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LOCATIONAL AND STRUCTURAL POTENTIAL MODEL
FOR
DEVELOPMENT PLANNING
OF
URBAN MARKET PLACES

"An Analytical Planning Model for the Study of the Demand and Supply of Activity Spaces, and of the Locational and Structural Potential, in A System of Urban Market Places, and the Formulation of a Development Planning Policy aimed at Achieving Balanced Demand and Supply of Activity Spaces, with the View to Optimising Locational and Structural Potential".

\- Case Study of Kaduna City Market Places

A thesis submitted to the Department of Urban and Regional Planning, University of Strathclyde, in fulfilment of the requirement for award of the degree of DOCTOR OF PHILOSOPHY

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... and the Formulation of a Development Planning Policy aimed at Achieving Balanced Demand and Supply of Activity Spaces, with the View to Optimising Locational and Structural Potential.

CHAPTER 8

CURRENT APPROACHES TO PLAN EVALUATION

8.0 Introduction

Following some initial exercises, together with consideration of United Kingdom and Nigerian planning studies, the researcher felt that the scope and reliability of evaluation results are often hampered by the poor integration of evaluation with activities undertaken at other stages of the planning process. Evaluation is frequently treated in practice as a discrete activity, functionally separate from other plan-making activities; with those responsible for undertaking the evaluation work having little or no influence over the nature of preceding work.

Alternatively, evaluation is left until too late in the study for it to make any effective contribution to subsequent decision-making procedures.

A variety of difficulties may result. For instance, the data available by which to measure the consequences of the alternative strategies may be only partial in relation to what is required or may not be in a suitable form. The alternative strategies put forward for evaluation may contain only relatively "poor" possibilities. In addition, it is common to find that those responsible for a planning study have only a hazy notion as to the nature of evaluation and the purpose it is intended to serve. All these aggravate the difficulties stemming from poor integration of evaluation with other plan-making activities. Of course, there is still a great deal to be done on extending the techniques of plan evaluation "per se", particularly on its ability to quantify the impact of proposals on those affected.

The thesis appreciated the need to generate, from the outset, proposals which are advantageous in terms of the interests of the groups using the planned area, and then to work rigorously towards the definition of possibilities and analyses which can bring out the essential advantages and disadvantages to the various groups. This, in turn, means ensuring that the planning process itself can lead smoothly to the production of such evidence. It was hoped that this type of approach can improve the quality of evidence produced by evaluation, as to the welfare consequences of the alternative strategies, and thus make these consequences both more explicit and better understood by the decision takers, and by those whose well being is affected by the planning policies. Those planning policies can only be right if they are based on comprehensive information on the contents of the planning strategies, the method and criteria of the evaluation techniques.

Accordingly the thesis proceeded to review current techniques in plan evaluation, listed hereunder, with a view to applying those that can most effectively contribute to the achievement of the stated goal of the research: "What development planning strategy, at urban level, can achieve balanced demand and supply of activity spaces in the market places, with a view to optimising their locational and structural potential ".

1. Cost-Benefit Analysis
2. Planning Balance Sheet method
3. Financial Investment Appraisal
4. Check-List of Criteria
5. Cost-in-Use
6. Threshold Analysis
7. Goals-Achievement Analysis
8. Optimisation Techniques

8.1 Cost-Benefit Analysis

The application of the economists' cost-benefit analysis to urban and regional planning problems is recently termed Social Cost-Benefit Analysis by N. Lichfield et al. (1975), and according to them, quoting A. Williams, Social Cost-Benefit Analysis

> is essentially a means of adapting the rates for profit-maximizing investment behaviour by private firms to fit the different circumstances under which governments operate, which in turn means trying to take account on the one hand of externalities and the peculiarities of 'public-goods' compared with 'private goods', and on the other, recognizing that the budgeting processes of government may require further reformulation of the rates if they are to be appropriate in a setting which is far removed from the classical one of a small firm operating in a large and perfect capital market .

Social cost-benefit analysis has been applied to the comparison of alternative plans within sectors such as water supply, transport, land use (embracing urban renewal, recreation and land reclamation), health, education, research and development, and defence - as reviewed by Prist and Turvey (1965) and Peters (1973). Items of cost and benefit for inclusion in the analysis are all the gains and losses of every member of society whose wellbeing would be affected by the project or plan, if implemented. Concern is with the welfare of a defined society and not with any smaller part of it. The benefits and costs are measured on the basis of the preferences of the individuals who are affected, rather than those of, say, decision-takers. The analysis seeks, as far as possible, to establish the values of individuals costs and benefits on the basis of evidence derived from observed peoples behaviour, rather than from their stated preferences.

A distinctive feature of the social cost-benefit analysis approach is that assessment of costs and benefits are undertaken according to clearly defined set of theoretically accepted principles of perfect capital market. The worth of a project, therefore, is judged by its net contribution to raising the level of aggregate consumption of items of value, regardless of whether or not they are bought or sold. Nevertheless, many goods and services do enter into a market situation on the principle that their true value to members of society can fairly be quantified. Consequently costs and benefits are defined in terms of quantity of goods and services which are equivalent in value to the disadvantages and advantages of the plans being investigated. Benefit is measured by the quantity of alternative goods and services which would give the same amount of satisfaction to the beneficiaries. Conversely, cost is measured by goods and services which would provide sufficient compensation to the losses of which, in other words, would restore them to their initial level of well-being.

Such analyses of items of consumption are normally referred to as efficiency analyses. Consideration of equity, relating to the fairness and justice of incidence of costs and benefits on groups in society should be relevant to social cost-benefit analysis. However, the treatment of equity does conflict with the general acceptance of principles of assessment of efficiency gains. Literature contains much debate as to the rationale in the inclusion of distributional equity in an efficiency analysis, such as cost-benefit technique.

The application of social cost-benefit analysis has differed somewhat between planning problems and with those carrying out the analysis. Cost-effectiveness and cost-minimization may be interpreted as special application of social cost-benefit analysis in special circumstances. Cost-effectiveness analysis is considered appropriate when a fixed amount of investment fund has been allocated to an agency or project and the best way of using the total budget allocation is to be determined. Cost-minimization analysis is considered appropriate in finding the least cost way of undertaking a particular project, where the same benefits are assumed to result from each alternative plan.

The first strong attack on social cost-benefit analysis as a useful strategic plans evaluation technique is its contradiction in equity consideration, and the second is its attempt to put monetary value on all objectives of the plan, both the tangible and intangible. A full cost-benefit assessment involves putting price on all objectives including such intangible ones as scenic beauty, environmental quality and so on, avoiding the need to judge the "weights" of one locational or structural potential relative to another. The report on Coventry - Solihull - Warwickshire (C-S-W) study for sub-regional planning strategy (directed by U. Wannop, 1971) maintained that no conceptual advantage was to be gained in putting a price on the intangible to compare with the tangible, rather than weighting the tangible to compare with the weighted intangible.

I. Turner, a former member of the C-S-W study team, has argued that in practice the result of an evaluation which employs points or other notional points of value instead of money, will be more easily understood by both the public and those responsible for taking decisions. In Turner's view, the officers and elected members who in their report before approving the recommended strategy found the result of their evaluation exercise easier to grasp than conventional cost-benefit analysis, and he considered that by comparison with the misunderstanding and confusion which followed the publication of the Roskill Commission's analysis in examining the merits of alternative locations for the Third London Airport.

Turner has put forward a possible explanation. He suggested that there might be a feeling of guilt associated with money, and argues that elected members and officers respectively do not like being regarded as mercenary and materialistic. An evaluation in monetary units induces this feeling of guilt which they try to suppress when talking about the quality of the environment and other non-market aspects of planning proposals. In his view, the use of non-money units avoided this problem of conflicting perceptions. Accordingly, social cost-benefit analysis is not applicable as a general rule, but can make useful contribution in association with other techniques in the case study at hand.

8.2 Planning Balance Sheet Method

Planning Balance Sheet Method is a particular application of Social Cost-Benefit Analysis. It is an attempt to determine the incidence of gains and losses on groups within the community. It allows the analyst to set down items of cost and benefit against each group who will experience the consequences of the option, and to trace the ultimate incidence of gains and losses. By doing this, Planning Balance Sheet Analysis could be employed to evaluate the problems of equity consideration.

The first task is to enumerate the various groups who play a role in establishing and running the various projects. These groups are collectively termed "producers/operators" and are listed vertically in a balance sheet form. Each producer/operator is, as far as possible, paired with the appropriate groups of individuals who would be consuming the goods and services generated by the projects. Each linked, or associated pair of producers and consumers is considered to be engaged in either a notional or a real "transaction" whereby the former produces services "for sale" to the latter. These transactions are obviously not confined to goods and services exchanged in the market. They would extend, for example, to include visual intrusion imposed upon people whose hair is being dressed in the stalls by passing shoppers. Thus the balance sheet aims at presenting a comprehensive set of accounts. In addition to the 'transaction' which enhances all outputs, estimates are made of the resource cost involved in generating the goods and services.

The generality of some planning studies, especially at the urban and regional scale, and their inevitable complexity, has meant that in practice planning balance sheet analysis has not achieved full documentation of all transactions among all groups affected. But the framework exists for extending the analysis if the study resources permit. The analyst aims at complete social accounting, but could take short cuts where necessary. In addition, if quantification of costs and benefits proves to be impossible, as has been the case in many studies, the method allows symbols to be inserted into the accounts to represent the costs and benefits in their appropriate positions in the balance sheet so that they do not get overlooked. Thus the planning balance sheet contains a statement of the proposals considered, the various "sectors" within the community who are potentially affected, either adversely or beneficially; the various items of plan consequences and the sectoral objectives for each of those items; the nature of the units of measurement employed; and the results of the analysis in relation to the preferences of each sector considered.

Planning balance sheet analysis has proved a convenient aid to tackling evaluation particularly in the categorization of effects. Instead of proceeding item by item, in conventional fashion, the analysis is organized around the affected groups of individuals. It focuses mainly on costs and benefits falling directly on those who produce or operate the project and on those who consume the goods and services generated by the project. The multi-sectoral nature of the proposals in the alternative strategies that have been put forward in this study for evaluation imply that a greater number of groups are affected. The repercussions of the proposals being far more wide-ranging, the number of imponderable factors present tend to be much greater than planning balance sheet method would cope with in its infancy version. Even in its new version, where symbols are employed to represent unquantifiable costs and benefits, it is not possible to compare monetary units directly with symbols, as the sheet includes both money and symbols.

8.3 Financial Investment Appraisal

This category of evaluation methods has separate roots in economics, accounting and real estate valuation. The common purpose is to estimate the future streams of capital and operating costs and revenue that will result from the implementation of investment projects.

In the public sector the main aim of such appraisal is to determine the financial implication of alternative investments to the decision-making body. The analysis is usually confined to those financial costs and returns which are of direct interest to the particular agency sponsoring the project. It must, however, be realised that no matter how comprehensive a financial appraisal is in relation to those groups in the community financially affected, the analysis is by nature restricted to items which are subject to market transaction. Furthermore, the value of those items is measured according to prevailing market prices, and these may not always be a reliable indication of their worth to society (for instance, the true cost of using labour that would otherwise be unemployed is zero, not that indicated by wage payments. Also the price of many outputs are distorted by the presence of taxes and subsidies).

An analysis was made of the financial expenses and expectations of six English new towns in the process of construction, by Lichfield and Wendt (1969). After introducing the cost elements for the towns, as a whole, including all agencies, the analysis concentrated on the interests of the New Town Development Corporation, relating both to the financial costs incurred by them and to the prospective financial returns. Their experience was reviewed up to 1961 and forecasts made on a comparable basis up to expected completion dates. On the costs side, all investments were included and on the revenue side all rents, after deducting real estate operating expenditure. The focus of this study lay in costs and returns at the dates mentioned, relating to partial and total completion and not providing the basis for a set of decisions.

An appraisal of alternative town centres development schemes for the new towns of Skelmersdale (Drivers Jones, 1968) provided a case which involved the discounting of expected streams of costs and returns to the date of decision. An estimate was made of the financial consequences (using discounted cash flow techniques) of the three illustrative alternatives for the town centre, on the assumption that the New Town Corporation would be responsible for undertaking the developments.

In some large scale urban development and renewal schemes attempts had been made at more comprehensive assessment, where those repercussions external to the financing body are taken into account. An example is the analysis of the financial implications of alternative urban renewal projects in Skelmersdale which had regard to all sectors of the community affected as either producers or consumers.

So far, the above examples related to project construction in which financial investment appraisal is used in aiding the preparation of budgets so that the appropriate amount of finance is available when required. These appraisals are also made to help test the feasibility of proposals. That was the intention of the planners engaged on the Notts-Derby Sub-Regional Study. The planners had discussions with the county treasurer to determine whether the capital likely to be made available was sufficient for implementing the development proposals.

For financial investment appraisal to be useful as an evaluation tool for assessing alternative proposals, the scheme must have been considerably processed by the design professionals. The minimum evidence required for this level of appraisal has to include at least preliminary design report. The report comprises all or some of the following architects' and/or engineers' sketch designs, and quantity and estate surveyors' estimates. Since these professionals have to be paid for producing the preliminary design report, as their fees could be quite high, financial investment appraisal is usually delayed until the alternative strategies have been reduced to two or so. At the recommendation stage of this report two proposals are put forward (the first and second preferred bests) for which the decision-takers may engage the services of the design professions to provide their services.

8.4 Check-List of Criteria

This approach, in its simplest form, ranks alternative plans on an ordinal basis in relation to a number of specified criteria (representing the desired attributes of the plans), with a subjective judgement on the alternative preferred according to the criteria employed. Its' development belongs to professional land use planners and it was popularly used in the United Kingdom in the 1960s.

L.C. Kitching (1969) demonstrated the approach in relation to regional planning consideration affecting the four short-listed sites selected by the Roskill Commission for the Third London Airport. He first enumerated seven characteristics ideally sought for in siting a major international airport in the South East Region of England: communication, airport noise, growth potential of population and industry, labour costs, amenity, agriculture and services. He then examined the four sites in relation to each of those criteria in turn, using such data as were available and formed a view as to the order of choice of sites in each case. The findings were set out in a summary table with sites ranked 1-4 for each criteria (1 being the best and 4 the worst). The ranked scores were then aggregated leading directly to conclusions. This implies the dubious assumption that all of the criteria were equally important.

In the Central Lancashire Study, the task of the planning team was to propose areas for major urban growth and to define the spatial arrangement of land use activities within those areas. The team selected ten areas which it considered to be feasible and grouped them into options. These were then assessed on nine criteria representing goals that the plan should achieve. They adopted a two-stage evaluation process. First, those options which performed very poorly on one or more of the criteria were eliminated. The surviving three options were then developed in great detail and re-examined against each criteria in turn. That analysis enabled the team to form a clear preference for one of the options. They stated that the preferred option had the least number of items of disadvantage as well as the greatest overall benefits. Similar to L.C. Kitching's technique, the team did not weight their nine criteria.

The consultants appointed by the Roskill Commission to find suitable locations for the associated urban development of each of the four short-listed alternative airport sites made an improved application of the check-list procedure. The process of comparison and selection of criteria was agreed with the commission and was basically the same for all four sites. Certain elements of urban development were costed (construction of site development, engineering, transport, provision of major services and shopping centres, land acquisition, losses in agricultural output, user transport costs). There was also a large number of additional criteria listed on which schemes were to be assessed as well. These criteria were then applied to the alternative strategies in three stages. At the first stage, all strategies were roughly ranked on a five-point scale in respect of each criteria without any quantification of cost elements. Pairs of strategies were then compared, and when one strategy was found to be dominated by another it was rejected, thus reducing the number of alternatives. At the second stage, the costed items were introduced, the alternative with the lowest total cost being provisionally selected. Finally, the uncosted criteria were examined to try to establish whether there were any factors which might outweigh cost advantages. This led to the selection of the preferred strategy.

The first setback to this approach is subjective judgement in the final comparison. The second setback is that if the costing of certain elements of the urban development was accurate, it must have required the production of sketch designs report of the four sites. This would mean spending so much money and time in the engagement of many professionals to produce work, most of which will never be used.

8.5 Cost-in-Use Technique

P.A. Stone (1973) has developed and applied procedures for estimating both private and public capital and operating costs involved in urban developments. These procedures he termed "Cost-in-Use" which may be expressed in average per capita costs for various phases in the implementation of projects or plans. This procedure has been applied to estimating costs of construction and land required for maintenance, improvement and addition to the housing stock of Britain over the period from the mid 1960s to the end of the century. A range of costs is presented to reflect alternative possible rates of growth and change in the spatial distribution of population, and alternative standards of quality that could be adopted for housing provision. Stone has made analysis on similar lines in relation to other types of urban facilities, such as roads, public utilities to assist in the long term formulation of urban development policies. Greater London Council used this procedure for inquiry into the Development Plan. Investigations were made for the resource implication of various possibilities for future rate and scale of urban development in the London area.

This procedure has the usual limitation of procedures developed by economists which take into account only those issues that are covered by market transactions. It overlaps with cost-benefit analysis since the resource costs that are obtained would form part of the evidence in cost benefit analysis. This precludes the application of both of them in a single project.

8.6 Threshold Analysis

The theory and methods of threshold analysis originated in Poland from the work of B. Malisz (1966) and since has been developed further and applied by J. Kozlowski; and J.T. Hughes (1972). It was first applied in the UK in 1966 on the Grangemouth/Falkirk Study and subsequently in the Central Borders Study. It was used in both cases to demarcate areas considered most suitable for new residential development. Threshold analysis deals only with those physical characteristics of areas which would cause significant fluctuation in the unit cost of future urban development.

A threshold is said to occur when new units of development, e.g. dwelling, cannot be constructed and serviced at previous unit cost levels, and substantial additional outlays are required . The presence of a threshold is indicated either by a rise in the gradient or a discontinuity in the marginal cost curve of urban development. Changes in the unit cost of additional development may be caused by a variety of physical characteristics such as topography of the area, the bearing strength of the soil or the physical capacity of public utility networks. Threshold cost items could, therefore, include the cost of extending electricity supply, building of new roads or pilling of a marshy site.

The technique is designed to help decision on the following types of issues: In which direction should a town expand? In what sequence should future growth areas be developed? Is it better to intensify development within existing urban areas or locate in new areas and incur additional fixed costs. The analysis provides information about the magnitude of change in unit development costs for alternative locations. The prospective outlays are related to the number of new inhabitants and are presented as an average threshold cost per new inhabitant.

Obviously, the significance of the analysis depends on the extent to which different categories of threshold costs tend to reinforce each other instead of occurring in different time periods. W. Lean (1969) has pointed out that the troughs in the cost curves of one category may coincide with the crests in another category, thus reducing or anihilating the total significance of the thresholds. More empirical works have not been carried out to establish whether or not this occurs frequently. Also since planning decisions are not based on costs only, the main use of threshold analysis is in helping in the initial narrowing down the range of possibilities which helps in selecting a manageable number of alternatives for detailed evaluation. The advocates of this technique have suggested that it could be used to provide some information required by other more sophisticated evaluation techniques such as cost benefit analysis, goal-achievement matrix and optimisation techniques.

8.7 Goals-Achievement Analysis

The original idea of goals-achievement matrix was put by M. Hill (1966) in his Ph.D. dissertation "A method for evaluating alternative plans: goals-achievement matrix applied to transportation plan". Hill had argued that it should be restricted to investigating single-sector projects and effects. But because of the robust nature of the method, many planners have adapted it in one form or another in the evaluation of multi-sectoral regional, sub-regional and urban structure plans.

Goals-achievement methods have in common a basic approach of attempting to determine the extent to which alternative plans will achieve a predetermined set of "goals" or "objectives". The term "goals" and "objectives" are used somewhat differently by those advocating this approach, but they are both used to denote the aims which it is thought the plan should achieve. The progress towards and the retrogression from the specified goals or objectives represent respectively the advantages and disadvantages associated with alternative plans.

There appear to be four main characteristics of this approach. First, goals or objectives are always formulated (in a preliminary fashion at least) in advance of both the design of alternative plans and the analysis of their consequences. Although the goals or objectives are established at the outset of the planning process, there is no inherent reason why they should not be modified in the light of experience during the study.

Second, the objectives are said to be "multi-dimensional", that is, to include those of an "aesthetic", "environmental", political and economic nature.

Third, all goals-achievement methods have been designed to compare mutually exclusive plans only, that is the considered plans represent alternative ways of tackling a particular problem (e.g. producing a particular output, locating given amounts of population and employment within an area, relieving traffic congestion).

Fourth, the objectives used for the evaluation are generally either assigned a "weight" to reflect their relative importance or are ranked in order of presumed importance, prior to the comparative analysis of plan consequences. It must be borne in mind that it is meaningless to assign relative importance to objectives a priori without reference to either differences in levels of objectives-achievement (which cannot be specified in advance of design) or to the units in which those achievements are to be measured.

The varying levels of sophistication of the goals-achievement method are illustrated by the following examples:

A. Kreditor's "policy evaluation matrix" (1967) is confined to a statement of objectives, with no indication of their relative importance. In his Schema the effectiveness of the alternative plans in achieving stated policy objectives was expressed in the following terms: a significant positive effect; a significant partial or marginal effect; a significant negative effect; or no apparent relationship. The preferred option is chosen on the basis of this classification. Kreditor's Schema did not suggest the rules to be used in making the choice, nor did it make provisions for equity consideration.

As an improvement to Kreditor's Schema, the methods developed by K. Schlager (1968) and J.C. Holmes (1972), the objectives themselves are ranked in order of considered importance of their achievement. The objectives are ranked in advance of analysis of the repercussions of proposals.

