CHAPTER 2

PROBLEM AND PROCEDURES
A comprehensive review and appraisal in the previous chapter has provided the backdrop required to position the topic of our concern, Vegetable Marketing and Producer-Trader Characteristics, amidst the current agricultural marketing research. The present chapter introduces the problem of analysis, the objectives, the hypotheses, the analytical procedures adopted in the study, the scope and the limitations.

The Problem of Analysis

'Marketing, in a general sense, is concerned with the identification of the demand for various goods and services and with the arrangements for the supply of these through an efficient distribution of network. It is essentially that function of management that oversees the buying and selling of a firm's commodities. The strategies and policies involved in marketing are inevitably manifest in some spatial form. It is the areal expression which is given to the sources of demand and the areal structure of the systems of supply that provide the foundations for a geographic study of marketing' (Davies, 1985: 1).

Geography of Marketing lends itself to be examined from two different scale perspectives: it is possible to interpret it in global or regional aspects of commerce and trade; and it is also possible to treat it in much more narrow, local terms, with emphasis on daily trading practices. In the present study, it is the second perspective that is assumed for analysis. Although narrow in scale, it is approached from farming (producer-oriented) and trading (trader-oriented) angles, in order to know what the farmers produce and what the traders buy from them and through which what the intermediaries or the agents do.
Markets, for commodities, long predates the development of the modern capitalist economy, notably in India. Marketing activity is by itself *no precise* indicator of the level of economic development, nor of relations of production (Chaudhuri, 1979). Traditionally, vegetable farmers have produced vegetables of several kinds for the market, while a part of it was for self-provisioning. The degree of commercialisation of vegetables has manifested in the proportion of the produce that has been sold as the marketable surplus. The English vegetables of the Mettupalayam region, which include potato, cabbage and carrot (irrigated crops), ginger, turnip and cauliflower (rainfed crops). Ever since their introduction, the English vegetables had shown a marketable surplus and, in recent years, with the *increased population and enhanced food tastes* and even *attitudinal change* towards some of the vegetables, the marketable surplus has increased, significantly. While some of the vegetables are seasonal (cabbage: June-October and July-November; carrot: June-October, July November; cauliflower: August-September), others are grown almost throughout the year (potato and ginger; and onion which is grown outside the economic hinterland).

The present day marketable surplus situation stands in contrast with the position in the early years after Independence. *Rising prices and increasing production* have been clearly important and the ever *increasing demand from the urban population* as the population itself grows. In Harriss' (1985: 170) analysis of commercialisation in development, the examples of Tamil Nadu and Punjab do not show an inevitable connection between commercialisation and agricultural development. If any, 'the former may be a necessary condition for the latter, but it is
not a sufficient one'. A high level of commercialisation may simply be sustaining a class of merchants which benefits from upward movements in retail prices and pockets the profits, often by controlling the production and processing of the agricultural products. This is exactly what is obtaining in the context of the English vegetables: the producers grow the vegetables in response to the perceived demands of the agents and traders; while the traders benefit enormously by the upward movement of the prices of the vegetables, the producers do not. The two aspects in which the trade in English vegetables can have an important role in the development of the agrarian economy and thus benefit the farmers are:

1. Price signals representing demand are transmitted through the marketing system to the producers who respond with varying degrees of sensitivity by allocating resources to particular crops (say, potatoes or cauliflower) according to their comparative advantage; and

2. Transfer of resources out of agriculture, making investments possible in industries and services; or better investments are in some way routed to 'petty business potato chippers' or agro-industries which specialise in 'potato chips', which keep the vegetable producer producing and thriving, even if in the final analysis he gets much less than the traders and the agents.

The way the marketing system works, and the producers and traders are connected by the agents in a loose-knit marketing network, which functions nevertheless the only conclusion we could derive is that all of them benefit, economically as well as socially (for example, Jumper, 1974). That is, the marketing system in operation has implications for socio-economic development and, particularly, agricultural development. Two positions are possible:
1. The government does intervene to regulate, but the private operators function much more efficiently than the government regulated markets. As such, the private traders corner most of the vegetable arrivals to the market, leaving a small proportion to be handled by the government run regulated market system.

2. The external traders, through their agents, exert a strong hold on producers from whom they buy vegetables at 'excessively' low prices and on consumers to whom they sell at 'excessively' high prices.

