like location of residence (suburban, or city core), quality of schools, population density etc.. Parameters like TTW (travel time to work given in minutes), TCW (travel cost to work given in pound), TCS (travel costs to supermarket), are also considered in the model.

In addition to these attributes, their expected influence (or sign) on the dependent variable i.e. intention to move is also given. So, an attribute can either influence the decision positively or negatively. In the present model, the expected sign of travel cost to work, travel time to work, travel cost to supermarket and few other attributes is positive. Whereas, for the number of bedrooms, quality of schools, the expected sign is negative. It means that if travel time to work increases, the household will be willing to move. Likewise, if the number of bedroom increases, the household will not be willing to move.

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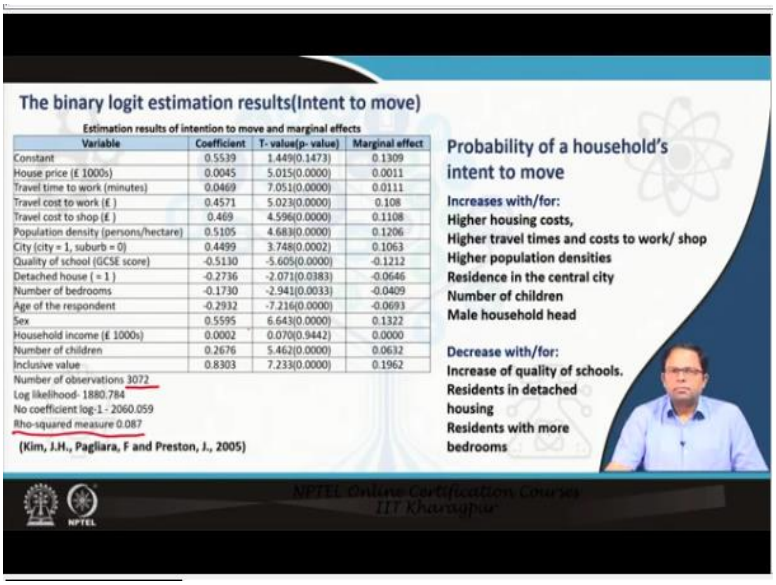

The dependent variable is binary, therefore a binary logit model is developed. The estimated parameters (or the beta coefficients), model specifications such as log-likelihood, number of observation, and R-square are given in the table. The total observations in the model were around 3000. R-square is a goodness of fit model which represents how well the model explains the variance in the data.

The present model demonstrated that housing cost, travel time and cost to work/shop, population density influences the intention to move positively. So, the probability of a household intention to move increases with higher housing cost, higher travel time and cost to work. In other words, when travel time increases, the household's intention to move also increases. Similarly, increase in the number of children, residence located in the core area, a male household head will increase the probability of intention to move.

Attributes such as detached housing, number of rooms, age of respondent, and quality of schools influence the intention to move negatively. So, increase in quality of schools, detached housing, more number of rooms, and higher age will decrease the probability of intention to move.

It is important to mention that, one needs to understand the logical reasons for what influences the decision to move. Moreover, the findings from the model should also be matched with the logical reasons, For example, if a neighbourhood has good quality of schools, then a household will not wish to move. Similarly, a household with more number of

children will probably want to move to satisfy the space requirement. The present model results conforms to the logical reasons.

The significance of model specifications, beta coefficients, p-value, and marginal effects will be discussed in subsequent chapters in more detail. The present example, broadly explains the different attributes or indicators which influence a person's intent to move. Some of the attributes are positively related, some are negatively related, and the coefficients determine the factor by which the attribute is positively or negatively related.

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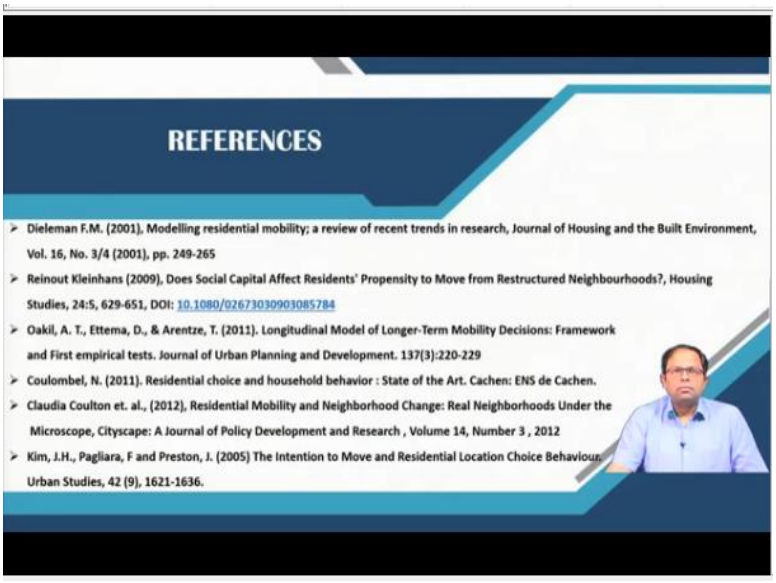

The references are listed in the above slide.

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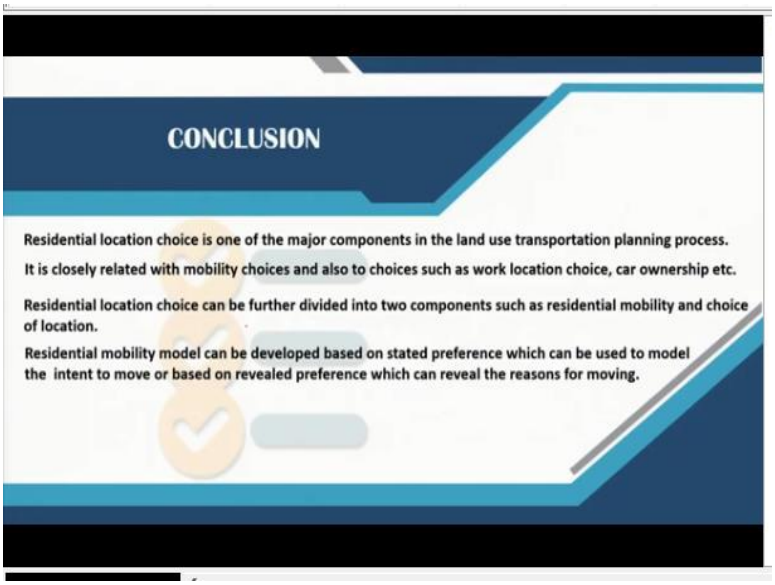

Conclusion

Residential location choice is one of the major components in the land use transportation planning process. It is closely related with mobility choices and also to choices such as work location choice, car ownership etc. Residential location choice can be further divided into two components such as residential mobility and choice of location. Residential mobility model can be developed based on stated preferences, which can be used to model the intent to move model, or based on revealed preferences which can reveal the reasons for moving.