G.C. Schimpeler and W.L. Grecco (1968) put forward an "effectiveness matrix" approach for evaluating alternative transportation proposals. In their procedure the objectives are each given a numerical "utility value" to represent their relative importance. Effectiveness values are then assigned to the alternative plans in relation to each of the objectives in turn. This is done with little discussion of the principles of measurement. A value of 1.0 signifies the fullest possible level of achievement of a particular objective and a value of 0.0 signifies zero achievement. In this way, a matrix of plan effectiveness is drawn up, and the total utility expected from implementing a particular plan is given by the sum of its achievement scores times the utilities attached to the various objectives. This procedure implies that the objectives are ends in themselves and not as a means of attaining a goal, and moreover there is no attention to equity issues.

Boyce et al. (1970) discussed the procedure used by those engaged on the Eastern Massachusetts Regional Planning Project. The procedure applied numerical weight to reflect the differential importance of the objectives. Four of the twelve objectives were treated as twice as important as all others and various performance measures used to indicate the extent of objective achievement of the plans. The plans are then ranked on an ordinal basis according to their particular performance scores. The preferred plan was selected by a simple summation of rank scores multiplied by the objective weight, which gave an overall weighted score to each alternative plan. The quantitive information obtained from the performance scores for the objectives were discarded in the process of this procedure. Again there was no explanation of how the differential weights of the objectives relate to policy. Equity was not mentioned at all.

The procedure used by R. Travers Morgan and Partners, working as principal consultants on the London Dockland Study (1976) demonstrates the problem solving approach to evaluation, where the objectives for evaluation are formulated in terms of solving various problems identified by the planning team. The team was asked to consider alternative land-use proposals and to assess their consequences in social cost-benefit terms as far as practicable. In their design and evaluation work, the team addressed itself to the task of trying to remedy the problems of the study area, which was thought of as deficient in the provision of facilities, such as lack of uncrowded housing and of job opportunities. Forty problems were identified and their solution became the objectives of the plan. Eighteen plans were prepared. These were evaluated by the extent to which they would solve the specified problems and the level of associated resource costs. A plan was considered to "solve" a given problem if it resulted in a defined level of provision of the facility in question. No value at all was placed on increments of provision above that level.

This was another case in which objectives were directly substituted for goals in order to use Hill's "goals-achievement matrix" procedure in the evaluation of alternative plans. Again, the author's view is that, the London Dockland Study, being a multi-sectoral planning task, the empirical relationship between the goals and the objectives required to be established in order to be able to transfer objectives-achievement to comprehensive goals-achievement.

M. Hill (1966) put forth "the goals-achievement matrix" procedure which has become well known and widely used, and is outlined here. A set of ideals and objectives for the plan are formulated at the outset, in advance of the design of alternative plans. The objectives are then defined in operational terms in order that measurement of the extent of their achievement by the plans may be obtained. The relative importance of the objectives, as judged by their ability to achieve the goals, is then established; this usually being denoted by a set of numerical values. The plans levels of achievement are estimated for each objective in turn, and then weighted by the respective values of the objectives; the results being presented in a matrix. If possible, the incidence of objective achievement for different groups in society should be traced. The weighted achievement levels of objectives are then summed to give an overall index of objective achievement for each plan. This index value would then be adjusted to take account of the equity of the resulting distribution of gains and losses. That completes the comparison of the plans.

The main features which have distinguished Hill's "goals-achievement matrix" method is the attention given to equity consideration. In his evaluation matrix, individuals in the community are grouped according to some criteria viewed relevant to an assessment of the justice and fairness of the proposals, such as income level, sex, or district of residence. A set of "incidence weights" are assigned to these groups in order to represent the preferences of the "community" with respect to alternative distribution of gains and losses which are to be applied to the totals of net gains. Accordingly, the analyst has to trace the incidence of gains and losses in relation to specific groups. The formulation of incidence weight is considered to be the responsibility of the decision takers. But planners must obtain evidence as to these weights from whatever sources they can if decision takers cannot or will not state their own preferences or issues of equity.

Coventry-Solihull-Warwickshire Sub-Regional Planning Study (1971) was undertaken by an independent team led by U. Wannop. The team's task was to advise the three sponsoring councils on a strategy to be adopted for urban and rural development of the sub-region as regards land-use and transportation policy.

The team derived four goals and then defined 28 operational objectives for which the degree of attainment was measurable. Four alternative strategies were generated as plans for obtaining the objectives. The alternative strategies were evaluated by measuring the promise of each one against each of the objectives for the strategy. Performance scores were calculated to show the degree to which each objective was likely to be achieved by each strategy. The scores for individual objectives were weighted to reflect their relative importance. The weights scored were then summed up so that the overall performance of the alternatives could be compared.

The study did not tackle equity consideration in the evaluation, except by way of an objective statement - 'to help any area of declining industry'. This was as a result of no attempt being made to divide the community into incidence groups in order to determine the gains and losses that accrue to each group as a consequence of the adoption of alternative proposals. What the study did in essence was to substitute objectives for goals in Hill's "goals-achievement matrix" method, and applied it to a comprehensive planning problem. This extended the analysis further than was considered valid by Hill at that time. Hill had argued that it should be restricted to investigating single-sector project and effect, just as he had applied it to transportation plans. In single-sector project, goals could be directly substituted with objectives, but not in multi-sectoral planning activity that included transportation, housing, agriculture, industry and retailing. The thesis established that, to adequately use Hill's "goals-achievement matrix" method in evaluation of alternative strategies in a multi-sectoral planning study, the empirical relationship between the goals and objectives has to be established earlier in order to be able to transfer objectives-achievement to comprehensive goals-achievement.

8.8 Optimising Techniques

Development in linear and non-linear programming has led to techniques which in certain problem situations can rapidly and efficiently search out preferred solutions from all the existing possibilities. For this purpose, preference criteria (i.e. an objective function)and any constants that apply have to be specified in advance of their use, and since the techniques are quantitively designed, they can only be employed when the problem is formulated in mathematical terms.

H. Ben-Shahar et al. (1969) developed a linear model for allocating residential and employment land uses and determining transport investment in urban development planning. The model has been applied in Israel and to a number of projects in other countries, including (using a modified form) an examination of alternative plans for Irvine New Town in Scotland. The model has linear programming formulation where the objective function is to maximize the total demand prices for all buildings less construction and demolition costs for new ones and also less all costs associated with the provision and use of communication infrastructure and capital. The authors of this model pointed out that only decision-takers can determine optimality criteria. However, they did not claim that this function is generally valid for public policy activity.

K.J. Schlager (1965) developed linear programming model for land use plan design. This model generated land use plan which minimizes total public and private investment cost subject to a number of design constraints.

It was applied to the metropolitan area in South East Wisconsin by the Regional Planning Commission. Given a forecast of population and employment, aggregate demand for each land use is determined by applying a conversion coefficient (or standard) to each population and employment group. Land use is allocated to type, location and density, subject to constraints regarding zoning (e.g. flood plain zoning, density controls) and design requirements (e.g. desired proximity of land use, schools, shopping). These constraints, which express conditions for acceptability of alternatives, can be regarded as minimum fixed level of achievement of planning objectives. By shifting constraints levels for service ratios, zoning, criteria, or land use proximity requirements, choice of the optimal plan will be affected. The costs of the levels of the constraints can be tested by determining the sensitivity of the outcome to the constraint. The effect of such shifts can be measured in monetary terms in the model by determining the changes in overall costs of the plan.

Schlager's linear model was subsequently modified by the South Eastern Wisconsin Regional Planning Commission because the discrete nature of the location of the activities was not considered to be well reflected in the linear form of the model, nor was the true cost of development thought to be adequately reflected, since it considered only locational costs, not linkage costs. Appropriate changes have been incorporated in a dynamic programming formulation of the model, in which relationship can be non-linear. This also included facility for multiple stage decision processes. The model leads to minimum cost combination of land uses constrained by design standards. Whilst this formulation is more realistic than Schlager's in its ability to incorporate non-linear and dynamic elements, its essential innovation is in the design of alternatives and not their evaluation. The objective function is still essentially concerned with cost minimization.

A.J. Scott (1971) has provided another demonstration of the use of dynamic programming to locational issues in urban and regional planning.

Since the early 1960s, Polish planners have carried out work under the name of the Warsaw Optimisation Method. Although this method is still in the early stages of development, it has been applied to problems of locating new residential developments and industrial employments. Examples of studies on which it has been used are the Master Plan for Skopje in Yugoslavia (1965) and the Master Plan for Warsaw Urban Region (1968).

Optimization method is essentially an extension of threshold analysis to the task of choosing optimal location for and intensities of urban land use activities. Its' aim is to maximize the benefits resulting from a given amount of new urban development as well as to minimize the associated capital and operating costs. The measurement of benefits, however, has proved very difficult. As a compromise, the approach adopted in practice is based on minimizing investment costs subject to meeting certain standards of provision that it is considered the plan should attain. These standards relate to matters such as the security of the market stalls, the pattern and capacity of pedestrian streets in the market place.

Possibilities exist for applying these searching procedures to choice situations in urban and regional planning, but there are several obvious difficulties associated with their use. The foremost of these is the specification of the criteria of preferences. It has generally proved difficult to find specifications that are sufficiently wide in scope to cope with the demands of many planning problems. But they have been successfully used in development planning schemes where the objectives are clear and delimited.

Also, data collection problems are often enormous, since all possible design solutions have to be allowed for. The uncertainties surrounding much of the evidence as to the measurement of the achievement of objectives often create difficulties; although we may test the sensitivities of the model, results change with change of measurement assumptions.

In conclusion, this chapter has reviewed eight current plan evaluation approaches which are capable of application at various levels of urban and regional planning process. Their merits and demerits have been considered. Bearing these in mind, these techniques may require to be applied at various stages in the next chapter 9, which is devoted to evaluation of alternative strategies for development planning of Kaduna urban market places, using the proposed locational and structural potential model.

CHAPTER 9

EVALUATION OF ALTERNATIVE STRATEGIES FOR DEVELOPMENT PLANNING OF KADUNA CITY MARKET PLACES USING THE PROPOSED LOCATIONAL AND STRUCTURAL POTENTIAL MODEL

9.0 Introduction

The quantitative distribution of demand and supply of activity spaces among the eleven Kaduna city market places for the years 1977 and 1984 are presented in Tables 9.1.1 and 9.1.2, pages 440 and 441 respectively. One retail market place, the Panteka Market Place (PMP), was omitted from the analysis because of insufficient data. The figures revealed that in the 7 year interval, the demand and supply of activity spaces in these market places changed, as shown in Table 9.1, page 439.

Assuming that the present population and other socio-economic growth indices remain unchanged, the current growth rates of demand and supply of activity spaces would remain unchanged. Therefore, for the years 1991, 1998 and 2005, the demand and supply of activity spaces in Kaduna city market places would be as shown also in Table 9.1, page 439.

The above growth rates of demand and supply of activity spaces represented the average growth rates for Kaduna city. The 11 retail market places to which the resulting demand and supply of activity spaces are distributed have differing growth rates, as shown in Tables 9.1.3 and 9.1.4, page 442.

Assuming the current trend in demographic, geographic and socio-economic development continues unaltered, these retail market places would maintain their current "trend rates" of growth and would have, in the target year, 2005, the distribution of demand and supply of activity spaces shown in Tables 9.1.5 and 9.1.6, page 444. That policy stance which would permit existing demographic, geographic and socio-economic trends to determine the growth rates of distribution of demand and supply of activity spaces in the 11 retail market places is termed "Trend Strategy".

The scattergrams of like-pairs of demand and supply of activity spaces for food (or non-food) shopping, which

TABLE 9.1: Average Growth of Demand and Supply of Activity Space in Kaduna City Market Places; 1977 - 1984

Year	Shoppers food-trips (shoppers per hour)	Shoppers non-food trips (shoppers per hour)	Number of food traders	Number of non-food traders	Food Floor-Space (m^2)	Non-Food Floor-Space (m^2)	Number of food stalls	Number of non-food stalls
1977	10707	9280	5038	5269	24396	38915	4979	5247
1984	30282	31090	11397	12846	51602	68217	10647	10783
Percentage rate of growth	182.82	235.02	126.22	143.80	111.51	75.30	113.84	105.51
1991	109143	119584	22768	22160	85644	104158	25782	31319
1998	230848	209631	48687	45541	242218	348950	58324	76356
2005	488267	367483	104112	93591	685041	1169052	131941	186156

TABLE 9.1.1: Distribution of the Demand for Activity Spaces to 11 Kaduna City Market Places in 1977 and 1984

Name of Market Place	The Shoppers Food-Trips/hour		The Shoppers Non-Food-Trips/hour		Number of Food Traders		Number of Non-Food Traders	
	1977	1984	1977	1984	1977	1984	1977	1984
CMP	3393	12471.49	7648	14410.88	977	4066.00	1894	6912.00
RSMP	1621	2295.17	109	140.93	499	765.00	125	157.00
PMP	.	36.18	.	495.52	.	.	.	.
M-KOMP	1950	2738.82	456	640.99	1058	1574.00	992	1707.00
TWMP	1072	2080.73	679	1313.80	438	997.50	979	1952.50
K-TMP	1784	4621.97	105	272.76	940	2453.00	434	1136.00
URMP	295	423.00	105	209.12	202	280.00	168	220.00
BMP	105	202.12	65	86.37	189	252.50	153	211.50
UTMP	0	.00	54	90.92	272	359.00	80	83.00
BDMP	136	195.68	55	72.74	87	124.00	88	83.00
USMP	240	295.33	0	.00	275	363.00	127	134.00
KOMP	111	148.33	4	4.55	101	163.00	229	250.00
	10707	30282	9280	31090	5038	11397	5269	12846

TABLE 9.1.2: Distribution of the Supply of Activity Spaces to 11 Kaduna City Market Places in 1977 and 1984

Name of Market Place	Stallage Food Floor-Space		Stallage Non-Food Floor Space		Number of Equivalent Food Stalls		Number of Equivalent Non-Food Stalls	
	1977	1984	1977	1984	1977	1984	1977	1984
CMP	5162	18975.50	17046	32119.50	977	3691.00	17046	5122.00
RSMP	2550	3610.00	4855	6975.00	499	706.00	4855	143.00
PMP	.	1065.00	.	49897.00	.	.00	.	.00
M-KGMP	4634	6510.00	5334	7497.00	1058	1487.00	5334	1549.00
TWMP	2602	5049.00	5874	11368.00	438	849.50	5874	1894.50
K-TMP	3459	8961.00	1766	4580.00	940	2432.00	1766	1124.00
URMP	1008	1570.00	888	1247.00	172	262.00	888	208.00
BMP	1044	1478.00	915	1243.00	189	246.50	915	207.50
UTMP	1338	1643.00	354	438.00	299	339.00	354	77.00
BDMP	407	721.00	244	487.00	88	120.00	244	81.00
USMP	1643	2140.00	635	785.00	191	357.00	635	131.00
KGMP	549	944.00	1004	1477.00	128	157.00	1004	246.00
Total	24396	51602	38915	68217	4979	10647	5249	10783

TABLE 9.1.3: Rates of Growth of the Demand for Activity Spaces in 11 Kaduna City Market Places Between 1977 and 1984; (Trend Strategy)

Name of Market Place	The Shoppers Food Trips %	The Shoppers Non-Food-Trips %	Number of Food Traders %	Number of Non-Food Traders %
CMP	267.57	88.43	316.17	264.94
RSMP	41.59	29.29	53.31	25.60
PMP	.	.	.	.
M-KGMP	40.45	40.57	48.77	72.08
TWMP	94.10	93.49	127.74	99.44
K-TMP	159.08	159.77	160.96	161.75
URMP	43.39	99.16	38.61	30.95
BMP	92.50	32.88	33.60	38.24
UTMP	.00	68.37	31.99	3.75
BDMP	43.89	32.25	42.53	5.68
USMP	23.05	.00	32.00	5.51
KGMP	33.63	13.65	61.39	9.17

TABLE 9.1.4: Rates of Growth of Supply of Activity Spaces in 11 Kaduna City Market Places Between 1977 and 1984; (Trend Strategy)

Name of Market Place	Stallage Food Floor-Space %	Stallage Non-Food Floor-Space %	Number of Food Stalls %	Number of Non-Food Stalls %
CMP	267.60	88.43	277.79	170.43
RSMP	41.57	43.67	41.48	28.83
PMP	.	.	.	.
M-KGMP	40.48	40.55	40.55	40.56
TWMP	94.04	93.53	93.95	93.51
K-TMP	159.06	159.34	158.72	158.99
URMP	55.75	40.43	52.33	31.65
BMP	41.57	35.85	30.42	35.62
UTMP	22.80	23.73	13.38	11.59
BDMP	77.15	99.59	36.36	55.77
USMP	30.25	23.62	86.91	12.93
KGMP	71.95	47.11	22.66	37.43

TABLE 9.1.5: Distribution of Demand for Activity Spaces to 11 Kaduna City Market Places Predicted by the Trend Strategy in the target year, 2005

Name of Market Place	The Shoppers Food-Trips	The Shoppers Non-Food Trips	Number of Food Traders	Number of Non-Food Traders
CMP	578650.4	977885.1	107281.8	163493.4
RSMP	6086.98	3089.31	1008.98	151.39
PMP	.	.	.	.
M-KGMP	7089.95	18058.28	1897.15	4232.77
TWMP	14215.82	96533.15	4312.90	7537.74
K-TMP	75096.14	48498.86	15956.84	9914.47
URMP	1165.21	16755.52	272.97	240.43
BMP	1347.11	2055.74	220.39	271.89
UTMP	.00	4401.83	302.14	45.11
BDMP	544.63	1706.42	131.42	33.89
USMP	514.12	.00	305.61	76.60
KGMP	330.67	67.69	250.80	158.30
Total	685041 persons/ hour	119052 persons/ hour	131941	186156

TABLE 9.1.6: Distribution of Supply of Activity Spaces to 11 Kaduna City Market Places by the Trend Strategy in the Target year, 2005

Name of Market Place	Stallage Food Floor-Space	Stallage Non-Food Floor-Space	Number of Food Stalls	Number of Non-Food Stalls
CMP	386661.7	181061.9	80200.66	67052.46
RSMP	4201.66	17427.24	805.75	202.38
PMP	.	.	.00	.00
M-KGMP	7404.03	17539.23	1663.69	2847.46
TWMP	15132.54	69431.09	2497.56	9087.13
K-TMP	63912.59	67314.61	16972.90	12923.86
URMP	2433.49	2909.69	373.17	314.11
BMP	1720.32	2625.67	220.38	342.61
UTMP	1247.94	699.05	199.10	70.83
BDMP	1644.26	3262.62	122.62	202.64
USMP	1939.79	1249.62	939.42	124.88
KGMP	1968.72	3962.24	116.75	422.65
Total	487639 m²	339194m²	104112	93591

would be predicted by trend strategy in the target year, 2005, are shown in Figs.9.3.6.1-2,pages 509-511,and in Figs.A9.4.1-10,pages A203- A221 Those scattergrams showed that the strong linear hierarchical relationships, which were exhibited in section 7.2 (1-2), page 346-365, between those pairs were retained, but the gaps between the CMP and the other market places had been further widened. As a result, the greater majority of the other market places appeared more bunched together, than was the case in Figures 7.7.1, A.7.2.1, A.7.2.2, A.7.2.3, A.7.2.4, A.7.2.5, pages 353 A103, A107, A111, A114, A118, respectively, in order to permit the CMP to appear on the same plot. This showed that the trend strategy promised more discrete relationship, with greater loss of hierarchical-continuum, between the CMP on the one hand, and the other retail market places on the other hand.

To present the predicted of the trend strategy with clarity, the base year, 1984 data, and those predicted by the trend strategy in the target year, 2005, were broken down by the 4 market place sub-groups, viz:

1.	Central Market Place	(1 No.)	'CMP'
2.	Special Market Places	(1 No.)	'SMP'
3.	District Market Places	(4 No.)	'DMP'
4.	Local Market Places	(5 No.)	'L/NMP'

Each sub-group's data were calculated as percentages of the totals for the 11 market places. The summary of this calculation is shown in Table 9.1.7, page 445. The table revealed that if the present trend growth

TABLE 9.1.7: Distribution of Demand and Supply of Activity Spaces among Kaduna City Retail Market Place Sub-Groups in the Base Year, 1984, and the Target Year, 2005, Predicted by the Trend Strategy.

Sub-Group of Market Places	Base Year & Target Year	Shoppers Trips				Number of Traders				Stallage Floor-Space				Number of Stalls				Number of Market Places
		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		
		Trips Persons-in-Hour	%	Trips Persons-in-Hour	%	Traders	%	Traders	%	Floor Space m^2	%	Floor Space m^2	%	Stalls	%	Stalls	%	
City Central Market Place	1984 2005	12471 578650	48.9 84.5	14411 977885	81.2 83.6	4066 107282	35.7 81.3	6912 163493	52.8 87.8	18976 386662	38.4 79.3	32119 181061	47.1 49.3	3691 80201	34.7 77.0	5122 67052	47.5 71.6	1
Special Centre Market Places	1984 2005	2295 6087	9.1 .9	140 3089	3.6 2.6	765 1009	6.7* .8	157 312	1.2* 1.6	3610 4202	7* 8.6	6975 17427	10.2 4.7	706 806	6.6 .8	143 202	1.3* .2	1
District Centre Market Places	1984 2005	9865 97567	38.7 14.2	2437 179846	13.7 15.4	5304 22440	46.5 17.1	5015 21925	39.0 11.8	22090 88883	42.8 18.2	24692 157195	36.2 42.8	5030 21507	47.2 20.7	4775 25173	44.3 26.9	4
Local Centre Market Places	1984 2005	841 2737	3.3 .4	254 8231	1.4 .7	1262 3305	11.1 2.5	762 1259	5.9 6.7	6926 8521	13.4 1.7	4430 11799	6.4 3.2	1220 1665	11.5 1.6	743 1164	6.9 1.2	5
Total for 11 Market Places	1984 2005	25509 685041	100 100	17739 1169051	100 100	11397 131941	100 100	12846 186156	100 100	51601 487639	100 100	68216 367482	100 100	10647 104112	100 100	10783 93591	100 100	11

* APPLIES ONLY TO THE RAILWAY STATION MARKET PLACE

were to continue unaltered, the percentages of demand and supply of activity spaces in the CMP would change as follows:

		1984	2005
1.	The shoppers food-trips	48.9	84.5
2.	The shoppers non-food trips	81.2	83.6
3.	The number of food traders	35.7	81.3
4.	The number of non-food traders	52.8	87.8
5.	The stallage food floor-space	38.4	79.3
6.	The stallage non-food floor-space	47.1	49.3
7.	The number of food stalls	34.7	77.0
8.	The number of non-food stalls	47.5	71.6

Accordingly, the percentages of demand and supply of activity spaces shared by the SMP, DMP and L/NMP (total of 10 market places) would decrease by the values by which those of the CMP had increased.