Both the positions are tenable and that implications for development and policies must be looked into.

The Objectives

The objectives of the study are as follows:

1. To examine the spatial characteristics of vegetable producers and traders in relation to distance and flow to and arrivals of vegetables at the market over time and in space with Mettupalayam as the regional context;

2. To analyse vegetable farming from agriculture (specific crops) and producer (production inputs and costs) points of view to explain the nature of vegetable production for the market;

3. To understand the arrivals at the market, and as to how the traders procure vegetables both as wholesalers and retailers, through agents, while at the same time acting as self-made or appointed agents, and thus serve external traders generating a flow outwards and to local consumers; and
The Nilgiris District and Mettupalayam: Location


Photograph - 2.1

1:1,400,000
4. To suggest ways and means to improve production of vegetables, flows to the markets and trade in the light of the perspectives gained from the study of vegetable producers and traders of Mettupalayam.

The Mettupalayam Region and the English Vegetables

The study is concerned with the region of Mettupalayam which falls in the district of Coimbatore while falling within the hinterland of the district of Nilgiris of Tamil Nadu. The Nilgiris district lies between 11° 08' N and 11° 55' N latitudes and 76° 13' E and 77° 02' E longitudes (Photograph 2.1). The area of the Nilgiris district is 2,549 km², with a population of 770,000. The Nilgiris receives as much as 1,862 mm (50-year average) of rainfall. The climate is such that it favours the growth of the vegetables such as potato, cabbage, cauliflower, and carrot. With the change of food habits in the plains, there is much preference for these vegetables, all over the State and beyond.

The focus is thus on what is popularly known as the 'English Vegetables' grown in the area within the radius of 80 km from the town of Mettupalayam. Mettupalayam is a first grade municipal town located at a distance of 36 km north of Coimbatore and is located at 9° 19' N latitude and 76° 58' E longitude, and on the State Highways leading to Gudalur. This town is served also by the Chennai-Mettupalayam broad gauge railway line and a narrow gauge hill track which runs between Mettupalayam and Ooty. In terms of service area, and in respect of
traders and goods flow, the area of concern is much wider (Figure 2.1). It literally includes the entire Indian subcontinent as the flow of vegetables outwards from the town show. Mettupalayam, a town with a population of 63,217 in 1991, has been a trading and transit centre, for the hill vegetables, fruits and other products from the hills around here. For many years, the town has grown steadily but not rapidly enough. In recent years, however, it has grown rapidly enough with the Nilgiris district for a hinterland, although the town itself is in Coimbatore district.

The Hypotheses

The study has been made to test some relevant hypotheses. The major ones are as follows:

1. Vegetable marketing and its components do display a distance decay\(^1\). They take many forms:
   a) Arrivals at the market increase with procurement over longer distance from the market centre and similarly the arrival intensity also increases with increasing distance from the market centre.
   b) The frequency of arrivals increases primarily because the number of farmer-producers increases with increasing distance from the market centre.
   c) Arrivals over the years are a corollary of increases in mundies, workshops, and transport (lorries) facilities.

2. As regards vegetables, the distance decay is present but likely to show weak relationships:
TRADING LIMITS OF TRADERS OF TAMIL NADU
METTUPALAYAM

Figure - 2.1
a) There is an increase in the quantum of potato shipped to market, from various producing areas, proving a direct relationship between flow and distance.

b) There is an increasing assembling of garlic with increasing distance from the market centre.

**The Methodology**

**The Data Collection.** The study reported here depends almost entirely on the data collection made in the field through a schedule based survey of farmers who are vegetable producers, from 185 villages and/or hamlets in the vicinity of Mettupalayam town, all belonging however to the Nilgiris district of Tamil Nadu. No village lies beyond a radius of 80 km from the market town. Traders interviewed hail from several States of the Indian Union such as Andhra Pradesh, Gujarat, Rajasthan, Kerala, Orissa, Maharashtra and Tamil Nadu. The mundi agents are all local. Three separate schedules have been used in the interviews: one for the producers, one for the mundi agents and the third for the traders. The schedules have been pre-tested through a pilot survey. Due to time constraints faced by the farmers, mundi agents and traders alike, the schedules have been simplified such that filling in takes around 10-20 minutes. Trained interviewers, administering the schedule orally have conducted the interviews. The interviews have been conducted in August 1997, over a few days at a stretch covering producers, mundi agents and traders. Once collected, the schedules have been verified for inconsistencies and then coded for computerised databases. The databases have been generated using DBMS.
The Sampling. The random sample for the field survey has been chosen at three levels: the producer, the mundi agent and the trader. In the final count, the producer sample has been limited to 1,000 and the traders limited to 560. The interviews have covered all the mundi agents in the town of Mettupalayam and the coverage is thus 100 per cent. The mundi agents are all registered dealers in vegetables and their records at the town municipality have been so verified.