This implies that Kaduna city would be tending towards a city with one major central retail market place, with increased attendant problems of congestion of people and vehicles in and around the CMP; and the other retail market places would remain under-developed with their potentials unutilized.

To provide a deeper understanding of the performance situation and development planning for urban market places, this thesis had proposed "locational and structural potential model". The performance situation in Kaduna city market places, established by the model, are:

1a That there is unbalanced hierarchical continuum in the strong linear relationship between any of the like-pairs of the following specific components of demand and supply of activity spaces, for food shopping:

the shoppers' food-trips
the number of food traders
the stallage food floor-space
the number of food stalls

1b That there is unbalanced hierarchical continuum in the strong linear relationship between any of the like-pairs of the following specific components of demand and supply of activity spaces for non-food shopping:

the shoppers' non-food-trips
the number of non-food traders
the stallage non-food floor-space
the number of non-food stalls

2.1 That there are strong multiple cubic causal relationships,

(i) between the growth rate of the shoppers trips for food or non-food, and the locational and structural potentials in the retail market place;

(ii) between the growth rate of stallage floor-spaces for food or non-food, and the locational and structural potentials in the retail market place.

2.2 That there are strong multiple quadratic causal relationships,

(iii) between the growth rate of the number of stalls for food or non-food, and the locational and structural potentials in the retail market place;

(iv) between the growth rate of the number of traders for food and non-food, and the locational and structural potentials in the market place.

The calibration of this analytical model has been described in the preceding chapter 7, and the existing performance situation is shown diagrammatically in Figure 7.11, p. 409.

In this chapter, the model is used to evaluate the predictions of a set of alternative development planning strategies "to achieve balanced demand and supply of activity spaces and optimisation of the locational and structural potentials in Kaduna retail market places".

In carrying out the evaluation of the alternative strategies, the above goal statement was developed into a relevant set of objectives, followed by the development of 4 alternative strategies. The objectives scores achievable by these alternatives were measured using the non-linear programmes of the model. The abilities of the alternatives to optimise the locational and structural potentials were assessed with the non-linear programmes of the model. Based on the values of the scores by the alternatives on the supply and demand for activity spaces by the shoppers, the traders and by road and railway vehicles; and also on their scores on the optimisation of the locational and structural potentials, they were ranked. The most efficient was adopted as the recommended planning strategy and the second was reserved as an alternative planning strategy.

The efficacy of the model as an appropriate technique, for evaluating urban retail market place development planning strategies, was put to a public opinion test. Next the distribution of demand and supply of activity spaces achieved by the recommended planning strategy was subjected to equity consideration in an attempt to eliminate social inequity. The rationale of, and the examination of the flexibility of the plan was discussed.

In the next step the forecast of demand and supply of activity spaces with the recommended planning strategy was done in order to obtain the materials of the planning.

The chapter is concluded with the phasing of the recommended planning strategy, i.e. designing a programme and schedule of actions necessary for the full realisation of the promises of the recommended planning strategy.

9.1 Relevant Set of Objectives

From the previous chapters and section 9.0, the goal of the research study, i.e. the ultimate achievement of the desired social, economic and physical environment, has been identified as:

> "To achieve balanced demand and supply of activity spaces, in a system of urban market places, with the view to optimising locational and structural potentials"

The goal is a generalised statement to which specific tests of achievement could not be easily applied. It is, therefore, necessary to define it in operational objectives to which specific tests could be easily applied in order to be able to measure the achievements predicted by the alternative planning strategies.

It has been established in Chapter 7 of this thesis that there are strong causal relationships between the rates of growth in the demand and supply of activity spaces, and the locational and structural potentials in Kaduna city market places. The subsequent 8 predictive equations, 2.1a, 2.1b, 2.2a, 2.2b, 2.3a, 2.3b, 2.4a and 2.4b had been calibrated in pages 386-397, and assembled in Table 7.37, page 398. The locational and structural potentials in Kaduna city market places have been listed in Table 9.1.8, page 452.

Since the precise size and structure of the demand and supply of activity spaces in the urban retail market places are chiefly influenced by the locational and structural potentials, other things being equal, optimisation of the locational and structural potentials in a market place would result in the optimal demand and supply of activity spaces. Hence the general goal; "To achieve optimisation of the locational and structural potentials" is broken down into the following operational objectives.

There are some objectives which are relevant to all the 12 Kaduna market places, and these are called "general objectives", whilst there are others which are relevant only to Kaduna CMP, and they are termed the "particular objectives" of the CMP.

The general objectives of the 12 Kaduna city market places are:

2.1a To achieve optimal demand by the shoppers' food-trips

2.1b To achieve optimal demand by the shoppers' non-food-trips

2.2a To achieve optimal demand by the number of food traders

2.2b To achieve optimal demand by the number of non-food traders

2.3a To achieve optimal supply of stallage food floor-space

2.3b To achieve optimal supply of stallage non-food floor-space

2.4a To achieve optimal supply of number of food stalls

2.4b To achieve optimal supply of number of non-food stalls

Whereas the shoppers and the traders constitute the primary client groups, the secondary client group attracted to the market place are the vehicles used by some primary clients to achieve accessibility of the market place. These vehicles are attracted to the CMP in large numbers and they form the "particular operational objectives" of the CMP as follows:

3.1a To achieve optimal demand for activity space by private vehicle traffic in the CMP

3.1b To achieve optimal demand for activity spaces by private vehicle accumulation in the CMP

3.2a To achieve optimal demand for activity spaces by commercial vehicle traffic in the CMP

3.2b To achieve optimal demand for activity spaces by commercial vehicle accumulation in the CMP

3.3a To achieve optimal demand for activity spaces by passenger trains

3.3b To achieve optimal demand for activity spaces by goods trains

The "criteria" for measuring the achievement of any of the above stated 14 objectives is the "increase" or "decrease" in the quantities of these objectives involved in the urban market places.

It is not only important to achieve optimisation of the locational and structural potentials in the urban retail market places, it is essential that balanced relationship between the demand and supply of activity spaces be achieved. Balance between the demand and supply are achievable by planned manipulation of the locational and structural potentials. The manipulation can upset the hierarchical relationship in the urban retail market place system. Central place theory provided the concept of a hierarchy of market places, each with its own hinterland in which the lower order market places provided only highly dispersed central commodities, and services and are themselves within the hinterlands of higher order market places. It was, thus, concluded that certain manipulations of the locational and

TABLE 9.1.8: The Locational and Structural Potentials in the Kaduna market places, of which ten * are included in the predictive equations 2.1a, 2.1b, 2.2a, 2.2b, 2.3a, 2.3b, 2.4a and 2.4b, page 398

(i) Locational Potentials

X_1 - Railway transport linkages

X_2 - Road transport linkages *

X_3 - Immediate surrounding residential population*

X_4 - Immediate surrounding places of work *

X_5 - Immediate surrounding other shopping centres *

X_6 - Immediate surrounding wholesale shops and warehouses *

(ii) Structural Potentials

Y_1 - Building Design Factors

Y_2 - Facilities and amenities

Y_3 - Parking and stationing of vehicles

Y_4 - Security of life and property *

Y_5 - Environmental qualities*

Y_6 - Zoning of the market place by commodity *

Y_7 - Fresh food stuffs *

Y_8 - Food and Non-food capacity *

structural potentials in a market place can result in balanced hierarchical relationship between the achieved demand and supply of like-pairs of food (or non-food) activity spaces. Therefore, the goal to achieve balanced demand and supply of activity spaces in Kaduna city retail market placesis given by the sum of these 12 operational objectives;

To improve the unbalanced demand and supply of activity spaces between:

1.1a the shoppers food-trips and the stallage food floor-space;

1.1b the shoppers non-food-trips and the stallage non-food floor-space;

1.2a the shoppers food-trips and the number of food stalls;

1.2b the shoppers non-food-trips and the number of non-food stalls;

1.3a the stallage food floor-space and the number of food stalls;

1.3b the stallage non-food floor-space and the number of non-food stalls;

1.4a the stallage food floor-space and the number of food traders;

1.4b the stallage non-food floor-space and the number of non-food traders;

1.5a the number of food stalls and the number of food traders;

1.5b the number of non-food stalls and the number of non-food traders;

1.6a the shoppers food-trips and the number of food traders;

1.6b the shoppers non-food-trips and the number of non-food traders;

Having set out the 26 objectives of Kaduna city market places, covering the achievement of balanced demand and supply of activity spaces and optimisation of the locational and structural potentials, the ground has been prepared to consider the task of development of the alternative strategies that predict the achievement of the stated objectives.

9.2 Development of the Alternative Strategies

The findings of the empirical test of the proposed locational and structural potential model in Kaduna city market places has helped to bring to the consciousness of those who make decisions the complex causal relationships between the growth rate of demand and supply of activity spaces, and the locational and structural potentials in Kaduna city market places. The locational and structural potential model thus calibrated may be employed in the systematic evaluation of possible development planning strategies in the search for a better future and thence working backwards those policies needed:

> "to achieve balanced demand and supply of activity spaces with the view to optimising the locational and structural potential in Kaduna city market places"

Based on the views of some individuals, organisations, on the extrapolation of past trends and on the relevant experience of other countries, the stated policy goals sought to achieve a pattern and capacity of shopping in Kaduna city market places that would provide the best use of available resources, best marketing and shopping environment, greatest convenience to the consumers, and the ability to adapt to change, whilst ensuring that social and economic advancement is maintained. In the hope of realization of those policy objectives, and since all possible design solutions have to be allowed for, the research found it necessary to generate 27 development planning proposals.

Two principles governed the generation of the development planning proposals. Firstly, they must be action programmes which were limited to the range covered by the locational and structural potentials in Kaduna retail market places. Secondly, they must lie within the ambits of the sub-variables that constitute the 6 locational and 8 structural potentials.

Having generated the development planning proposals, 27 in number, it was necessary to group them together in order to form a short-list of the "best" set of alternative strategies. The problem of delimiting alternatives was by means of cyclic planning process. It involved eliminating alternatives from a large number of successive refinement of the designs and by generation of modified or new alternatives in the light of improved understanding of the problem and as increasing amount of evidence was collected.

At each phase refinements occurred in the detailing of the designs. This led to greater knowledge of their respective merits as the search for differences is widened in detail.

One approach that met the requirements that alternatives of a wide-ranging nature generated for final consideration was to select one or more at each phase in a cyclic plan-making process for each of a number of different range of plans. At each phase an alternative was selected which appeared to be "best" (according to the evaluation findings) of the "worst" set of plans, along with the "best" alternative from the next "worst" set, and so on for all ranges of plans up to that set appearing to be the best. A reasonable selection of alternative groups to be detailed was thus available for the next phase.

At each phase the principle governing the grouping together of the proposals was merits they had in common. After considerable computer programming, the 27 proposals were assembled under 9 different "policy solutions", as shown in Table 9.2.1, page 463. This time the principle governing the grouping together was the major advantages to be gained, and the avoidance of serious conflicts, in ensuring that the various proposals within a policy solution were all capable of successful implementation with available resources.

As has been discussed in Chapters 2, 3 and 4 of this work, shopping is one of the cardinal functions of the city centre, and the market place being the traditional shopping facility in the West African setting, the proposal to move the central market place away from the city centre has no merit, and it is therefore dropped from further consideration. Secondly, the concept of introducing various forms of taxation on the citizens using the market place when the government has not made any recent financial investment in the CMP, is considered to have no merit. If the government increased rents and imposed taxes on the use of the central market place facilities, after substantial investment in redevelopment of the CMP, as it did after the 1975 reconstruction in order to regain the capital invested, that may be understandable. The increased rent after the 1975 redevelopment of the CMP enabled the government to repay the loans from the bank and the insurance companies who provided the greater part of the money used in the reconstruction. But as soon as the government paid back the loans, the rent was reduced to half. It is borne in mind that it is the responsibility of the government and its agencies to locate, develop and manage market places in the city. For the government to increase rents and impose taxes, merely to inhibit some city residents from engaging in social and economic contacts at the CMP, is a measure nothing short of being immoral and is, therefore, excluded from further consideration. Accordingly, policy solutions D and F have no part to play again in the development of the alternative strategies. The other remaining 7 policy solutions, A, B, C, E, G, H and I, embodying 20 development planning proposals, are combined as appropriate in accordance with the above stated principles in order to form the four alternative planning strategies. Some conflict, or discrimination, was found to exist between certain policy solutions.

It could be argued that policy solutions B and C do not discriminate against each other. At this stage of the planning process there is an argument in support of the fact that they discriminate against each other. In horizontal expansion, there is the requirement of acquiring undeveloped and developed lands, and demolition and clearing of existing structures. In vertical expansion, there is the requirement of extra costs on foundation work and excavation of the ground to provide underground train and road vehicle stations and parking for private cars, or erection of an elevated deck to provide train and road vehicle stations and parking for private cars.

The CMP is situated in the commercial hub of the city where land value is highest and development of plots is optimized by building 3 to 4 storeys high. But contrary to the prevalent economic use of land in this most valued part of the city, the CMP is still operating on a single floor at the ground level. The cost of acquiring more land for horizontal expansion of the CMP on the ground level would almost approximate the cost of paying for the extra cost of foundation work and excavation or providing an elevated deck for vertical expansion. The cost of either alternative is quite substantial by itself and would preclude the other, since the investors have limited capital for the project. At the end of the evaluation exercise, if horizontal and vertical expansion options come first and second, or vice versa, cost-effectiveness analysis may be employed to examine a way of forging a compromise of the two strategies at project level.

Finally, among the remaining 7 different policy solutions, under which the proposals were detailed above, some could be seen to discriminate against others and would pose serious conflicts if grouped together to constitute a strategy. This was noted as an avenue that was to be explored in detail as the "nucleus" for forming alternative strategies. The four policy solutions A, B, C and E, which discriminated seriously against each other, were placed on the left hand side of Figure 9.2.1, page 466 . They were termed "discriminatory policy solutions". The other three policy solutions, G, H and I, did not seem to discriminate against any other solution except I, which seemed to discriminate seriously against A. These three policy solutions were placed on the right hand side of Figure 9.2.1, page 466 , and were called "essential policy solutions". The policy solutions G and H seemed to be the most agreeable of all. They were connected together and called "mandatory policy solutions", whereas I was called "optional policy solution".

The alternative strategies were formed by grouping together policy solutions which promised major advantages to be gained, and ensured the avoidance of serious conflict, and that the various proposals within the strategy were all capable of successful implementation with available resources. By combining discriminatory policy solution A with the mandatory policy solutions G and H, "Alternative Strategy SG1", shown in Figure 9.2.1, page 466, was obtained.

By combining discriminatory policy solution B with the essential policy solutions G, H and I, "Alternative Strategy SG2", shown in Figure 9.2.1, page 466 was obtained.

By combining discriminatory policy solution C with the essential policy solutions G, H and I, "Alternative Strategy SG3", shown in Figure 9.2.1, page 466 was obtained.

By combining discriminatory policy solution E with the essential policy solutions G, H and I, "Alternative Strategy SG4", shown in Figure 9.2.1, page 466 was obtained.

After some detailing, the 5th strategy, called the "Trend Strategy SG5" shown in Figure 9.2.1, page 466 was included. The "Trend Strategy SG5" was based on an extrapolation of past changes in the amount and location of urban development within Kaduna city, and was an attempt to show the implication of a continuation of past policies for future retail market place development. What this implied was that the "essential policy solution U" was the existing development control and urban management of the CMP in 1984. The proposals in the four alternative strategies, SG1, SG2, SG3 and SG4, are shown in Tables 9.2.2, 9.2.3, 9.2.4, and 9.2.5, pages 467, 467, 468, 469, respectively.

In detailing the alternative strategies, care was taken to ensure that each of the discriminatory policy solutions, A, B and C, contained equally only the first three most important proposals; as the inclusion of unequal number of proposals in the discriminatory solutions would have introduced biased weighting. If any discriminatory policy solution contained more proposals than the others, that would provide it with undue opportunities of scoring more numerical points than the others in the evaluation matrix shown in Figure 9.3.1, page 471 . The detailing excluded initial consideration of the monetary cost of each proposal, but concentrated on the achievement potentials of the proposals.

This approach is based on the principle that the strategy must meet certain standards of provision that it is considered the plan should attain, subject to minimization of investment costs at the project stage. Usually cost-minimization analysis is considered appropriate in finding the least cost way of undertaking a particular project, where the same benefits are assumed to result from each alternative plan.

Applying the test of objective achievement to the alternative strategies was the final stage in the process of removing doubts as to the optimal strategy. Evaluation had effectively commenced with the adoption of the stated goal. Therefore development planning actions which indicated some hopes of achieving the goal became the most satisfactory approaches in which to crystallize the alternative strategies for Kaduna city market place system. Initially 27 proposals were generated. They were grouped up into 9 different policy solutions. Of these, two pertaining to relocation of the CMP and the control of the CMP using pricing techniques were subjectively eliminated from further consideration. The remaining 7 different policy solutions were grouped into 4 alternative strategies to which the trend strategy was added to constitute the reference strategy. The alternatives had therefore been developed to the point where it was clear that balanced demand and supply of activity spaces and optimisation of the locational and structural potentials should be the main focus for development planning. But doubts remained as to the relative amounts of achieved activity spaces which should go to the CMP and the other market places (DMP, SMP and L/NMP) and as to the proportion of the city's retail activity which should go to the city central market place.

Already the alternative strategies had much in common, ranging from 70% of proposals in the strategies SG1 and SG2 or SG3, 77% of proposals in strategies SG2 and SG3 and that as much as up to 91% in the case of SG4. Because of the attention which was paid to the composition of the alternatives it was expected that the final tests would distinguish the fine differences in the predictions of the alternatives. Should very large differences occur, the realism of the alternatives as equals and the representativeness of the factors considered in the development of the strategies would be in doubt, and the strategy emerging from the tests as the best one would have required further detailing. The precise description of the tests of the predictions of the alternative strategies is set out in the next section 9.3, page 470.

TABLE 9.2.1: Proposals within the 9 different policy solutions

---

A Proposals in the Disposal of some CMP Activities

AA. Transfer major food and service shopping to the DMPs and L/NMPs.

AB. Transfer the station for intercity buses, taxi cabs, motor trucks, to locations some kilometers away from the CMP along the main entry and exit routes of the city. This would constitute the nucleus for a wholesale market places.

AC. Shift the railway from the CMP.

B Proposals in the Horizontal Expansion of the CMP

BA. Expand the CMP into adjoining vacant land.

BB. Expand the CMP into adjoining built-up plots.

BC. Establish Train Station on ground surface at the CMP.

C Proposals in the Vertical Expansion of the CMP

CA. Expand the CMP 2 to 3 storey structure.

CB. Take the road, vehicle parking and station under or above the ground at the CMP.

CC. Take the railway and train station under or above the ground at the CMP.

D Proposals in the Relocation of the CMP

DA. Transfer the CMP to new site inside the city centre.

DB. Transfer the CMP to new site at the edge of the city.

DC. Convert the present CMP site to other land uses.

TABLE 9.2.1 (Contd.)

E Proposals in the No Development Planning Action in the CMP

None.

F Proposals in the Control of the CMP Using Pricing Techniques

FA. Increase the rent on stalls.

FB. Increase the toll on commercial vehicle station.

FC. Introduce tax on the use of hand carts in the CMP.

FD. Introduce tax on the use of private car parking at the CMP.

G Proposals in the Control of the CMP Through Development Control

GA. Introduce omnibuses to ply the bus routes passing through the retail market places in the city.

GB. Remove and prevent illegal extension of stalls and buildings in the vicinity of the CMP.

GC. Separate the access for commodities and facilities from the access for shoppers.

GD. Provide suitable cold storage facilities for fresh food commodities.

H Proposals in the Control of the CMP Through Urban Management

HA. Ensure proper use of activity spaces in the CMP.

HB. Ensure proper use of facilities, amenities and utilities in the CMP.

HC. Increase protection of life and property.

TABLE 9.2.1 (Contd.)

I Proposals in the Decentralization of the CMP

- IA. Repeat model of the CMP in small scale at the DMPs.
- IB. Repeat model of the CMP in small scale at the SMPs.
- IC. Repeat model of the CMP in small scale at the L/NMPs.

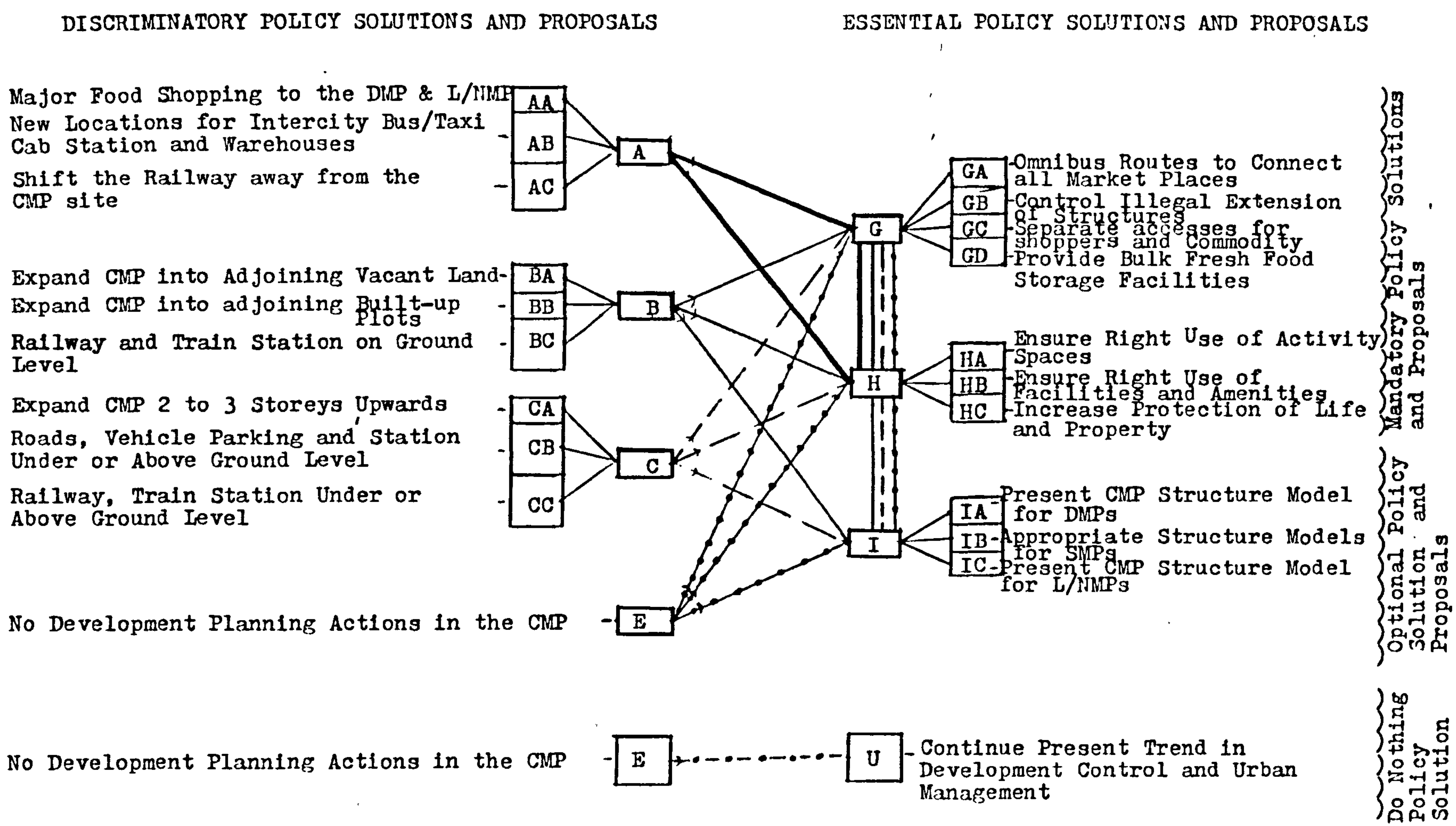


Figure 9.2.1: The Scope of the Four Alternative Strategies and of the Trend Strategy.

(To be read in conjunction with Table 9.2.1, page 463-465)

Notes:

Alternative Strategy SG1
Alternative Strategy SG2
Alternative Strategy SG3
Alternative Strategy SG4
Trend Strategy SG5

TABLE 9.2.2: Proposal in Alternative Planning Strategy;SG1

Ref. Index	Proposal
AA	Major food shopping to the DMPs and L/NMPs.
AB	New locations for intercity bus/taxi cab station, warehouses and wholesale shops.
AC	Shift the railway away from the CMP site.
GA	All market places to be fully integrated in omnibus route circuit.
GB	Control illegal extension of structures in and around the market place.
GC	Separate accesses for the shoppers and commodity.
GD	Provide bulk fresh food storage facilities in the market places.
HA	Ensure right use of activity spaces in the market place.
HB	Ensure right use of facilities and amenities in the market place.
HC	Increase protection of life and property in the market place.

TABLE 9.2.3: Proposals in Alternative Planning Strategy;SG2

Ref. Index	Proposal
BA	Expand the CMP horizontally on the ground level into adjoining vacant land.
BB	Expand the CMP horizontally on the ground level into adjoining built-up plots.
BC	Introduce intracity trains with existing railway and train station on ground level at all the market places affected.
GA	All market places to be fully integrated in the omnibus route circuit.
GB	Control illegal extension of structures in and around the market place.
GC	Separate accesses for the shoppers and commodity.
GD	Provide bulk fresh food storage facilities in the market places.

TABLE 9.2.3 (Contd.)

HA	Ensure right use of activity spaces in the market places.
HB	Ensure right use of facilities and amenities in the market places.
HC	Increase protection of life and property in the market places.
IA	Construct present standard of CMP type of structures for the DMPs.
IB	Construct present standard of CMP type of structures for thw SMPs.
IC	Construct present standard of CMP type of structure for the L/NMPs.

TABLE 9.2.4: Proposals in Alternative Planning Strategy; SG3

Ref. Index	Proposal
CA	Expand the CMP 2 to 3 storeys vertically upwards.
CB	Roads, vehicle parking and station on and above ground level.
CC	Railway, train station under or above ground level.
GA	All market places to be fully integrated in the omnibus route circuit.
GB	Control illegal extension of structures in and around the market places.
GC	Separate accesses for the shoppers and commodity.
GD	Provide bulk fresh food storage facilities in the market places.
HA	Ensure right use of activity spaces in the market places.
HB	Ensure right use of facilities and amenities in the market places.
HC	Increase protection of life and property in the market places.
IA	Construct present standard of CMP type structure for the DMPs.
IB	Construct present standard of CMP type structure for the SMPs.
IC	Construct present standard of CMP type structure for the L/NMPs.

TABLE 9.2.5: Proposals in Alternative Planning Strategy;SG4

E	No development planning action in the CMP.
GA	All market places to be fully integrated in the omnibus route circuit.
GB	Control illegal extension of structures in and around the market places.
GC	Separate accesses for the shoppers and commodity.
GD	Provide bulk fresh food storage facilities in the market places.
HA	Ensure right use of activity spaces in the market places.
HB	Ensure right use of facilities and amenities in the market places.
HC	Increase protection of life and property in the market places.
IA	Construct present CMP type of structures for the DMPs.
IB	Construct present standard of CMP type of structure for the SMPs.
IC	Construct present standard of CMP type of structure for the L/NMPs.

Table 9·2·6: Trend Strategy; SG5

Trend strategy is the policy stance which would permit existing physical, demographic, geographic and socio-economic trends to determine the growth rates of demand and supply of activity spaces in the city's retail market places:

E No development planning action in the CMP.

U Continue existing practices of development control and urban management.

9.3 Selection of the Recommended Strategy

The recommended strategy was selected in 4 steps. Firstly, the efficiency scores of the alternative strategies on the general objectives of the 12 market places were derived. Derived also in the second step were the efficiency scores of the alternatives on the particular objectives of the CMP. In the third step the alternatives were assessed on their capacity to achieve balanced demand and supply of activity spaces in the urban market places. In each of the three steps the alternatives were ranked 1 to 4, 1 being the most efficient and 4 the least efficient. On the 4th step the average rank of each alternative was calculated; the lower the average rank, the better the efficiency performance of the alternative. Accordingly the alternative with lowest average was adopted as the recommended planning strategy and the second was reserved as the alternative plan.

9.3.1 Locational and Structural Potentials Objective-Achievement Matrix

The relevant set of objectives, the development planning proposals and the consequential locational and structural potentials in the market places, together with their administrative district of the city, were composed into "the locational and structural potentials objective-achievement matrix" shown in Figure 9.3.1, page 471 . The 21 development proposals are shown grouped into policy units, A, B, C, E, G, H, I and U; this grouping has been detailed in section 9.2 above. The matrix shows the eight general objectives of the 12 market

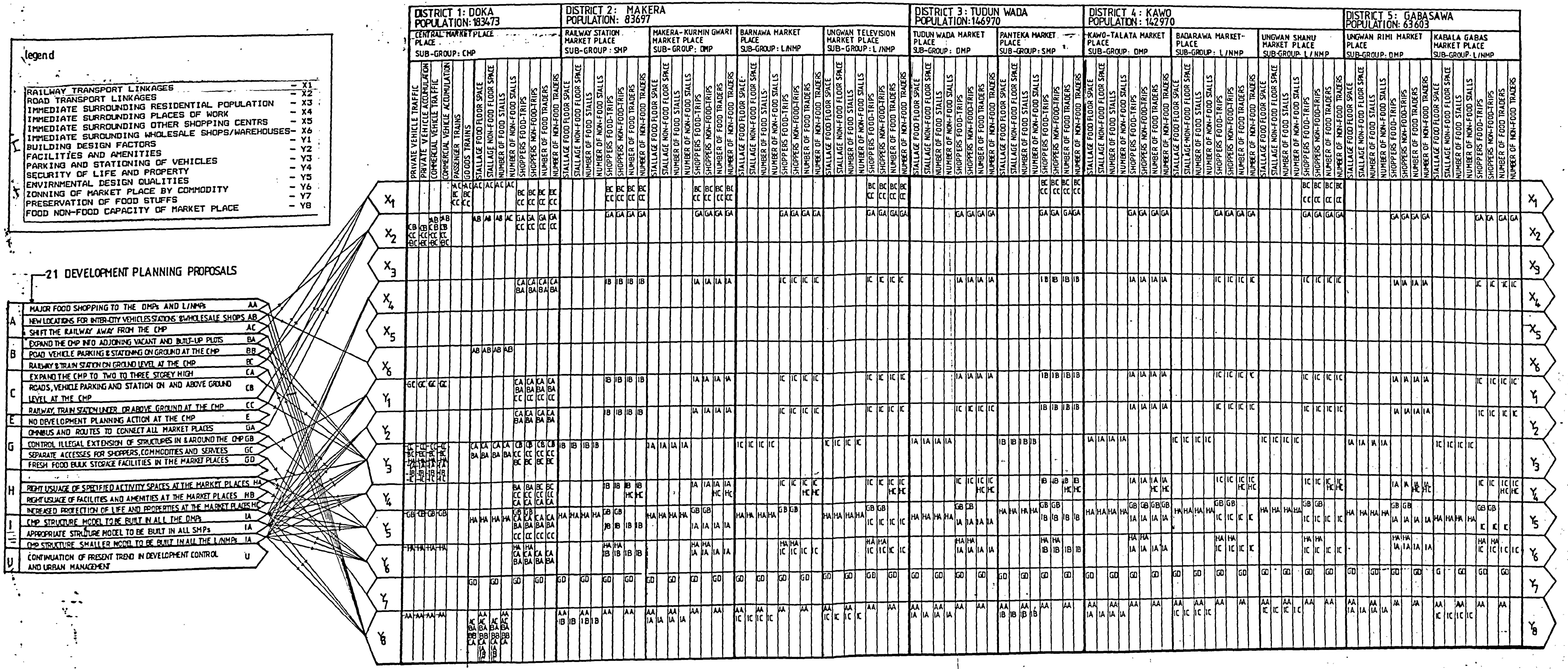


Figure 9.3.1: PROPOSED LOCATIONAL AND STRUCTURAL POTENTIAL OBJECTIVES-ACHIEVEMENT MATRIX.

places and the 6 particular objectives of the CMP, which have been described in section 9.1 above. The matrix also shows the market places lodged in their respective five districts of the city to facilitate equity consideration.

A development planning proposal could be incidental in more than one locational or structural potential, as a proposal could increase the importance of one locational or structural potential in one market place whilst at the same time decreasing the importance of other locational or structural potentials in other market places. Thus, in order to measure the real effect of a proposal on the city's retail market places, it is necessary to weigh-up and aggregate the various advantages and disadvantages the proposals might bring about if implemented. That would aid the decision-takers in their job of weighing-up the various advantages and disadvantages of each proposal and of determining the optimality criteria. That is why a proposal is not rigidly fixed inside a single locational or structural potential, but it is rather placed in a position where it is possible to trace its incidence in any locational or structural potential (where it applies), across the objectives of all the 12 retail market places in Kaduna city.

The next step was to trace the 'direct' incidences of the proposals on the above listed objectives in the 12 Kaduna city market places, using the proposed locational and structural potentials goals-achievement matrix given in Figure 9.3.1, page 471.
Each proposal, one at a time, starting with proposal AA, is traced through each and all the 6 locational (X_1 - X_6) and all the 8 structural (Y_1 - Y_8) potentials

across each objective of the 12 market places in the five administrative districts of the city. Where a proposal has "incremental incidence" in a locational or structural potential on an objective in any market place, the symbol of the proposal (AA or AB, or AC .... or U) is indexed to indicate its "incremental incidence". Where a proposal has "decremental incidence" in a locational or structural potential on an objective in any market place, the symbol of the proposal (-AA or -AB or -AC and so on) is indexed with a negative sign before the symbol to indicate its "decremental incidence". Where a proposal has "no incidence" in a locational or structural potential on an objective in a market place, no symbol is indexed at all, i.e. a blank space represents no incidence by the proposals. After the incidences of all of the proposals have been traced through all the locational and structural potentials across all of the objectives in all of the market places and the incidences noted, the chart shown in Figure 9.3.1, page 471 is obtained.

The incidences belonging to each of the 4 alternative strategies were isolated in turn, in order to measure its 'promise' to achieve the objectives of the research, using the proposed locational and structural potentials model.

9.3.2 Preparation of the Locational and Structural Potential Data for the Alternative Strategies

The following five steps were adopted in the measurement of the levels of goals achievement predicted by each of the alternative strategies, SG1, SG2, SG3 and SG4. The data for the alternative SG3 are used in the illustrations in this section of the report. The data for the other alternatives are lodged in the Appendices 9.2.1(1-5), 9.2.2(1-5), 9.2.3(1-5), pages A159-A163, A164 -A168, A169 -A173, respectively.

Step 1. For each market place and in each locational and structural potential, the incidences of the relevant proposals were added up and shown as "incidence scores" of the proposals, e.g. Table 9.3.1 , page 475.

Step 2. For each market place and for each locational and structural potential, the incidence scores of the relevant proposals, i.e. the numerical scores in one cell in Table 9.3.1 , page 475 , are added up and multiplied by the highest interval level of measurement of the locational or structural potential shown in column 4 of the Calculation Scheme of locational and structural potential scores, Appendix 6.3.2, page A54 . The products obtained were called the "crude proposal scores" and are shown in Table 9.3.2 , page 476 . The highest interval level of measurement in the locational or structural potential was used because the proposals did not intend to offer any potential at a quality below what existed.

TABLE 9.3.1 : Alternative Strategy SG3 Incidence Scores

Locational (X) and Structural (Y) Potentials, and Interval Level	MARKET PLACES															
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/ Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
5 X_1			2CC	4CC	4CC	4CC		4CC		4CC			4CC		
9 X_2	-2CB -2CC	-2CB -2CC		4CC 4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA
4/1000 p X_3															
7 X_4				4CB	4IB	5IA	4IC	4IC	5IA	4IB	5IA	4IC	4IC	5IC	4IC
5 X_5															
4 X_6															
10 Y_1	-2GC	-2GC		4CA 4CC	4IB	6IA	4IC	4IC	6IA	4IB	6IA	4IC	4IC	6IA	4IC
6 Y_2				4CA	4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC
$1/1000m^2$ Y_3	-2CC -2HA -2IA -2IB -2IC -2CB	-2CC -2HA -2IA -2IB -2IC -2CB		4CB 4CC 4CA	4IB	4IA	4IC	4IC	4IA	4IB	4IA	4IC	4IC	4IA	4IC
5 Y_4				4CB 4CA 4CC	2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IA	2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IA	2HC 4IC
6 Y_5	-2GB	-2GB		4CB 4CC 2GB 4HA 4CA	2CB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IC
10 Y_6	-2HA	-2HA		2HA 4CA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IC
10 Y_7				4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD
* Y_8				4CA	4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC

TABLE 9.3.2 : Alternative Strategy SG3 Crude Proposal Score

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			10	20	20	20		20		20			20		
X_2	-36	-36		72	36	36	36	36	36	36	36	36	36	36	36
X_3															
X_4				28	28	35	28	28	35	28	35	28	28	35	28
X_5															
X_6															
Y_1	-20	-20		80	40	60	40	40	60	40	60	40	40	60	40
Y_2				24	24	48	24	24	48	24	48	24	24	48	24
Y_3	-12	-12		12	4	4	4	4	4	4	4	4	4	4	4
Y_4				60	30	50	30	30	50	30	50	30	30	50	30
Y_5	-12	-12		108	60	60	60	60	60	60	60	60	60	60	60
Y_6	-20	-20		60	60	70	60	60	70	60	60	60	60	70	60
Y_7				40	40	40	40	40	40	40	40	40	40	40	40
Y_8				143	7	148	9	20	115	11	120	19	5	29	3

TABLE 9.3.3 : Alternative Strategy SG3 Crude Prescription Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES															
	Doka District				Makera District					Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place															
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			10	24	45	24	2	24	2	24	2	2	24	1	1
X_2	-36	-36		132	73	67	58	53	83	65	64	53	70	59	53
X_3				350	89	101	77	50	174	242	90	48	91	49	64
X_4				42	43	39	35	28	37	36	39	28	28	39	28
X_5				26	12	10	0	0	15	6	0	0	0	0	0
X_6				15	6	14	4	6	0	17	6	0	7	3	3
Y_1	-20	-20		120	60	80	60	60	80	60	80	60	60	80	60
Y_2				584	24	48	24	24	270	122	84	24	24	84	60
Y_3	-12	-12		188	65	4	4	4	62	4	53	4	4	4	4
Y_4				140	55	85	55	45	85	60	90	45	50	95	65
Y_5	-12	-12		218	95	135	105	95	145	95	140	100	95	140	95
Y_6	-20	-20		140	90	120	90	80	120	120	120	90	80	120	90
Y_7				51	49	54	54	52	54	56	56	54	52	56	54
Y_8				511	69	296	102	87	230	96	241	87	63	118	44

TABLE 9.3.4 : Transformed, Standardized and Weighted Locational Potential Scores Prescribed by the Alternative SG3

Name of Market Place	Railway Transport Linkages	Road Transport Linkages	Immediate Surrounding Residential Population	Immediate Surrounding Places of Work	Immediate Surrounding Other Shopping Centres	Immediate Surrounding Wholesale Shops and Warehouses
	X_1^2	X_2^2	X_3^2	X_4^2	X_5^2	X_6^2
CMP	.00	75.13	26.54	24.60	68.01	34.38
RSMP	.00	.68	-3.70	28.81	5.37	-8.96
PMP	.00	-6.12	9.67	1.44	-7.35	49.06
M-KOMP	.00	-4.49	-3.09	12.58	.19	27.73
TWMP	.00	10.28	2.20	5.06	14.90	-17.22
K-TMP	.00	-6.91	-3.65	12.58	-11.59	-8.96
URMP	.00	-10.70	-5.15	12.58	-11.59	-15.15
BMP	.00	-11.42	-4.22	-2.07	-11.59	-13.55
UTMP	.00	-14.83	-5.13	-23.89	-11.59	-8.96
BDMP	.00	-14.83	-5.18	-23.89	-11.59	-17.22
USMP	.00	-1.96	-3.60	-23.89	-11.59	-5.98
KOMP	.00	-14.83	-4.70	-23.89	-11.59	-15.15
	X_1^3	X_2^3	X_3^3	X_4^3	X_5^3	X_6^3
CMP	.00	77.08	28.22	25.81	71.77	32.50
RSMP	.00	-2.14	-3.66	30.90	-1.21	-10.94
PMP	.00	-6.88	6.52	.03	-8.18	53.65
M-KOMP	.00	-5.80	-3.42	11.93	-4.57	23.82
TWMP	.00	5.43	-0.21	3.78	6.37	-13.91
K-TMP	.00	-7.40	-3.65	11.93	-9.17	-10.94
URMP	.00	-9.76	-4.11	11.93	-9.17	-13.54
BMP	.00	-10.18	-3.85	-3.53	-9.17	-13.03
UTMP	.00	-12.10	-4.10	-23.19	-9.17	-10.94
BDMP	.00	-12.10	-4.11	-23.19	-9.17	-13.91
USMP	.00	-4.05	-3.63	-23.19	-9.17	-9.20
KOMP	.00	-12.10	-4.00	-23.19	-9.17	-13.54

TABLE 9.3.5: Transformed, Standardized and Weighted Structural Potential Scores Prescribed by the Alternative SG3

Name of Market Place	Building Design Factors	Facilities and Amenities	Parking and Stationing for Vehicles	Security of Life and Property	Environmental Design Qualities	Zoning of Market Place by Commodity	Freshness of Food Commodity	Food and Non-Food Capacity
	Y_1^2	Y_2^2	Y_3^2	Y_4^2	Y_5^2	Y_6^2	Y_7^2	Y_8^2
CMP	28.66	7.14	18.80	32.63	52.55	24.83	-17.03	69.55
RSMP	-5.86	-0.87	.22	-7.04	-11.65	-9.99	-29.85	-12.29
PMP	-5.86	-0.54	-2.30	-5.66	-11.65	9.09	17.28	-10.87
M-KOMP	3.09	-0.83	-2.30	3.01	3.69	9.09	3.17	14.16
TWMP	3.09	.83	-0.01	3.01	8.36	9.09	3.17	3.08
K-TMP	3.09	-0.72	-0.63	5.11	5.99	9.09	17.28	4.73
URMP	3.09	-0.72	-2.30	7.32	5.99	9.09	17.28	-9.36
BMP	-5.86	-0.87	-2.30	-7.04	-8.31	-9.99	3.17	-10.49
UTMP	-5.86	-0.87	-2.30	-9.43	-11.65	-15.14	-10.42	-11.39
BDMP	-5.86	-0.87	-2.30	-9.43	-10.02	-9.99	3.17	-11.39
USMP	-5.86	-0.87	-2.30	-8.30	-11.65	-15.14	-10.42	-12.54
KOMP	-5.86	-0.80	-2.30	-4.17	-11.65	-9.99	3.17	-13.19
	Y_1^3	Y_2^3	Y_3^3	Y_4^3	Y_5^3	Y_6^3	Y_7^3	Y_8^3
CMP	29.96	7.27	19.03	35.14	55.40	27.08	-17.08	73.21
RSMP	-5.23	-0.74	-1.05	-6.28	-10.05	-10.11	-29.19	-9.72
PMP	-5.23	-0.67	-1.92	-5.49	-10.05	8.32	17.61	-9.37
M-KOMP	1.66	-0.74	-1.92	.91	.99	8.32	2.95	6.24
TWMP	1.66	.05	-1.17	.91	5.04	8.32	2.95	-2.34
K-TMP	1.66	-0.72	-1.45	2.76	2.94	8.32	17.61	-1.20
URMP	1.66	-0.72	-1.92	4.82	2.94	8.32	17.61	-8.90
BMP	-5.23	-0.74	-1.92	-6.28	-7.98	-10.11	2.95	-9.26
UTMP	-5.23	-0.74	-1.92	-7.49	-10.05	-14.12	-10.66	-9.51
BDMP	-5.23	-0.74	-1.92	-7.49	-9.07	-10.11	2.95	-9.51
USMP	-5.23	-0.74	-1.92	-6.95	-10.05	-14.12	-10.66	-9.77
KOMP	-5.23	-0.74	-1.92	-4.55	-10.05	-10.11	2.95	-9.87

Step 3. For each market place the "crude proposal scores" of locational and structural potentials on the objectives were added up with the "crude physical scores" of the corresponding locational and structural potentials, shown in Tables 7.14(a) and 7.14(b), page 311, to obtain the "crude prescription scores" of the locational and structural potentials on the objectives in the market places, shown in Table 9.3.3 , page 477 . The "crude prescription scores" of the locational and structural potentials on the objectives in the market places were systematically coded on computer survey sheets.