The trader sample includes several of them from other States while a large majority is from Tamil Nadu. The traders sampled from Andhra Pradesh are 11, from Gujarat 4, Kerala 36, Maharashtra 11, Orissa 5, Rajasthan 5 and Tamil Nadu 488. Except for traders from Tamil Nadu, all others buy vegetables at Mettupalayam and sell in their home States. The traders from Tamil Nadu also sell outside the state and also outside the country (Figure 2.2). Sri Lanka and Maldives are also their trading destinations. The traders often double themselves as agents, either self appointed or appointed by external traders. Among the traders, 201 have been acting as self-appointed wholesalers; 34 as self-appointed wholesalers as well as retailers; and 10 as self-appointed retailers only, 67 as appointed wholesale agents and 1 appointed as both a wholesaler and a retailer, 120 as wholesalers only, 67 as retailers and 60 as both wholesalers and retailers. The mundi owners (104 private mundies, 1 public owned, which is the Nilgiris Co-operative Marketing Society) or agents have all been interviewed to get to know how they operate, given the conditions existing in the marketing situation.
The Schedules. In the present study, three separate schedules have been used, with a view to gathering information from the producers, traders and mundi owners or middlemen (Appendix 2.1). Considering the time the three types of respondents (farmers, traders and mundi owners) could spare less time, as they are extremely busy and are almost always 'tied up' with work, the schedules have all been kept as simple as they can be. Most questions in the schedules are simple, straightforward and solicit answers or 'just a tick or a cross' against the queries. In any case, the interviews have taken a few minutes of the respondents' time. No interview has exceeded more than 45 minutes. The respondents have been extremely co-operative. A diary has been kept all through the interviews to register any remarks made by the producer, trader and mundi owner or agent respondents so that they may be later used in the writing up of the thesis.

The Methods of Analysis. There is considerable focus on quantitative and statistical analysis in Indian marketing geography. Although qualitative and often descriptive methods have become the forte of geographical research in much of the West and English-speaking countries, it is yet to catch up with the scholars in India. Therefore, the study has made the statistical analyses relevant to the topic at hand.

The methods of research adopted for analysis of data relating to vegetable marketing in Mettupalayam are both bi-variate and multivariate. The bi-variate analysis used here is the simple regression and correlation, with a facility for calculating 'elasticity', which in a sense 'is the value of the dependent variable (Y) when the independent (X) changes by 100 per cent. Multiple regression and stepwise
multiple regression are also used here to analyse multivariate data on vegetable producers, especially time series data on vegetable arrivals (dependent) and the number of mundies, workshops, gunny mundies and the lorries for transport (independent). Stepwise multiple regression has been used to select the set of independent predictors of arrivals in the trader establishments. The other multivariate method used here is that of the Common Factor Analysis (CFA), which is a classificatory method and much widely used in geographical research for its ability to handle spatial as well as temporal data. In the present study however the CFA has been used in the dimension reduction of data gathered from the field survey of the vegetable producers (a sample of 1000 farmers about the town of Mettupalayam) in an area of 80 km radius whose vegetable produces are sold in the market of Mettupalayam and traders (560 is the sample). For the purpose of understanding the rationale behind the use of the two methods, a brief description is given in the following pages, highlighting the nature and usefulness of the methods.

The Simple Regression and Correlation. Simple regression is a method of determining the existence of a linear or straight-line relation between two variables considered for analysis. The criterion determining the best-fit line is 'the line which minimises the sum of the squared deviations of points from the line'. That is, the least squares fit. Once this line has been determined, it is characterised by two parameters, which are usually designated as $a$ and $b$. The parameter 'a' is the intercept of the line with the Y (dependent variable) axis. This can obviously be positive, negative or zero and it indicates the position of the line when X (independent variable) is zero.
The second parameter, 'b', is the regression coefficient and it indicates the slope of the line, that is, the increase or decrease in Y that is to be expected with a unit increase or decrease in the value of X.

The simple regression and correlation methods cannot be applied to curvilinear trends. However, it is possible to transform the trend into linear form. Since the study considers the relationships between, for example, distances to market and the quantum of vegetables produced by farmers, as linear, the benefit gained is such that the coefficient of 'b' gives the rate of increase or change in Y per unit of X. Additionally, the elasticity of Y for every 100 per cent increase in the value of X may be measured in each of the applications to provide for measuring changes in per cent terms. The elasticity value can both be positive and negative when relation between X and Y is positive or negative, respectively.

The linear correlation coefficient, 'r', can be computed with the same application and it would relate the variance in the dependent variable Y to the reduction in that variance when the independent variable X is used to estimate values of Y. The coefficient of determination, $r^2$ is the ratio between the explained or reduced variance, that is, the variance in the residual values of Y, and the original variance. Regression is the intensity of a relationship. Correlation is, on the other hand, the strength of a relationship.

**Multiple Regression.** Multiple regression is an extension of the bi-variate simple regression and correlation. In fact, multivariate procedures are all such
extensions of bi-variate procedures, to account for complexities in real problem situations. The multiple regression equation has the general form:

\[ Y = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n + E \]

Where \( Y \) is the dependent variable, \( X_1, \ldots, X_n \) are the independent variables, \( a \) is the constant and \( b_1, \ldots, b_n \) are the slope coefficients. Once the equation is fit, then it would be possible to determine the multiple correlation value and other related coefficients, which could be used in interpretation of results.

The multiple correlation coefficient derived from the multiple regression indexes the goodness-of-fit of the equation relating a dependent variable to a set of independent variables.

The multiple regression gives rise to multiple and partial correlation coefficients and these are very frequently used in the reports of social science research, as statements of the effects of independent variables on a given dependent. The square of the multiple correlation coefficient, multiple coefficient of determination, indicates the proportion of the variance in the dependent variable associated with all of the independent variables.

Multiple and partial correlations may be used to describe the goodness-of-fit to a linear trend, or they may be used to infer the probable relationships in a population from a properly selected sample. For the latter purpose, however,
Snedecor's F-test can be used. The applications give computed values of both regression and standardised correlation coefficients. The comparison of regression coefficients is often difficult as the independent variables to which they refer are scaled in different metrics. So for the purpose of comparison, the regression coefficients can be transformed into beta coefficients, which are standardised partial correlation coefficients. The standardised partial correlation coefficients can be used to show comparable rates of change, since in deriving these all of the variables are measured on the same scale. Whereas regression coefficients focus on absolute changes, the beta coefficients focus on relative changes. The F-test value on the other hand gives some suggestion of the accuracy of the partial regression line as a fit to the data points. The multiple regression model is used in problem analysis to evaluate the extent to which each predictor variable (the X set of variables) contributes to the explanation of the observed criterion score (for instance, travel cost as a measure of difficulty in access) and to predict the criterion scores for which information on the group of predictor variables is available. It may be, for example, hypothesised that difficulty in access measured by travel cost (amount spent per month on travel) is a function of the predictor variables.

**Step-wise Multiple Regression.** This method starts with an equation, which includes all independent terms. These are taken in turn and treated as if they were the lasts to be included and their respective contributions are to be explained after the sums of squares are determined. The variable with the lowest contribution is eliminated and the process is repeated with other variables until a statistically significant variable is found to explain maximum variance. At that point, the process
causes the regression model to be optimum. In the absence of the procedural aspects of, for example, forward inclusion, selection focuses often on the R square values and there is a tendency to select models with high R square estimates but which include many variables. By examining the rate at which variance is explained or the regression sums of squares increase, with the number of terms, it is usually possible to determine the scope at which diminishing returns set in. This enables us to decide which combinations of the prescribed number of variables is best.

The Common Factor Analysis (CFA). In multivariate analysis, the bi-variate techniques are extended so that more than two variables can be considered, the 'm' variables becoming the 'm' axes of the test space. Procedures of multivariate analysis are often concerned with the problem of reducing the original test space to the minimum number of dimensions needed to describe the relevant information contained in the original observations. Multivariate procedures differ in the types of original information they preserve. Some understanding of matrix algebra is essential to using and understanding the multivariate analysis.