Step 4. The "crude prescription scores" of the locational and structural potentials on the objectives in the market places were normalized to obtain the "prescription Zscores" of the locational and structural potentials on the objectives in the market places.

Step 5. Next the "prescription Zscores" were multiplied by the appropriate weights of the locational and structural potentials shown in the last row of Table 7.8, page 303 , to obtain the "weighted prescription scores" of the locational and structural potentials in the market places, see Tables 9.3.4-5 pages 478-9 . The weighted prescription scores of the locational and structural potentials are ready for application in the non-linear programmes of the proposed locational and structural potential model.

9.3.3 Application of the Non-Linear Programmes in the Measurement of Predicted Distribution of Demand and Supply of Activity Spaces

This section was devoted to the measurement of the achievement of optimal demand and supply of activity spaces in 11 Kaduna retail market places by the alternatives, SG1, SG2, SG3, SG4 and the trend SG5. Stage 5 of the proposed locational and structural potential model shown in Figure 9.3.2, page 482, was employed in the measurement of the general objective achievement scores. The non-linear programmes, eight in number, have been detailed in sections 7.3 (1- 4), pages 366-397 and are shown in Table 7.37, page 398.
The summary of the measurements of the general objective scores predicted by the alternative strategies are set out in the succeeding pages. Table 9.4 , page 486 , lists the measurements, and is followed by the application of the non-linear predictive equations in the measurement of the distribution of the optimal demand and supply of activity spaces predicted by the alternative strategies, SG1, SG2, SG3 and SG4. A principle outlined in the following six steps was adopted in the measurement of the general objectives-achievement of the alternatives.

(i) Predicted Growth Rate:

For each alternative strategy a set of weighted prescription scores of the locational and structural potentials in the market places had been developed. The relevant locational and structural potentials are programmed into the predictive equations 2.1a, 2.1b,

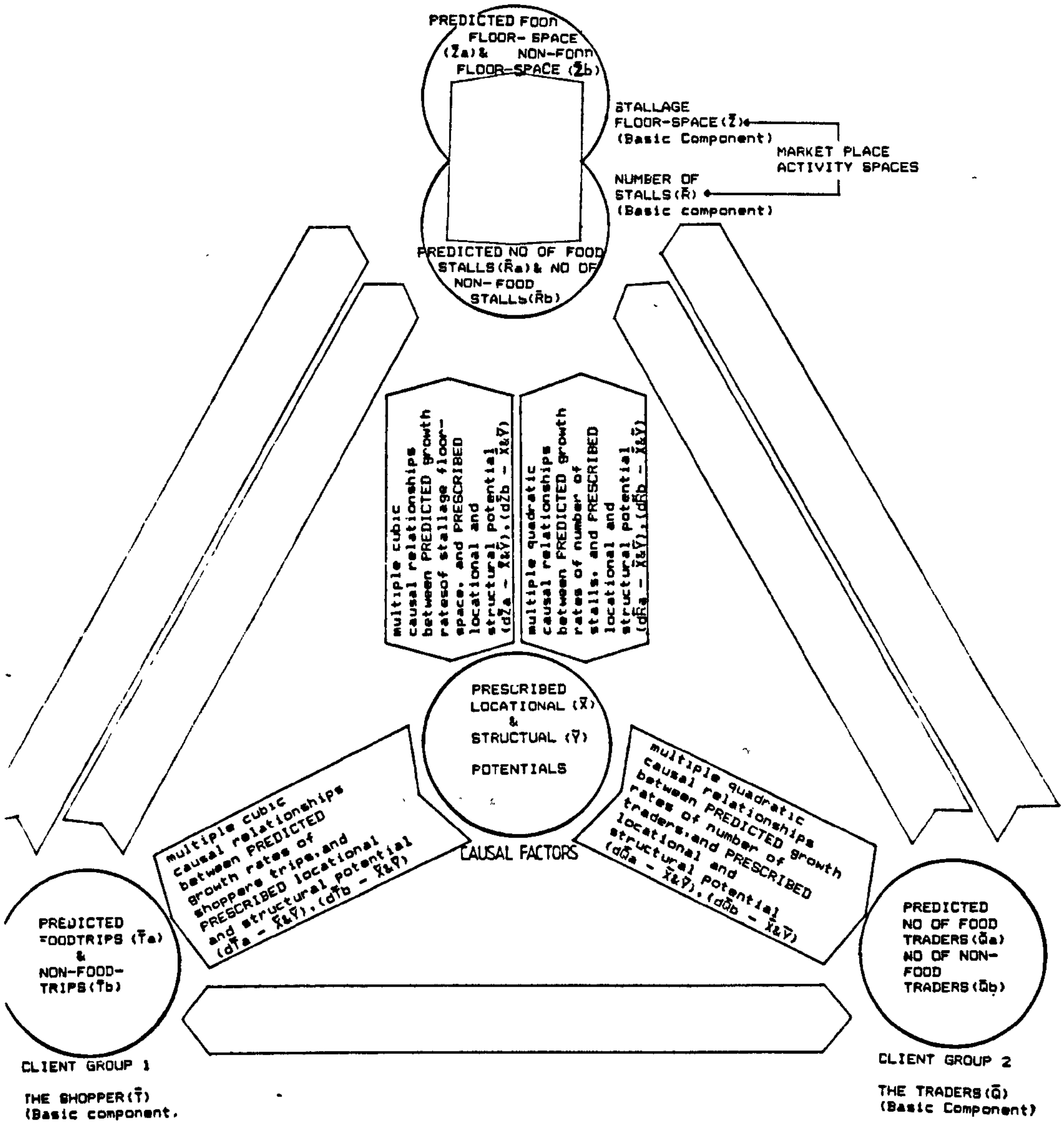


Figure 9.3.2 :PROPOSED LOCATIONAL AND STRUCTURAL POTENTIAL MODEL:-Stage 5

2. There is strong non-linear multiple causal relationship between the PREDICTED growth rate of any demand or supply of activity space, the PRESCRIBED locational and structural potentials.

2.2a, 2.2b, 2.3a, 2.3b, 2.4a and 2.4b, for the rates of growth of the general objectives, shown in page 450. The rates of change of the general objectives predicted by the alternatives was calculated on the VAX computer employing SPSSX. The rates of change predicted by the trend strategy described in page 442, were adopted as the reference strategy.

(ii) Predicted Distribution Scores:

The rates of change predicted by each alternative were applied on the base year, 1984, data to produce the forecast of the predicted distribution of optimal demand and supply of activity spaces for the target year 2005.

(iii) Predicted Distribution Level:

The above objective scores predicted by the alternatives were bare results of measurements in the appropriate units of quantities, e.g. square metres, number of stalls, or persons. Because they are unlike units, the objective achievement scores had no meaning outside the particular measurements to which they relate. The predicted scores had to be translated into predicted distribution level so that the results of the objective measurements may be combined. The predicted distribution level of an objective in each market place was obtained by calculating the predicted distribution scores as percentages of the total of that objective of all the market places in the city.

(iv) Efficiency Criterion:

The efficiency of an alternative on an objective achievement comprised:

(a) decrease of the predicted distribution level from that of the trend strategy in the case of the CMP;

(b) increase of the predicted distribution level over those of the trend strategy in the cases of the other market places (SMP, DMP, L/NMP).

This efficiency criterion was based on the confirmed performance situation in Kaduna city retail market place system. See pages 359 - 365.

(v) Performance Situation:

It was confirmed from the research findings in Chapter 7 that:

(a) the CMP suffered from congestion of shoppers trips and traders, whereas the other market places received too few shoppers trips and traders, see Table 7.3.2, page 364 .

(b) the "trend rate" of growth of the CMP is far in excess of those of the other market places, see Tables 9.1.3 and 9.1.4, pages 442 , and that if this trend would continue, the 1984 hierarchical relationships shown in Figures 7.7.1, page 353, and Figures A.7.2.1-5, p. A102 - A118 , would worsen to those projected for the trend strategy, SG5, shown in Figures 9.3.6.1-2, pages 509-511; and in Figure A.9.4.1-10, p. A 203 - A221 in the target year 2005.

(vi) Efficiency Score:

The efficiency score by an alternative strategy on an objective in a market place was obtained by subtracting the predicted distribution level of the trend strategy from that of the alternative strategy. Based on the stated efficiency criterion, negative value in the case of the CMP is treated as desirable efficiency score, whereas positive value is regarded as undesirable efficiency score. In the case of the other market places, the converse is true, i.e. positive value is desirable, whilst negative is undesirable efficiency score. The desirable and undesirable efficiency scores are added up separately. The total efficiency score by an alternative on an objective is the difference between the sums of the desirable and undesirable efficiency scores. Accordingly the efficiency score of the trend strategy, which constituted a reference situation, is zero. Based on values of the total efficiency scores on the objective achievement, the alternatives were ranked 1 to 4; 1 being the highest, and 4 the lowest.

The calculation of efficiency scores in this manner had the advantages of providing a frame of reference independent of the alternative strategies being evaluated, and the efficiency scores were not therefore wholly reliant upon the numbers or characters of the alternatives nor by the way in which the alternatives had been generated.

9.3.3.1 Measurement of the General Objective Achievement

The following Table 9.4 sets out the 8 general objectives

TABLE 9.4: The General Objectives of Optimisation of the Locational and Structural Potentials

Objective No.	General Objective Statement
2.1a	To achieve optimal demand by the shoppers food-trips.
2.1b	To achieve optimal demand by the shoppers non-food trips.
2.2a	To achieve optimal demand by the number of food traders.
2.2b	To achieve optimal demand by the number of non-food traders.
2.3a	To achieve optimal supply of the stallage food floor-space.
2.3b	To achieve optimal supply of the stallage non-food floor-space.
2.4a	To achieve optimal supply of the number of food stalls.
2.4b	To achieve optimal supply of the number of non-food stalls.

The measurement of the performance of the alternative strategies over and above the trend strategy, in achieving general objective 2.1a (shown above) is systematically presented in the succeeding pages, 487 to 492.

9.3.3.1 Objective 2.1a

To achieve optimal demand for activity spaces by the shoppers' food trips.

Predicted Growth Rate:

The predictive equation, 2.1a, of the rate of growth of the shoppers' food trips, dT_a, in the 12 Kaduna market places was established in page 388 of this thesis as:-

$$dT_a = 0.0115X_2^3 - 0.1575X_3^3 + 0.0102X_4^3 + 0.0844Y_6^3 + 0.0527Y_8^3 + 0.2652 \quad \ldots\ldots \quad (2.1a)$$

X_2 - Road transport linkages

X_3 - Immediate surrounding residential

X_4 - Immediate surrounding places of work

X_6 - Zoning of market place by commodity

Y_8 - Food and non-food capacity

This predictive equation was solved for dT_a on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives, SG1, SG2, SG3 and SG4, on the above listed locational and structural potentials in the market places. The growth rates of demands for activity spaces by the shoppers' food-trips predicted by the alternatives are shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
	%	%	%	%	%
CMP	104.32	113.40	112.78	52.27	267.57
RSMP	37.46	106.43	111.81	22.85	41.59
PMP	.00	.00	.00	.00	.
M-KQMP	113.96	155.34	155.81	148.39	40.45
TWMP	97.18	158.66	160.94	163.73	94.10
K-TMP	155.66	173.89	173.93	175.84	159.08
URMP	56.60	259.33	258.78	219.05	43.39
BMP	189.36	326.98	322.63	160.55	92.50
UTMP	.00	.00	.00	.00	.00
BDMP	53.90	338.34	327.77	244.62	43.89
USMP	44.12	313.74	305.24	202.36	23.05
KQMP	53.73	328.15	317.57	238.67	33.63

To this list was added the "trend growth rates" of demand of activity spaces by the shoppers' food-trips, predicted by the trend strategy, SG5. The trend strategy constituted the "reference strategy", that was required to be improved by the planning exercise. At 95% confidence level the equation predicted within ± 17.16% accuracy.

Predicted Distribution Score:

Forecasting with the above growth rates predicted by the alternatives, produced in the target year, 2005, the predicted distribution of the shoppers' food-trips is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	302317.0	206325.8	205569.2	113947.2	578650.4
RSMP	16942.45	34372.55	37318.12	11012.72	6086.98
PMP	102.82	61.60	61.91	93.63	.
M-KGMP	76237.99	77622.82	78444.24	108622.1	7089.95
TWMP	45334.79	61305.79	63254.67	98770.15	14215.82
K-TMP	219500.8	161667.3	162550.6	251030.4	75096.14
URMP	4617.02	33410.21	33425.69	35551.41	1165.21
BMP	13917.43	26787.27	26105.39	9251.77	1347.11
UTMP	.00	.00	.00	.00	.00
BDMP	2027.15	28059.24	26207.55	20726.45	544.63
USMP	2512.15	35609.82	33625.54	21125.43	514.12
KGMP	1531.42	19818.65	18478.09	14909.75	330.67
Total persons/hour	685041	685041	685041	685041	685041

Predicted Distribution Level:

The above predicted distribution of the shoppers food-trips, in each market place, was calculated as a percentage of the total shoppers' food trips, in the market places. The predicted percentage distribution of shoppers' food-trips, called "predicted distribution level" by the alternative strategies is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	44.13%	30.12%	30.01%	16.63%	84.47%
RSMP	2.47	5.02	5.45	1.61	.89
PMP	.02	.01	.01	.01	.
M-KGMP	11.13	11.33	11.45	15.86	1.03
TWMP	6.62	8.95	9.23	14.42	2.08
K-TMP	32.04	23.60	23.73	36.64	10.96
URMP	.67	4.88	4.88	5.19	.17
BMP	2.03	3.91	3.81	1.35	.20
UTMP	.00	.00	.00	.00	.00
BDMP	.30	4.10	3.83	3.03	.08
USMP	.37	5.20	4.91	3.08	.08
KGMP	.22	2.89	2.70	2.18	.05
Total	100.00	100.00	100.00	100:00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of the shoppers' food-trips from that of the trend strategy, in the case of the CMP.

2. Increase of predicted percentage distribution of the shoppers food-trips over those of the trend strategy, in the case of the other market places (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP attracted 267.6% of shoppers' food-trips today than it did 7 years ago, for the same designed space capacity. The additional stallage floor-space was cannibalized from the accessibility floor-spaces, which had consequently diminished by 28331 sq. m., lost to stallage floor-space.

2. The other market places (SMPs, DMPs, L/NMPs) are neglected by the city residents for food shopping, and people do not show estate interest in development of stalls in these other market places.

Efficiency Score:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-40.34	-54.35	-54.46	-67.84	.00
RSMP	1.58	4.13	4.56	.72	.00
PMP	.	.	.	.	.
M-KQMP	10.09	10.30	10.42	14.82	.00
TWMP	4.54	6.87	7.16	2.34	.00
K-TMP	21.08	12.64	12.77	5.68	.00
URMP	.50	4.71	4.71	5.02	.00
BMP	1.83	3.71	3.61	1.15	.00
UTMP	.00	.00	.00	.00	.00
BDMP	.22	4.02	3.75	2.95	.00
USMP	.29	5.12	4.83	3.01	.00
KQMP	.18	2.84	2.65	2.13	.00
Efficiency Score	80.67	108.7	108.92	105.66	.00
Rank	4	2	1	3	

The measurement of the performances of the alternative strategies over and above the trend strategy, in achieving the subsequent general objectives 2.1b, 2.2a, 2.2b, 2.3a, 2.3b, 2.4a and 2.4b (listed above) are systematically recorded in Appendices 9.3.1 to 9.3.7, pages A174 to A 201 . Their format is exactly similar to that of the general objective 2.1a.

The summary of the efficiency scores by the alternative strategies on the optimisation of the locational and structural potentials is shown in Table 9.5, page 492.

TABLE 9.5: Summary of Efficiency Scores by the Alternative Strategies on the General Objective of Optimisation of the Locational and Structural Potentials

Optimal Demand and Supply of Activity Spaces		Alternative Strategies				Trend Strategy
		SG1	SG2	SG3	SG4	SG5
The Shoppers Food-Trips	(T_a)	80.67	108.7	108.92	105.66	0
The Shoppers Non-Food-Trips	(T_b)	71.47	81.70	82.62	57.74	0
The Number of Food Traders	(Q_a)	105.42	109.60	97.92	153.72	0
The Number of Non-Food Traders	(Q_b)	41.86	129.46	92.66	96.84	0
The Stallage Food Floor-Space	(Z_a)	110.51	90.05	93.17	80.66	0
The Stallage Non-Food Floor-Space	(Z_b)	51.64	13.41	23.32	0.14	0
The Number of Food Stalls	(R_a)	62.7	122.04	92.26	118.14	0
The Number of Non-Food Stalls	(R_b)	35.98	58.30	69.85	81.72	0
Gross Efficiency Score		560.25	713.26	660.72	694.62	0
RANK		4	1	3	2	Reference

9.3.4 CMP Particular Objective Scores Achievable by the Alternative Strategies

The 6 particular objectives of the Kaduna city central market place are listed in Table 9.6, page 493.

The crude prescription scores on the 6 CMP particular objectives by the alternative, SG3, and SG1, SG2, SG4, were extracted from Tables 9.3.3 and Appendices 9.2.1.3, 9.2.2.3, 9.2.3.3, pages 477, and A161 , A166, A171 , respectively, and are shown in Table 9.7, page 494. The maximum score achievable on any CMP particular objective was 120 and those scores represented units of cars, buses, motor trucks and train coaches.

Because they were unlike units those crude prescriptions scores had to be translated into achievement levels so that the results of the objective achievement measurements might be combined. The achievement level on each CMP particular objective by an alternative was obtained by calculating the prescription score as a

TABLE 9.6: The Particular Objectives of the CMP

Objective No.	CMP Particular Objective Statement
3.1a	To achieve optimal demand for activity spaces by private vehicle traffic in the CMP
3.1b	To achieve optimal demand for activity spaces by private vehicle accumulation in the CMP
3.2a	To achieve optimal demand for activity spaces by commercial vehicle traffic in the CMP
3.2b	To achieve optimal demand for activity spaces by commercial vehicle accumulation in the CMP
3.3a	To achieve optimal demand for activity spaces by passenger trains
3.3b	To achieve optimal demand for activity spaces by goods trains

TABLE 9.7: Objective-Achievement Scores on the CMP Particular Objectives by the Alternative Strategies

STRATEGY	CMP Particular Objectives					
	Private Vehicle Traffic	Private Vehicle Accumulation	Commercial Vehicle Traffic	Commercial Vehicle Accumulation	Passenger Trains	Goods Train
SG1	74	74	92	92	10	10
SG2	78	78	78	78	10	10
SG3	100	100	100	100	10	10
SG4	60	60	60	60	-	-
Maximum Score	120	120	120	120	120	120

TABLE 9.8: Objective-Achievement Levels on the CMP Particular Objectives by the Alternative Strategies

STRATEGY	CMP Particular Objectives							
	Private Vehicle Traffic 3.1a	Private Vehicle Accumulation 3.1b	Commercial Vehicle Traffic 3.2a	Commercial Vehicle Accumulation 3.2b	Passenger Trains 3.3a	Goods Train 3.3b	Gross Efficiency Score	Rank
SG1	61.67	61.67	76.67	76.67	8.33	8.33	293.34	2
SG2	65	65	65	65	8.33	8.33	276.66	3
SG3	83.33	83.33	83.33	83.33	8.33	8.33	349.98	1
SG4	50	50	50	50	-	-	200	4
Maximum	100	100	100	100	100	100	600	Reference

percentage of the maximum score achievable on that objective, and was anything between 0 to 100, and is shown in Table 9.8 , page 495 .

The total efficiency score by an alternative was obtained by adding its achievement levels on the 6 CMP particular objectives. Based on the values of the total efficiency scores the alternatives were ranked 1 to 4; 1 being the most efficient, and 4 the least, see Table 9.8 , page 495 .

9.3.5 Balanced Demand and Supply of Activity Spaces in the Urban Market Places

The measurement is a combined index comprising

(i) the "improved hierarchical-continuum score" measured by the number of market places introduced into the gap between the CMP at upper extreme and the bunch of market places at the lower extreme.

(ii) the "improved slope of the regression score" measured by the probability of the regression of the predicted like-pair of demand and supply approaching the diagonal, i.e. having a slope value of 1.

9.3.5.1 Improved Hierarchical-Continuum Score

In section 7.2, pages 346 to 365 , the regression of like-pairs of demand and supply of activity spaces for food shopping, and non-food shopping, showed a big gap between the CMP on the one hand and the other market places on the other hand.

Therefore, the Kaduna city retail market place hierarchy was said to have formed an unbalanced "hierarchical-continuum" in their provision of shopping requirements of the city's residents. But rather that they fell into "two discrete hierarchies" with the CMP at the upper extreme and the other market places at the lower extreme. It was also shown that the gap between the CMP and the other market places would be further widened by the trend strategy. This would mean further congestion of people and vehicles in and around the CMP and further under-development and under-utilization of the potentials of the other market places.

The big gap between the CMP on the one hand and the other market places on the other hand, in the provision of non-food shopping requirements, can be explained in that the majority of non-food commodities, especially durable, prestigious and specialised services required a large minimum number of buyers to keep such traders in business. Therefore, a very large portion of a city's non-food shopping requirements are met at the CMP.

But for food shopping the CMP should provide adequately for the everyday needs of people living or working within the central district. It should provide sufficiently to accommodate demand for food resulting from combined shopping by the residents living in the remote districts, and migrant custom from outside the city region.

The above argument suggests that the space between the CMP and the other market places, in the case of food-pair of activity spaces, is expected to be smaller than that, in the case of corresponding non-food-pair of stallage spaces. But this was not the case, as shown in Figures 7.7.1 and A7.2.1-5 page 353 and A 103 to A 112

The above performance situation imply that Kaduna city retail market places operate as a two-tier hierarchy; with the CMP serving as the main city's retail market place and the others (SMP, DMP and L/NMP) serving as neighbourhood market places, and that the city now needs some form of secondary market places.

Experience from the developed countries of Europe and America confirms that the need for secondary city centres was felt when the suburbs began to spread beyond a mile from the main shopping centre. Since every house needed not to be outside a mile of either a main shopping centre or a secondary shopping centre, it became necessary to meet this requirement when the old city's diameters began to extend beyond 2 miles. However, this principle was determined primarily by walking distance of one mile.

In the new towns growth proceeded by planned development of successive neighbourhoods within predetermined boundary rather than by outward expansion. Here no secondary centres were needed unless the ultimate population of the town was to be more than 100,000. The main centre could, with advantage, serve the whole town for all purposes - apart from the everyday needs of housewives living in the outer neighbourhood - provided its designers made the most of the opportunities for good planning afforded by a virgin site.

In the light of high rate of car ownership, motorized shoppers could choose where to shop within the city-region irrespective of their locations. The governing principle this time was which centre offered most to the shoppers. Where the main centre did, shoppers had to go there, until it became congested, difficult of access and deficient in short-period parking accommodation. Where these conditions persisted in the face of a rapid increase in car ownership, pressure for the development of large-scale "out-of-town" shopping centre soon became irresistible.

From all of the above points of view, the performance situation in Kaduna city retail market place hierarchy required planned introduction of secondary retail market places which would provide "hierarchical continuum" by stemming the big gap between the CMP and the other market places. It was concluded that the prediction by an alternative to stem the big gap between the CMP and the other market places was termed the "improved hierarchical-continuum score".

Accordingly, the improved hierarchical-continuum score by an alternative was estimated by the number of market places it has introduced into the gap between the CMP at the upper extreme and the neighbourhood market places at the lower extreme. A score of 1 is awarded for each market place introduced into that gap by an alternative strategy.

9.3.5.2 Improved Slope of the Regression Score

The quantity of demands for activity spaces by the client groups which a market place attracts to itself is termed the "marketing demand", whilst the supply of activity spaces to cope with the demands is termed the "marketing supply". Conceptually, in a market place a "certain marketing demand" has to be adequately matched by a "certain marketing supply", in order to achieve a "balanced utilitarian value" of the market place. Urban market places, usually in mutual competition in the struggle to achieve and/or retain (their) balanced utilitarian values, fall into a "hierarchical continuum". The hierarchical-continuum is exemplified in the linear programmes, 1a and 1b, (page 347), of the proposed locational and structural potential model. For the predicted values of demand and supply of activity spaces, the linear programmes 1a and 1b are rewritten in the generic form as:

$$\bar{D}_{a_1} = \bar{\alpha}\bar{D}_{a_2} + \bar{C}_a \quad \ldots\ldots\ldots\ldots\ (1a.\ pred.)$$

$$\bar{D}_{b_1} = \bar{\beta}\bar{D}_{b_2} + \bar{C}_b \quad \ldots\ldots\ldots\ldots\ (1b.\ pred.)$$

'a' and 'b' are notations to indicate:
(i) 'a' for food shopping
(ii) 'b' for non-food shopping

'a' and 'b' are treated as parts of the preceding letters, that is

$\bar{D}_{a_1}$ and $\bar{D}_{a_2}$ are a pair of predicted demand and supply of activity spaces, for food shopping, and are called 'predicted food like-pair';

$\bar{D}_{b_1}$ and $\bar{D}_{b_2}$ are a pair of predicted demand and supply of activity spaces, for non-food shopping, and are called 'predicted non-food like-pair'.

$\bar{D}_{a_1}$ and $\bar{D}_{a_2}$ may be substituted with any pair of the following:

1.1a	Predicted Shoppers Food-trips	$\bar{T}_a$
1.2a	Predicted number of food traders	$\bar{Q}_a$
1.3a	Predicted stallage food floor-space	$\bar{Z}_a$
1.4a	Predicted number of food stalls	$\bar{R}_a$

The substitutions produced 6 linear equations.

$\bar{D}_{b_1}$ and $\bar{D}_{b_2}$ may be substituted with any pair of the following:

1.1b	Predicted shoppers non-food-trips	$\bar{T}_b$
1.2b	Predicted number of non-food traders	$\bar{Q}_b$
1.3b	Predicted stallage non-food floor-space	$\bar{Z}_b$
1.4b	Predicted number of non-food stalls	$\bar{R}_b$

The substitutions produced 6 linear equations.

$\bar{\alpha}$ and $\bar{C}_a$ are the slope and constant of the hierarchical equation for food shopping.

$\bar{\beta}$ and $\bar{C}_b$ are the slope and constant of the hierarchical equation, for non-food shopping.

Each of the above 12 predicted linear programmes produced a scatterplot, each plot representing a market place. The area under a plot implies the size of its utilitarian value relative to those of the other market places contained in the same scatterplot.

The area under a plot is obtained by projecting it vertically and horizontally to the axes of the scatterplots. The area of the rectangle bounded by the two projected lines and the horizontal and vertical axes passing through the origin determine the size of the area under the plot. The utilitarian values, (the areas under the plots) of two retail market places, A and B, are illustrated in Figure 9.3.3, page 503.

Ideally a market place would attain balanced utilitarian value in respect of any like-pair (food and non-food) of demand and supply of activity spaces, if the rectangle under the plot is a square, i.e. if it lies on the diagonal of the scatterplot produced by the like-pair. In a situation where all the market places lie on the diagonal of the plot, the slope of the regression equation would be 1. This would be a situation of "perfectly balanced utilitarian values" in respect of the like-pair of demand and supply activity spaces. Therefore, as a system of market places approaches the situation of perfectly balanced utilitarian values in respect of any like-pair (food and non-food shopping) of demand and supply of activity spaces;

$$\bar{\alpha} \longrightarrow 1 \quad \text{and} \quad \bar{\beta} \longrightarrow 1$$

Where $\bar{\alpha}$ and $\bar{\beta}$ are the coefficients, when the predicted values of demand and supply of activity spaces in the target year are applied to the generic hierarchical equations, 1a and 1b, page 347. Therefore, as a

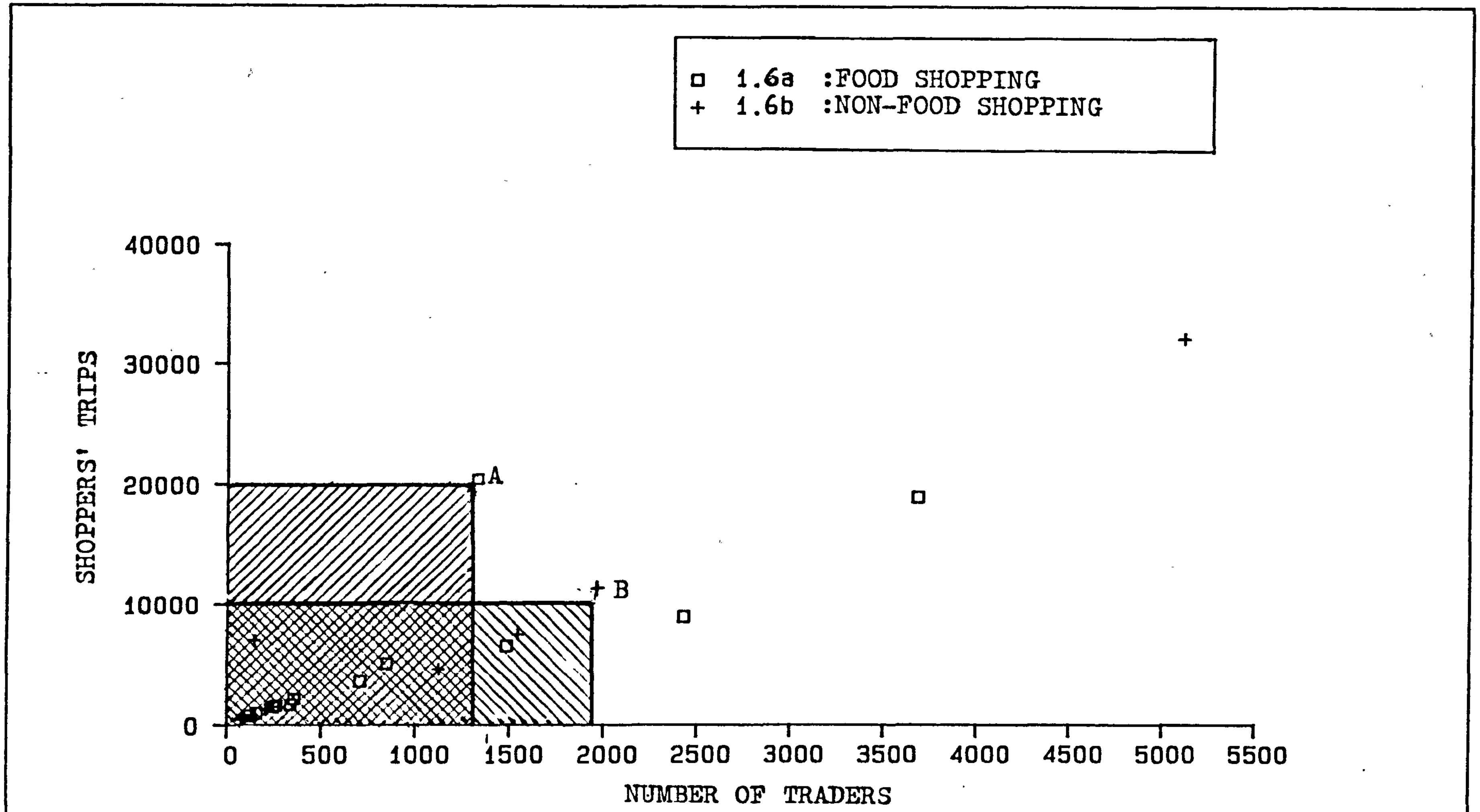


Fig. 9.3.3	THE AREAS UNDER THE PLOTS OF TWO MARKET PLACES A AND B IN THE HIERARCHICAL RELATIONSHIPS BETWEEN SHOPPERS' TRIPS AND NUMBER OF TRADERS

system of urban market places tends to a situation of perfectly balanced utilitarian values of the predicted demand and supply of activity spaces, the improved slope of regression is measured by:

for food shopping,

$$V_a = \frac{1}{(1-\bar{\alpha})} \quad ; \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 9.3a;$$

for non-food shopping,

$$V_b = \frac{1}{(1-\bar{\beta})} \quad . \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 9.3b.$$

Hence the "improved slope of regression score" achieved by an alternative over and above that of the trend strategy in the target year is measured by:

for food shopping,

$$\bar{V}_a = \frac{1}{(1-\bar{\alpha})} - \frac{1}{(1-\hat{\alpha})}$$

$$\therefore \quad \bar{V}_a = \frac{\bar{\alpha} - \hat{\alpha}}{(1-\bar{\alpha})(1-\hat{\alpha})} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3.a);$$

for non-food shopping,

$$\bar{V}_b = \frac{1}{(1-\bar{\beta})} - \frac{1}{(1-\hat{\beta})}$$

$$\therefore \quad \bar{V}_b = \frac{\bar{\beta} - \hat{\beta}}{(1-\bar{\beta})(1-\hat{\beta})} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3.b).$$

where $\hat{\alpha}$ and $\hat{\beta}$ are the slopes when the values of the demand and supply of activity spaces predicted by the trend strategy in the target year are applied to the generic equations 1a and 1b, page 347;

where $\bar{\alpha}$ and $\bar{\beta}$ are the slopes when the values of the demand and supply of activity spaces predicted by an alternative strategy in the target year are applied to the generic equations 1a and 1b, page 347.

The numerical values of $\bar{V}_a$ and $\bar{V}_b$ are adopted irrespective of the sign, which could be either positive or negative.

The improvement on the unbalanced hierarchical continuum in the relationship between any like-pair of demand and supply of activity spaces achieved by an alternative strategy is estimated by a combined index. The first part of the estimate is the "improved hierarchical-continuum score", measured by the number of market places the alternative has introduced into the gap between the CMP at the upper extreme and the bunch of the other market places at the lower extreme. The second part is the "improved slope of regression score" derived as shown above from the slopes of the hierarchical equations of the predicted like-pairs (for food and non-food shopping) of demand and supply of activity spaces in the target year.

The achieved efficiency score for balanced demand and supply of activity spaces by an alternative strategy, is given by the product of the improved hierarchical continuum score and the improved slope of regression score.

9.3.6 Application of the Linear Programmes of the Model to Test the Alternative Strategies for Achievement of Balanced Demand and Supply of Activity Spaces

The linear equations (1a. pred) and (1b. pred), page 500, were solved for the coefficients, $\bar{\alpha}$, and $\bar{\beta}$ and $\hat{\alpha}$ and $\hat{\beta}$ on the VAX computer employing the SPSSX package, using, in turn, the values of the food-pairs and non-food-pairs of demand and supply of activity spaces predicted by the alternatives, SG1, SG2, SG3 and SG4, and by the trend strategy, SG5, in the target year, 2005.

Also the SPSSX package was employed on the VAX computer to produce multi-scatterplots, using, in turn, the values of the food-pairs and non-food-pairs of demand and supply of activity spaces predicted by the strategies, SG1, SG2, SG3, SG4 and SG5, for the target year, 2005. The multi-scatterplots enabled the estimation of the number of market places introduced into the gap between the CMP at the upper extreme and the other bunch of market places at the lower extreme.

Those two measurements provide the combined index of the test of balanced demand and supply of activity spaces achieved by the alternatives. The summary of these tests is presented in the succeeding pages. Table 9.9, page 512, lists the objectives, and is followed by the application of the linear programmes of the model, stage 6, in the measurements (Figure 9.3.4, page 507).

The measurement of the performance of the alternative strategies over and above the trend strategy, in achieving improved balanced demand and supply of activity spaces in the relationship between the predicted pair 1.1a and 1.1b (shown in Table 9.9), are systematically presented in pages 508 - 511.

The measurement of the performances of the alternatives over and above the trend strategy, in achieving the improved balanced demand and supply of activity spaces in the subsequent hierarchical relationships, 1.2a, 1.2b, 1.3a, 1.3b, 1.4a, 1.4b, 1.5a, 1.5b, 1.6a and 1.6b (listed in Table 9.3.10, page 462) are systematically presented in Appendices 9.4.1 - 9.4.10, pages A202-A221. Their format is exactly similar to those of 1.1a and 1.1b, which are detailed in the succeeding pages.

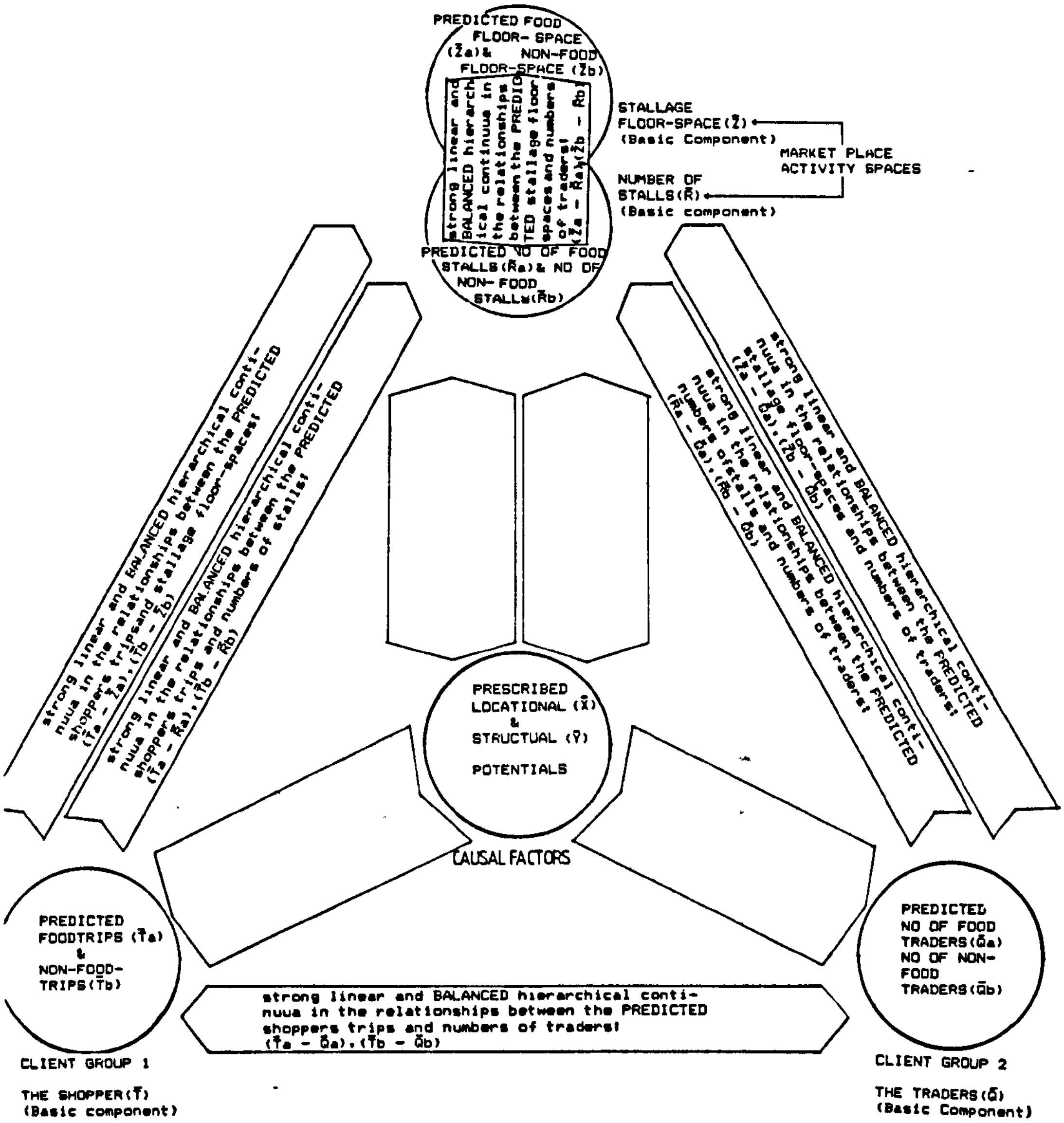


Figure 9.3.4 :PROPOSED LOCATIONAL AND STRUCTURAL POTENTIAL MODEL:-Stage 6

1a. There is strong linear and BALANCED hierarchical continuum in the relationship detween any PREDICTED pair of demand and supply of activity spaces.for food shopping.

1b. There is strong linear and BALANCED hierarchical continuum in the relationship detween any PREDICTED pair of demand and supply of activity spaces.for non-food shopping.

Note : Arrow indicates direction of Influence.

9.3 6.1 Objective 1.1a

To test predicted balanced demand and supply between the shoppers food-trips and the stallage food floor-space; $(\bar{T}a - \bar{Z}a)$

Measurement:

The scatterplots produced by the relationships between the shoppers food-trips and the stallage food floor-space predicted by the alternatives SG1, SG2, SG3 and SG4 were superimposed on that predicted by the trend strategy, SG5. The five graphs are shown in Figure 9.3.6.1, page 509 . The summary statistics and the numerical-continuua are presented in Table 9.3.6.1, page 509 .