A popular multivariate procedure in geographical analysis is the Common Factor Analysis, for which variants are available and are in use in geography as well. It is a particular psychometric model that has been in wide use in social sciences. This helps in the study of the logical implications of systematic inter-correlations within sets of tests. However, the social sciences follow just one of the many approaches to the reduction of dimensionality in correlated systems of measurements and the
rotation (varimax, for example) of a reduced number of axes to more meaningful positions.

The CFA is also a classification procedure in that it may be usefully applied to multivariate situations to classifying the N individuals, on the basis of m variables. One particular feature of the CFA is that 'p' underlying factors in the multivariate sample space model is always less than the 'm' variables: \( p < m \). The underlying factor dimensions are drawn from the use of inter-correlations system by generating 'p' number of scores each for the 'N' individuals. The scores may however be drawn from the varimax rotation, which in effect stands for maximising variance. If we can measure 'm' variables with respect to areal units, the scores may be assigned to these areal units for constructing one or more maps showing areal differences (or regional variations) in respect of 'p' reduced dimensions. The purpose of factor analysis is to interpret the structure within the variance-covariance matrices of the multivariate (vegetable producers and traders) data collection made. The basic mathematical operation in factor analysis may be stated as follows (Rao, 1973):

\[
Z_j = a_{j1} P_1 + a_{j2} P_2 + \ldots + a_{jm} P_m \quad \text{where}
\]

\[
Z_j = X_j - X_{\text{mean}} / o_j \quad \text{or standardised variable}
\]

\( P_i = (i = 1,2,\ldots,m) \) are the principal components and 
\( a_{ji} = (j = 1,2,\ldots,n) \) are the coefficients or factor loadings of \((i = 1,2,\ldots,m)\) 
\( j \)th variable relating to the \( i \)th component.
In other words, each factor is nothing but a linear combination of weighted variables which can also be expressed as:

\[ P_1 = a_j X_j \text{ where} \]
\[ a_j = \text{factor loadings of } j \text{ variables } (j = 1, 2, ..., m). \]

Thus, in factor analysis, a data matrix containing measurements on 'm' variables for each of 'n' observations is analysed. The technique uses extraction of the eigenvalues and eigenvectors from the matrices of correlations or co-variances. The basic mathematical operation in factor analysis is done with many embellishments on the procedures. CFA is a deep and complex methodology. It is one of the most widely used multivariate procedures. The model is based on several unique assumptions. For one, the precise number of factors is assumed prior to the analysis. The factors extracted, or rather the number of factors, are validated by the variances each of them explain to the total. There is a progressive decline in the value of variances with the increasing number of factor dimensions. The first or the main factor dimension has the highest of the total variance explained and the bipolar the next highest and so on, resulting in progressively declining variances.

The analysis begins with the standardisation of data. In this procedure, the data is first converted to standardised, or unitless, form by subtracting from each observation the mean of the data set and dividing by the standard deviation. The new, or the transformed variables will then have a mean of 0.0 and a variance of 1.0. This is useful in comparing the distribution of one variable to that of another when the two
variables are expressed in different units of measurement. It provides, in a manner of speaking, a way of comparing disparate variables. Since the variables used in any given application are not immediately comparable, it is necessary to standardise each individual item of data, before computing the variance-covariance matrix. The covariance matrix of standardised variables is nothing more than the correlation matrix, which in this analysis is referred to as the inter-correlation (similarity) matrix. Standardisation does have a tremendous influence on the structure of the variance-covariance matrix and consequently on the results of the CFA. In social sciences, we have no alternative but to standardise our data, because the raw matrices of variances and co-variances would contain hodgepodge of measurement units that logical interpretation would be difficult. Hence, there is a good reason to standardise.

The CFA employs principal components, the eigenvectors of a variance-covariance matrix, as starting points for analysis. It belongs to the category of techniques in which utility is judged by performance and not by theoretical considerations. It relies on a set of assumptions about the nature of the parent population from which the samples are drawn. These assumptions provide the rationale for the operations, which are performed, and the manner in which the results are interpreted.