Balancing Statistics:

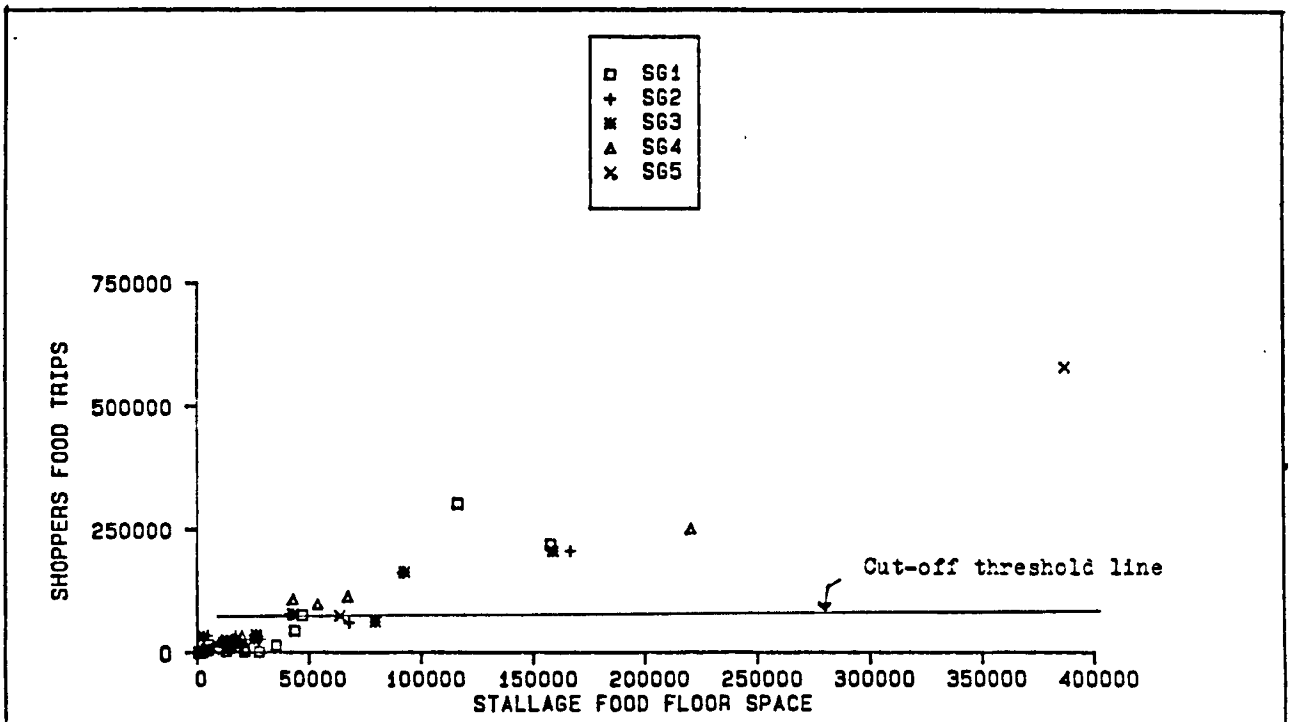
	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	2	2	3	4	1
Slope of regression	1.8747	1.2314	1.2465	1.1503	1.5015

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	3	4	1
Slope Score	-.8508	2.3275	2.0628	4.6594	0
Efficiency Score	-1.7016	4.655	6.1884	18.6376	0
Rank	4	3	2	1	

Figure/Table 9.3.6.1:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shoppers Food-trips and the Stallage Food Floor-space; Predicted by the Alternative and Trend Strategies in the Target Year 2005.



ACHIEVED HIERARCHICAL RELATIONSHIP BETWEEN FOODTRIP AND FOOD FLOOR-SPACE

Figure 9.3.6.1: Multi-Scatterplots.

TABLE 9.3.6.1 : Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.9106	.9458	.9363	.9505	.9999
R Square	.8292	.8945	.8767	.9035	.9989
Signif F	.0001	.0001	.0000	.0000	.0000
SE of EST	44693.6	22098.6	23968.1	25329.7	6502.5
Ca	-18536.3	9125.6	8017.6	13096.2	-4619.3
$\bar{\alpha}/\hat{\alpha}$	1.8747	1.2314	1.2465	1.1503	1.5015
N-Continuum	2	2	3	4	1

- i.e. no. of market places above the cut-off threshold line

9.3.6.2 Objective 1.1b

To achieve balanced demand and supply between the shoppers non-food-trips and the stallage non-food floor-space; $(\bar{T}b - \bar{Z}b)$

Measurement:

The scatterplots produced by the relationships between the shoppers non-food-trips and the stallage non-food floorspace predicted by the alternatives SG1, SG2, SG3 and SG4 were superimposed on that predicted by the trend strategy, SG5. The five graphs are shown in Fig. 9.3.6.2, page 511 . The summary statistics and the numerical-continuua are presented in Table 9.3.6.1, page 511 .

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of Market Places Introduced	4	3	3	3	1
Slope of regression	4.0079	3.1122	3.6299	3.8421	4.9239

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	4	3	3	3	1
Slope Score	.0076	.2186	.1254	.097	0
Efficiency Score	.3104	.6558	.3762	.291	0
Rank	3	1	2	4	

Figure/Table 9.3.6.2:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shopper's Non-Food-Trips and the Stallage Non-food Floor-space, Predicted by the Alternative and Trend Strategies in the Target Year 2005.

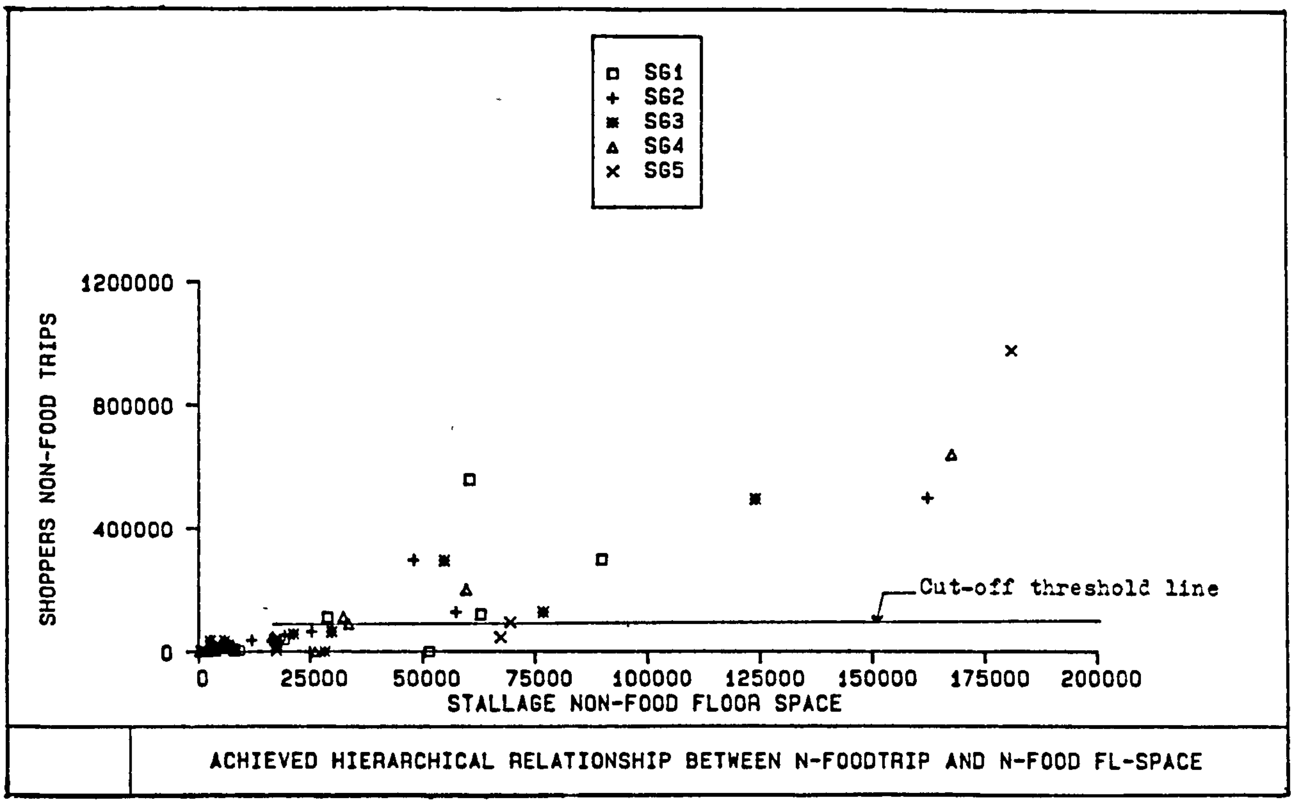


Figure 9.3.6.2 : Multi-Scatterplots.

TABLE 9.3.6.2 : Summary Statistics

Statistic	Alternative Strategies				Trend Strategy	
	SG1	SG2	SG3	SG4	SG5	
R	.6841	.9319	.8977	.9875	.9253	
R Square	.4679	.86846	.8059	.9751	.8561	
Signif F	.0101	.0000	.0001	.0000	.0001	
SE of EST	135006.7	5956.1	71816.5	31159.7	122321.4	
Cb	-19357.2	3266.4	-14484.0	-19220.0	-63422.5	
β / β	4.0079	3.1122	3.6299	3.84214	4.9239	
N-Continuum	4	3	3	3	1	- i.e. no. of market places above the cut-off threshold line

The summary of the efficiency scores by the alternative strategies on the achieved balanced demand and supply in the hierarchical relationships between the predicted pairs of demand and supply of activity spaces is shown in Table 9.10, page 513.

TABLE 9.9: Tests of the achieved balanced demand and supply of Activity Spaces in the Urban Market Places

Objective No.	General Objective Statement
	To achieve balanced demand and supply of activity spaces in the hierarchical relationship between these predicted pairs;
1.1a	The shoppers food-trips and the stallage food floor-space
1.1b	The shoppers non-food-trips and the stallage non-food-floor-space
1.2a	The shoppers food-trips and the number of food stalls
1.2b	The shoppers non-food-trips and the number of non-food stalls
1.3a	The stallage food floor-space and the number of food stalls
1.3b	The stallage non-food floor-space and the number of non-food stalls
1.4a	The stallage food floor-space and the number of food traders
1.4b	The stallage non-food floor-space and the number of non-food traders
1.5a	The number of food stalls and the number of food traders
1.5b	The number of non-food stalls and the number of non-food traders
1.6a	The shoppers food-trips and the number of food traders
1.6b	The shoppers non-food-trips and the number of non-food traders

TABLE 9.10 : Summary of the Efficiency Scores by the Alternative Strategies on the Achievement of Balanced Demand and Supply of Activity Spaces

Demand and Supply of Activity Spaces			Alternative Strategies				Trend Strategy
			SG1	SG2	SG3	SG4	SG5
1.1a	The shoppers food-trips and the stallage food floor-space	$(\bar{T}_a - \bar{Z}_a)$	1.7016	4.655	6.1884	10.6376	0
1.1b	The shoppers non-food-trips and the stallage non-food floor-space	$(\bar{T}_b - \bar{Z}_b)$	.3104	.6558	.3762	.291	0
1.2a	The shoppers food-trips and the number of food stalls	$(\bar{T}_a - \bar{R}_a)$	.0272	.2634	.102	.0076	0
1.2b	The shoppers non-food-trips and the number of non-food stalls	$(\bar{T}_b - \bar{R}_b)$	.1456	.0507	.0426	.0816	0
1.3a	The stallage food floor-space and the number of food stalls	$(\bar{Z}_a - \bar{R}_a)$	.6596	.411	.144	.0334	0
1.3b	The stallage non-food floor-space and the number of non-food stalls	$(\bar{Z}_b - \bar{R}_b)$	2.5803	.1927	.154	.3820	0
1.4a	The stallage food floor-space and the number of food traders	$(\bar{Z}_a - \bar{Q}_a)$	.1152	.1188	.1845	.0168	0
1.4b	The stallage non-food floor-space and the number of non-food traders	$(\bar{Z}_b - \bar{Q}_b)$	24.6406	24.9616	46.9918	25.3361	0
1.5a	The number of food stalls and the number of food traders	$(\bar{R}_a - \bar{Q}_a)$	.417	3.3756	.9862	7.0616	0
1.5b	The number of non-food stalls and the number of non-food traders	$(\bar{R}_b - \bar{Q}_b)$	.0762	2.1831	.5742	.4472	0
1.6a	The shoppers food-trips and the number of food traders	$(\bar{T}_a - \bar{Q}_a)$	.1212	.1448	.1872	.2872	0
1.6b	The shoppers non-food trips and the number of non-food traders	$(\bar{T}_b - \bar{Q}_b)$	.3392	.0762	.0165	.1443	0
	Gross Efficiency Score		31.1341	37.0876	55.9476	44.74	0
	RANK		4	3	1	2	Reference

9.3.7 Adoption of the Recommended Planning Strategy

In order to adopt the most preferred planning strategy, this section summarised the findings of the three sets of objective-achievement tests:

A To achieve optimisation of locational and structural potentials:

(i) the general objectives (of optimal demand and supply of activity spaces) in the 12 Kaduna city market places;

(ii) the particular objectives (of optimal demand and supply of activity spaces for vehicles) in the CMP.

B To achieve balanced demand and supply of activity spaces:

(iii) improvement of the unbalanced demand and supply of activity spaces in the 12 Kaduna city market places.

(i) The total efficiency scores by the 4 alternative strategies on the optimal demand and supply of activity spaces in the 12 Kaduna city market places were summed up in Table 9.5, page 492. The gross efficiency scores by the alternatives in this respect and their subsequent ranking were as follows:

	Alternative Strategies			
	SG1	SG2	SG3	SG4
Gross Efficiency Score	560.25	713.26	660.72	694.62
Rank	4	1	3	2

(ii) The gross efficiency scores by the 4 alternative strategies on the optimal demand and supply of activity spaces in the CMP by road and railway vehicles, were summed up in Table 9.8, page 495. The total efficiency scores by the alternatives in this respect and their subsequent ranking were as follows:

	Alternative Strategies			
	SG1	SG2	SG3	SG4
Gross Efficiency Score	293.34	276.66	349.98	200
Rank	2	3	1	4

(iii) The total efficiency scores by the 4 alternative strategies on the achievement of balanced demand and supply of activity spaces in the 12 Kaduna city market places were summed up in Table 9.10, page 513. The gross efficiency scores by the alternatives in this respect and their subsequent ranking were as follows:

	Alternative Strategies			
	SG1	SG2	SG3	SG4
Gross Optimisation Score	31.1341	37.0876	55.9476	44.74
Rank	4	3	1	2

There are two options available for calculating the final ranks of the alternative strategies:

Firstly, the planner can give weights to the three sets of objectives-achievement. These weights can then be applied to the gross efficiency scores by the alternatives on those sets of objectives-achievement. Thereafter the weighted gross efficiency scores can be added up and the alternatives ranked accordingly 1-4.

Secondly, the planner can argue that the weighting done by the shoppers and the planner during the calculation of the locational and structural potential scores are enough. In that case the planner may proceed to calculate the final rank of an alternative by finding the average of its ranks in the 3 sets of objective-achievement tests.

The thesis adopted the second option and the final ranks of the alternatives were obtained as follows:

	Alternative Strategies			
Objective	SG1	SG2	SG3	SG4
Optimal demand and supply of activity spaces in the 12 market places	4	1	3	2
Optimal demand and supply of activity spaces for railway and road vehicles in the CMP	2	3	1	4
Improvement of the unbalanced demand and supply of activity spaces in the 12 market places	4	3	1	2
Average Rank	3.33	2.33	1.66	2.66

From the foregoing argument it was concluded that SG3 was the best to achieve balanced demand and supply of activity spaces and optimisation of the locational and structural potentials in the 12 Kaduna city retail market places. SG2 was second, SG4 and SG1 are third and fourth respectively. Consequently SG3 was adopted as the recommended planning strategy and SG2 was adopted as the alternative planning strategy.

The performance situation achievable by the recommended planning strategy, SG3, in the target year 2005, is shown in the proposed locational and structural potentials model, stage 7, in Figure 9.3.7, page 517 . The recommended strategy had prescribed remedial locational and structural potentials which promised redistribution of the demand and creation of activity spaces in Kaduna retail market places in order to achieve linear and hierarchical-continuua in the relationships between like-pairs of demand and creation of activity spaces for food shopping or non-food shopping at levels that would optimise the remedial locational and structural potentials prescribed by the recommended planning strategy.

In order to validate how rightly the decision to adopt SG3 and SG2 as the recommended and alternative planning strategies, respectively, the nine policy solutions (see Table 9.2.1, page 463), from which the 4 alternative strategies were formed, were subjected to opinion survey of a cross-section of Kaduna city policy groups in the form of self-completing questionnaire. The summary of the analysis of this opinion survey is given in the following section 9.4.

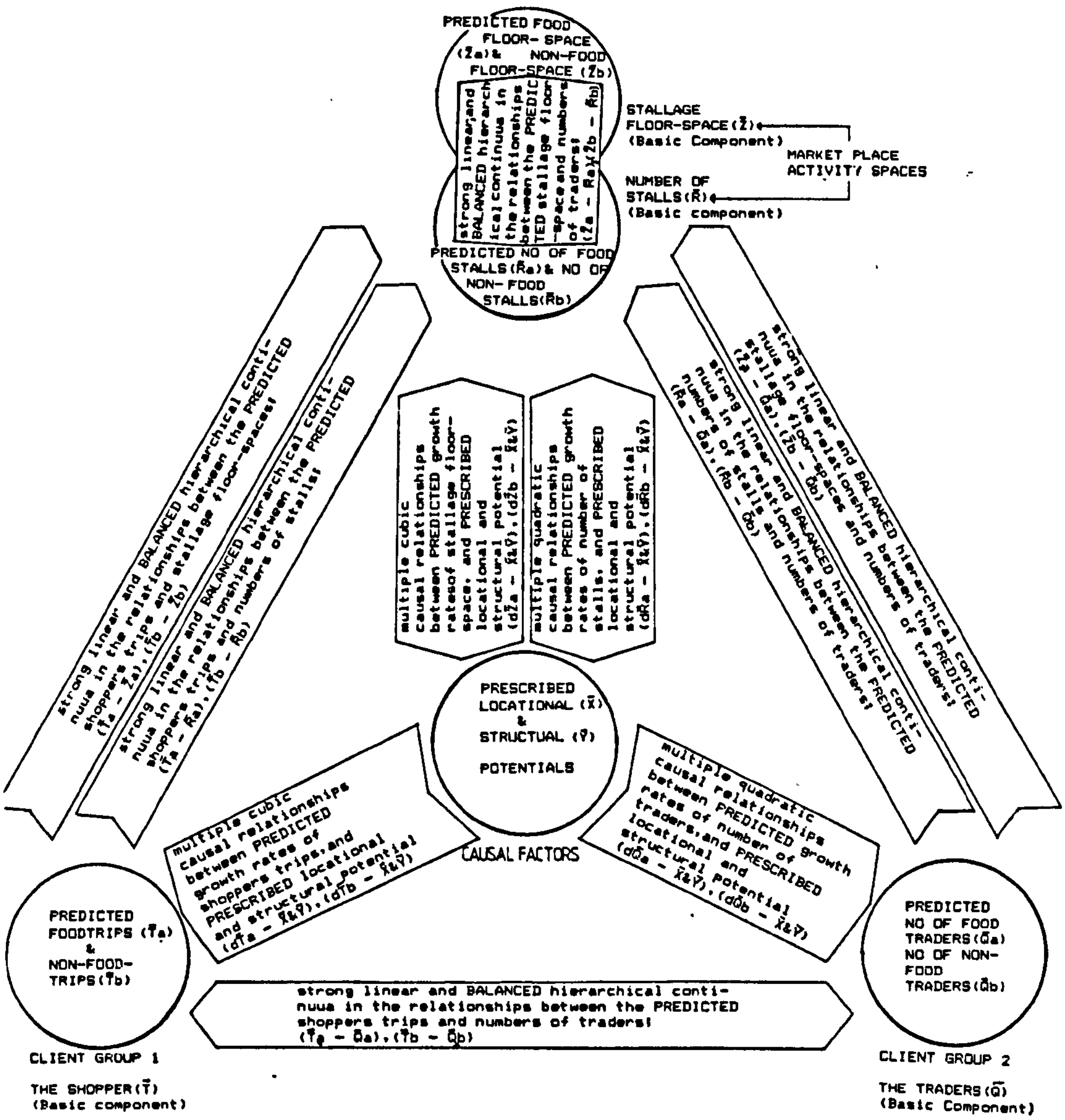


Figure 9.3.7 !PROPOSED LOCATIONAL AND STRUCTURAL POTENTIAL MODEL!-Stage 7

2. There is strong non-linear multiple causal relationship between the PREDICTED growth rate of any demand or supply of activity spaces and the PRESCRIBED locational and structural potentials.

1a. There is strong linear and BALANCED hierarchical continuum in the relationship detween any PREDICTED pair of demand and supply of activity spaces, for food shopping.

1b. There is strong linear and BALANCED hierarchical continuum in the relationship detween any PREDICTED pair of demand and supply of activity spaces, for non-food shopping.

Note ! Arrow indicates direction of Influence.

9.4 Validation of Proposed Locational and Structural Potential Model as an Evaluation Technique for Selection of Most Efficient Planning Strategy

As a means of checking the efficacy of the proposed locational and structural potential model,as an evaluative tool for selecting an appropriate planning strategy, the views of a cross section of Kaduna residents were sought on the 9 proposed policy solutions listed below:

A. Dispersal of some CMP activities.............. 1

B. Horizontal expansion of the CMP on the ground level 2

C. Vertical expansion of the CMP 3

D. Relocation of the CMP on a new site........... 4

E. No development planning action in the CMP..... 5

F. Control of the CMP using pricing techniques .. 6

G-H. Control of the CMP through development control and urban management 7

I. Decentralization of the CMP 8

It was necessary to distinguish between dispersal of some CMP activities and decentralization of the CMP. Dispersalof some CMP activities is a process by which the CMP activities are thinned down by removing some activities and relocating them on new sites;whereas decentralization of the CMP is the process by which smaller models of the present CMP are built in some other locations in the city.

The 9 policy solutions were put forward to the respondents as development planning solutions to facilitate growth and change in the congested Kaduna city central market place. The respondents were requested to rank the policy solutions in order of usefulness in facilitating growth and change in the CMP from their own point of view. The most useful was to be ranked 1st, whilst the least useful was to be ranked 8th. The fact that the questionnaire was self-completing limited its coverage in respect of respondents.

Because of the policy nature of this survey, the questionnaire was administered on a carefully selected 15 groups of professions or occupation.