In the CFA, the relationship within a set of m variables is regarded as reflecting the correlations of each of the variables with 'p' mutually uncorrelated underlying factors. The usual assumption is that p < m. Variance of the m variables is therefore derived from variance in the 'p' factors, but in addition a contribution is
made by unique sources which independently affect the 'n' original variables. The CFA refers to the 'p' underlying factors as common factors and summarise the independent contribution as a unique factor. The CFA requires that 'p', the number of factors, be known prior to analysis. This implies that the investigator has some insight into the probable nature of the factors and can predict a suitable number of factors to be extracted. The eigenvalue operation in factor analysis is performed on a standardised variance-covariance or correlation matrix. Hence, the CFA used here is said to be R-mode factor analysis.

This assumes not only that all variables are weighted equally, but also allows the researchers to convert the principal component vectors into factors. In larger matrices such as ours, the eigenvalues usually are more uniform for standardised data than for raw data. And to perform the CFA, it is necessary that we convert our unit, or normalise, eigenvectors to a form in which the vector length represents the magnitude of the eigenvalue. The result is a factor, a vector which is weighted proportionally to the amount of total variance it represents.

The elements in the factors are referred to as factor loadings. The eigenvalues represent the proportion of the total variance accounted for by the eigenvectors. The factor loadings on the other hand are the correlation values between the old and the new, transformed variables. If we arrange the factor loadings in a matrix form, we have then a factor matrix. If we square the elements in the factor matrix and sum within each variable, the totals are the amount of variance of each variable
retained in the factors. These sums are referred to as the communalities and are symbolically represented as $h_j^2$. The communalities are equal to the original variances.

A specific rule that most factor analysts suggest in the extraction of factor is that of retaining all factors which have eigenvalues greater than one. That is, retain all factors that contain greater variance than the original standardised variables. But of course in most instances only a few of the factors will contain most of the variance in the data set and hence this recommendation is useful. If factor theory is applicable to any given data set, a few factors should account for a very high percentage of the variance and communalities of the variables found under each factor dimension is high.

The CFA is said to be reducing the dimensionality of a problem to a manageable size. However, the meaning of the factors may be difficult to deduce. This problem is overcome by resorting to maximisation of the variance of the loadings on the factors. This in other words is maximising the range of the loadings. This is done in the analysis here by a rotation procedure called Kaiser's varimax rotation. The rotation of the factor axes is performed iteratively. The analysis also results in factor scores, which represent estimates of the contribution of various factors to each original observation (sample of the vegetable producers' population observed). In fact, factors themselves are estimated from these same data. Thus the computation of factor scores is somewhat a circular process and the results are not unique. The matrix of scores computed reflects in part the covariance structure of the
original m variables as well as the structure of the 'p' underlying factors. Factor analysis explains in a sense the interrelationships in a large number of variables by the presence of a few factors. Except for the simple regression where a customised program has been used, in all others SYSTAT has been used for analysis (Wilkinson, 1990).

The Scope and Limitations

The scope of the study is restricted to 'producer-agent-trader' interactions. Agricultural and production aspects are studied in respect of 'English vegetables', which have specific market values and spatial outflows. Traders are seen as:

(a) retailers serving local consumers;
(b) wholesalers serving external traders;
(c) self-appointed agents making commission on 'volumes transacted' from the procurement of produce for external traders; and
(d) appointed agents making a fixed commission from external traders.

There is a greater understanding of trader oriented market dynamics from the study than a producer-oriented and space-time oriented dynamics. The one limitation the study has is that of analysis and interpretation of data collected using three separate schedules of questions (one for producers, one for traders, and the third for primary data collection on mundies, gunny mundies, workshops and lorries) and some
time series data, not quite integrating the three sets but drawing inferences from the analysis and elaborating on the findings and the conclusions.

It is however obvious that the farmers of Mettupalayam region produce vegetables (English vegetables) primarily for market and the mundi agents procure them from the farmers, invariably through their agents, even while some of them act as self-appointed or external trader appointed agents. While production and trading dynamics have been analysed, the marketing dynamics in the sense of 'producer-agent-trader-consumer' interactions are not dealt with at all. A survey of the direct consumers is not possible in the study as the produce pass to the hands of the consumers by crossing several stages of trading dynamics. Casual references to such interactions are nevertheless made but in shallow treatments, as 'production-flows and arrivals-trade' are seen in quick succession.

Notes

1. The concept of distance decay is used here in a more generic sense, connoting 'change over distance' rather than declines over distance. Although, initially the concept was coined to mean any distribution showing tendencies to show declines over distance, in recent years, the concept has come to mean 'change' rather than 'decline' over distance.