01. administrator
02. politician
03. academician
04. financier
05. civil engineer
06. quantity surveyor
07. estate surveyor
08. town planner
09. architect
10. lawyer
11. medical practitioner
12. economist
13. sociologist
14. trader/businessman
15. shopper

The respondents covered both sexes. It was hoped that these respondents were capable of appreciating the implications of the stated solutions as they were put in the form of policy statements.

It was also in this questionnaire that respondents were requested to define "the City Central Market Place" or in other words, to explain what "the City Central Market Place meant to them". The questionnaire is set out in Appendix 9.4A, page A222.

114 questionnaires were distributed, of which 94, representing 83%, were received completed and 90, i.e.

79% were processed via the VAX computer using SPSS-X package. 4 questionnaires that were not properly completed were not included in the analysis.

In the analysis the respondents were classified into 3 policy groups, namely: the decision takers, (01 to 04), the technical experts, (05 to 13), and the users, (14 to 15). In order to be able to find the mean scores of the policy solutions, crude scores were allotted to the ranks in reverse order, as follows:

ranked 1st	-	crude score of 8
ranked 2nd	-	crude score of 7
ranked 3rd	-	crude score of 6
ranked 4th	-	crude score of 5
ranked 5th	-	crude score of 4
ranked 6th	-	crude score of 3
ranked 7th	-	crude score of 2
ranked 8th	-	crude score of 1

The mean score of each policy group and of the entire groups were calculated for each policy solution and the policy solutions were eventually lodged in their respective alternative strategy as set out in Figure 9.2.1, page 466 . The summary of the calculation of the total score for each strategy by the policy groups is shown in Table 9.4.1, page 521 . For each alternative strategy, the mean scores of the policy solutions therein, by each policy group, were summed up to obtain the total score of the strategy by the policy group. Based on the scores of the alternatives by each policy group, the alternatives were ranked 1 to 4 in respect of that policy group. Also for each alternative strategy the mean scores

TABLE 9.4.1: Summary of the Evaluation of the Alternative Strategies by Kaduna residents

Alternative Strategies		Policy Solutions in the Strategies	Policy Group's Mean Scores			Mean Score for Entire Groups
			Decision Takers	Technical Advisers	Users	
SG1	A	Dispersal of some CMP activities	6.26	6.04	5.60	6.04
	G-H	Control of the CMP through Development Control and Urban Management	5.67	5.86	6.15	5.83
		Total score for the strategy	11.93	11.90	11.75	11.87
		Rank of the strategy	4	4	4	4
SG2	B	Horizontal Expansion of the CMP on the ground level	3.98	3.32	3.90	3.73
	G-H	Control of the CMP through Development Control and Urban Management	5.67	5.86	6.15	5.83
	I	Decentralization of the CMP	5.45	5.04	6.20	5.49
		Total Score for the strategy	15.10	14.22	16.25	15.05
		Rank of the strategy	2	2	1	2
SG3	C	Vertical expansion of the CMP	4.21	4.92	3.20	4.11
	G-H	Control of the CMP through Development Control and Urban Management	5.67	5.86	6.15	5.83
	I	Decentralization of the CMP	5.45	5.04	6.20	5.83
		Total score for the strategy	15.33	15.82	15.55	15.77
		Rank of the strategy	1	1	2	1
SG4	E	No Development planning action in the CMP	2.81	2.36	2.20	2.53
	G-H	Control of the CMP through Development Control and Urban Management	5.67	5.86	6.15	5.83
	I	Decentralization of the CMP	5.45	5.04	6.20	5.83
		Total Score for the strategy	13.93	13.26	14.55	14.19
		Rank of the strategy	3	3	3	3

Excluded from the alternative strategies	D	Relocation of the CMP outside the city centre	3.86	3.71	4.10	3.89
	F	Control of the CMP using pricing techniques	4.71	4.42	4.65	4.61

of policy solutions therein, by the entire policy group, were summed up to obtain the total score of the strategy by the entire policy group. Based on the scores of the alternatives by the entire group, the alternatives were ranked 1 to 4; 1 being for the highest score, and 4 for the least score.

All the policy groups were unanimous in placing SG1 and SG4 in the ranks 4 and 3 respectively. The decision takers, the technical advisers and the entire group placed SG3 and SG2 in the ranks 1 and 2 respectively. But the users placed SG3 and SG2 in the ranks 2 and 1 respectively. Therefore the final ranks of the alternatives SG1, SG2, SG3 and SG4 were 4, 1.75, 1.25 and 3 respectively.

The ranks of the alternatives by the public were then compared with the ranks of the alternatives by the proposed locational and structural potentials model, as follows:

	Alternative Strategies			
	SG1	SG2	SG3	SG4
Final Rank by the Model	3.33	2.33	1·67 -1.33	2·67 3.33
Final Rank by Kaduna Public	4	1.75	1.25	3

It could be seen that the model and public opinion were in agreement in placing SG3 and SG2 first and second respectively. Public opinion was clear in placing SG4 and SG1 in the third and fourth positions respectively, whereas the model ranked both SG4 and SG1 in the third position. Therefore it could be confidently concluded that there was not any serious reason to doubt the efficacy of the model as an appropriate tool for selecting an appropriate planning strategy for urban retail market places. Why then take the problems of such an intricate model when simple public opinion survey produce almost the same results? However simple public opinion survey did lack any other detailed information necessary for producing a plan which was provided by the model. So the public opinion survey could not have been substituted for the model.

However the differences found between the users and the other policy groups, as well as the model, must not be completely ignored because their opinion was expected to reflect their values and views on the constraints of the environment and their personal circumstances. Therefore the study found it necessary to focus the next section on the comparative circumstances of selected groups; with a view to taking equity considerations, where inequities were found to exist.

9.5 Equity Consideration

The term "equity" is normally used to refer to the ethical desirability of redistributing real income and wealth between groups of individuals, and to the injustice caused to individuals by substantial uncompensated social and economic losses. It has been argued by both N. Lichfield (1956, 1975) and M. Hill (1968) that matters of equity are rightly of considerable importance in choosing between planning proposals. Therefore it was necessary to identify those sections of the public who would be affected by the consequences of a course of action, since inevitably the consequences were unlikely to affect all sections of the public served uniformly. Thus the equity weights attached to the issues involved in planning proposals, by the people affected by the plan, are of primary importance in the evaluation of the desirability of the planning strategy. Since a plan has not only to be desirable, but must be achieved with available limited resources, the equity weights supplied by the planned have to be balanced by the economic weights supplied by the planner.

The economic weighting of the locational and structural potentials by the planner were provided when the sub-variables that constitute those potentials were given interval levels of measurement; see Appendix 6.3.2 (Calculation Scheme) page A54 , column 4. The appropriate set of equity weights of the locational and structural potentials shown in the last row of Table 7.8, page 303 , has been provided by the consumers. It has been derived on the principle that the amount of influence a locational or structural potential had on the consumers, in their decision of choice of shopping centre for food and non-food, was an appropriate indication of the equity weight of that particular potential.

There were two additional tasks that had to be accomplished in order to take full account of equity. These were the grouping of individuals on the criteria of districts of residence, and places of work. Since the individual shoppers' trips originated from either his district of residence or place of work, two groupings were considered in order to determine what adjustments should be made to the estimate of gains and losses to the various groups, so as to reflect their relative significance for the welfare of society as a whole. It is assumed here that the measures made of gains and losses are judged to be reasonably accurate indications of prospective changes in the individual's well-being. On this basis, the achievement of the recommended planning strategy in each market place was examined on two backgrounds, viz:

(i) places of work as implied by the city's central area structure; and

(ii) residential population of the administrative districts of the city.

9.5.1 Breakdown of Predicted Distribution of Demand and Supply of Activity Spaces Among the Urban Market Places by City Central Area Structure

This equity consideration involves the breakdown of the base year, 1984, and the target year, 2005, distribution of the demand and supply of activity spaces to the market places by the city central area categories. The data on the eight objectives - the shoppers food-trips and non-food-trips, the number of food and non-food traders, the stallage food and non-food floor-spaces, and the number of food and non-food stalls - were broken down by the 4 market place sub-groups, viz:

1. Central Market Place (1 No.) 'CMP'
2. Special Market Places (1 No.) 'SMP'
3. District Market Places (4 No.) 'DMP'
4. Local Market Places (5 No.) 'L/NMP'

The objective scores on each market place sub-group were calculated as percentages of the total for the 11 market places. The summary of the calculations is shown in Table 9.5.1, page 527 . Between 1984 and 2005, for both food and non-food shopping, the CMP and the SMP showed a general fall in the percentages, whereas the DMPs and the L/NMPs showed general rises.

Food Shopping:

In the case of the CMP the maximum and minimum percentage falls were 18.9 and 3.3 respectively, whilst in the case of the SMP the maximum and minimum falls were 3.6 and 1.6 respectively. As for the DMP, the maximum and minimum rises were 10.6 and 1 respectively, whereas for the L/NMPs there were rises of 11.9 and 6.8 and falls of 0.8 and 1.1.

Non-Food Shopping:

In the case of the CMP the maximum and minimum percentage falls were 38.7 and 10.5 respectively, whilst in the case of the SMP the maximum and minimum falls were 5.2 and 1.197 respectively. As for the DMPs, the maximum and minimum rises were 33.2 and 9.2 respectively, whereas for the L/NMPs there were maximum and minimum rises of 5.0 and 0.4 respectively.

TABLE 9.5.1: Distribution of Demand and supply of activity spaces among Kaduna city Retail Market Place Sub-Groups in the Base Year, 1984, and Target Year, 2005, of the Recommended Planning Strategy

Sub-Group of Market Places	Base Year & Target Year	Shoppers Trips				Number of Traders				Stallage Floor-Space				Number of Stalls				Number of Market Places
		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		
		Trips (Persons Per Hour)	%	Trips (Persons Per Hour)	%	Traders	%	Traders	%	Floor Space (m^2)	%	Floor-Space (m^2)	%	Stalls	%	Stalls	%	
Central Market Place	1984 2005	12471 205569	48.9 30.0	14411 496953	81.2 42.5	4066 42684	35.7 32.4	6912 77251	53.8 41.5	18976 158877	38.4 32.6	32119 124077	47.1 36.6	3691 32179	34.7 30.9	5122 34524	47.5 36.9	1
Special Market Places	1984 2005	2295 37318	9.0 5.4	140 37600	7.9 3.2	765 4469	6.7 3.4	157 614	1.2 .003	3610 26227	7 5.4	6975 17059	10.2 5.0	706 2737	6.6 2.6	143 365	1.3 .004	1
District Market Places	1984 2005	9865 337675	38.7 49.3	2437 547826	13.7 46.9	5304 71227	46.5 54.0	5015 96646	39.0 51.9	22090 242380	42.8 49.9	24692 182750	36.2 53.9	5030 50141	47.2 48.2	4775 50110	44.3 53.5	4
Local Market Places	1984 2005	841 104416	3.3 15.2	254 86459	1.4 7.4	1262 13560	11.1 10.3	762 11644	5.9 6.3	6926 60154	13.4 12.3	4430 15308	6.4 4.5	1220 19054	11.5 18.3	743 8591	6.9 9.2	5
Total for 11 Market Places	1984 2005	25509 685041	100 100	17739 1169052	100 100	11397 131941	100 100	12846 186156	100 100	51601 487639	100 100	68216 339194	100 100	10647 104112	100 100	10783 93590	100 100	11

The implication of the above redistribution of demand and supply of activity spaces achievable by the recommended planning strategy is that the CMP and the SMP have surrendered some of their trade volumes to the DMPs and the L/NMPs. Therefore, some residents in remote districts would afford to choose to go to the CMP or the SMP for shopping for some categories of commodities, instead of being compelled to do so.

9.5.2 Breakdown of Predicted Distribution of Demand and Supply of Activity Spaces Among the Market Places by Administrative Districts

This second equity consideration involves the breakdown of the base year, 1984, and the target year, 2005, distribution of the demand and supply of activity spaces to the market places by the administrative districts. The data on the eight objectives - the shoppers food-trips and non-food-trips, the number of food and non-food traders, the stallage food and non-food floor-space and the number of food and non-food stalls - were broken down by the 5 administrative districts, viz:

1. Doka District
2. Makera District
3. Tudun Wada District
4. Kawo District
5. Gabasawa District

Each objective score on the market places in each district was calculated per 1000 population of the district's residents. The summary of the calculations is shown in Table 9.5.2, page 531 . The last two rows contain the average demand and supply of activity spaces per 1000 population of the city's residents, for the base year, 1984, and the target year, 2005.

To calculate the deviation of a district's objective score from the city's average objective score, the city's average objective score was subtracted from that of the district and the results are displayed in Table 9.5.3, page 532 . Also the percentage of the city's population residing in the district is shown in column 1.

Doka district contained 29.56% of the city's residential population and contained only the city central market place. The consistent positive deviation above the city's average confirms that the shopping provisions proposed by the recommended planning strategy were excessive of the requirements of the residents of the central district. This is explainable by the fact that the CMP draws custom from the remote districts of the region, as well as from other towns.

Makera district, where 13.48% of the city's residential population resided, had consistent positive deviation, implying over provision of shopping requirements. This district has 4 market places. The population is scattered and not as compact as Doka or Tudun Wada. The situation suggests that the planning strategy tended to over-provide the district. In the preparation of the designs, the scope of the market place has to be scaled down, bearing in mind the scattered nature of the district's residential population.

Tudun Wada district provided residences for about 23.68% of the city's residential population and contained only the DMP within the district's boundaries. The consistent negative deviation suggested under-provision. Administratively, the CMP belongs to Doka district, but spatially it lies on the boundary of Doka and Tudun Wada districts. In terms of services provided by the CMP, a great part of Tudun Wada lies within the central district. But with the extension of Tudun Wada far beyond the Tudun Wada By-Pass Road, Tudun Wada would require an additional market place thereabouts.

Kawo district, with 23.03% of the urban population, showed eight positive and eight negative deviations from the average for the city. This suggests an equitable share of the provisions of shopping needs of the residents of the districts by the 3 retail market places.

Gabasawa district, the smallest in terms of residential population, has 10.25% of the overall city's population, and consistent negative deviation from the city's average. Gabasawa, although quite extensive spatially, has very high proportion of senior workers both in government and in the industries. The households are the most motorised in the city and may tend to shop in any other place, especially the central market place and the superstores.

TABLE 9.5.2: Distribution of Demand and Supply of Activity Spaces in the Retail Market Places according to Administrative Districts in the Base Year, 1984, and Target Year, 2005, of the Recommended Planning Strategy

District and Population	Base Year & Target Year	Shoppers Trips				Number of Traders				Stallage Floor-Space				Number of Stalls				Number of Market Places
		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		Food Shopping		Non-Food Shopping		
		Trips (Persons -in- Hour)	Traders/ 1000 Pop.	Trips (Persons -in- Hour)	Traders/ 1000 Pop.	Traders	Traders/ 1000 Pop.	Traders	Traders/ 1000 Pop.	Floor-Space (m^2)	Fl-Space/ 1000 Pop.	Floor-Space (m^2)	Fl-Space/ 1000 Pop.	Stalls	Stalls/ 1000 Pop.	Stalls	Stalls/ 1000 Pop.	
Doka 183472 759677	1984 2005	12471 205569	68 271	14411 496954	79 654	4066 42684	22 56	6912 77252	38 102	18976 158877	103 209	32120 124077	175 163	3691 32174	20 42	5122 34524	28 45	1 1
Makera 83697 346553	1984 2005	5236 141868	63 409	959 139599	11 402	2951 23795	35 68	2159 27850	25 78	13241 97139	158 280	16153 53431	192 149	2779 23498	33 67	1976 10145	23 29	4 4
Tudun Wada 146970 608539	1984 2005	2117 63255	14 104	1809 128275	12 210	998 11752	7 19	1952 19592	13 32	6114 79800	41 13	61265 76846	416 126	850 6996	6 11	1895 14297	13 23	1 1
Kawo 142970 591976	1984 2005	5113 222384	36 376	345 332033	2 561	2940 36824	21 62	1353 57346	9 96	11822 108799	82 184	5852 59004	41 99	2909 34169	20 57	1336 32265	9 55	3 3
Gabasawa 63603 263352	1984 2005	571 51904	9 197	214 71978	3 273	443 16885	7 64	470 4116	7 14	2514 43023	39 163	2724 25836	43 98	419 7270	6 28	454 2360	7 9	2 2
All Districts 620712 2,570,097	1984 2005	30318 685041	49 266	31586 1169052	51 455	11397 131941	18 51	12846 186156	20 72	51601 487639	83 189	68216 339194	110 131	10647 104112	17 41	10783 93591	17 36	11 11

TABLE 9.5.3: The Deviation of Districts Demand and Supply of Activity Spaces per 1000 Population from the City's Average Demand and Supply of Activity Spaces per 1000 Population

District & Percentage of City's Population	Base Year & Target Year	Shoppers Trips		Number of Traders		Stallage Floor-Space		Number of Stalls		Number of Market Places
		Food-trips Deviation from city average	Non-Food-trips Deviation from city average	Food Traders Deviation from city average	Non-Food Traders Deviation from city average	Food Floor-Space Deviation from city average	Non-Food Floor-Space Deviation from city average	Food Stalls Deviation from city average	Non-Food Stalls Deviation from city average	
Doka 29.56	1984	+19	+28	+4	+18	+20	+65	+3	+11	1
29.56	2005	+ 5	+199	+5	+30	+20	+32	+1	+ 9	1
Makera 13.48	1984	+14	-40	+17	+5	-31	+82	+16	+6	4
13.48	2005	+143	-53	+17	+6	+91	+18	+26	-7	4
Tudun Wada 23.68	1984	-35	-39	-11	-7	-42	+306	-11	-4	1
23.68	2005	-162	-245	-32	+12	-176	-5	-30	-13	1
Kawo 23.03	1984	-13	-49	+3	-11	-1	-69	+3	-8	3
23.03	2005	+110	+106	+11	+24	-5	-32	+16	+19	3
Gabasawa 10.25	1984	-40	-48	-11	-13	-44	-67	-11	-10	2
10.25	2005	-69	-182	+13	-6	-26	-33	-13	-25	2
All Districts 100	1984	0	0	0	0	0	0	0	0	11
100	2005	0	0	0	0	0	0	0	0	11

9.6 The Flexibility of the Recommended Planning Strategy

Flexibility is concerned with uncertainty and situations other than that which the forecast has suggested to be the most likely. Its' goal is different in kind to all the others of the strategy. A general definition of flexibility is the capacity of the plan to cope with departures from the expected course of event. This definition, however, needs to be expanded to bridge the gap between the rationale of, and the examination of flexibility.

It is true that the flexibility inherent in the strategy is only one aspect of flexibility in the planning process as a whole, and probably not the most important. The thesis development of flexibility consideration has to be seen in this wider context; for the characteristics of Kaduna city retail market place development strategy, regarded as flexible, may be merely an aid to the continuous adjustment which would go on with the passage of time. But this form of flexibility, being a latent quality, is only useful if the opportunity to take advantage of it is seen at the right time, in the course of periodic reappraisal of the strategy.

The flexibility objective and considerations applied to the model dealt with the set of circumstances which was considered most likely to arise in the year 2005, and with realistic pattern of shopping, population of the city-region, and other related activities. The flexibility was concerned with variation in these circumstances, which, if they arose, might make the plan less satisfactory.

The flexibility considerations were set apart from the goal achievement tests, and their implications were specially considered in the selection of the preferred alternative.

Although departure from the expected line of development is not invariably deleterious, forecasts which did not consider a range of possibilities, and even a degree of pessimism, are clearly unrealistic. Thus a departure from the most likely course of events may, probably , be beneficial rather than damaging. Hence, an additional facet of the strategy may, therefore, be its ability to extract maximum benefit from unexpected advantageous or disadvantageous circumstances. In such a situation, its flexibility could be seen as a matter of opportunism, thus stressing the importance of continuous monitoring of industrial developments, of preference for areas of new housing, and the effects of new road building.

The flexibility considerations referred to a set of characteristics which had bearing on the capacity of the plan to accommodate the unexpected.

Five considerations were developed. Two were related to the distinction which had to be drawn between uncertainty about trends and uncertainties about events. Gradual departure from expected trend in population growth or in overall industrial and administrative structures have to be distinguished from such occurrences on a significant scale, such as the closure of large industrial firms, or even the siting of the New Federal Capital in close proximity to Kaduna city.

The first consideration was to gauge the vulnerability of the plan's growth at a rate higher or lower than the most likely rate. The second examined the plan's ability to cope with unexpected change in social attitude towards the objectives of the plan. The third examined the ability of the plan to switch over to one of the rejected options. The fourth considered the effects of major happenings which might deflect the city-region from the expected course of development. The fifth considered the issues involved in the phasing and implementation of the plan.

9.6.1 The Plan Should be Able to Adapt to Variations within Possible Range of Departures from "Mean Forecasts"

At 95% Confidence Level, the predictive equations have upper and lower limits of the B statistic. The coefficients in the predictive equations, 8, (2.1a 2.1b....2.4a, 2.4b,) page 398, are the mean B-values; therefore, the objective achievement scores shown in Table 9.5 , page 492 , represented those due to the mean B-values. The total departure from these mean objective achievement scores was derived when the objective achievement scores were repeated with the upper and with the lower limits of B-values. The departures which have been expressed in percentage form are shown as follows:

1.	Demand by the shoppers food-trips	± 17.16%
2.	Demand by the shoppers non-food-trips	± 15.89%
3.	Demand by the number of food traders	± 34.85%
4.	Demand by the number of non-food traders	± 13.11%

5.	Creation of stallage food floor-space	± 22.24%
6.	Creation of stallage non-food floor-space	± 9.58%
7.	Creation of number of food stalls	± 28.59%
8.	Creation of number of non-food stalls	± 26.81%

The application of this departure range to the adopted plan provided accessibility to possible spare capacity of the plan.

Statistically a small departure range is preferred, but the above argument seems to present a more flexible plan as one that allows for a large departure range. But paradoxically a good plan is one that allows least distraction from achievement of its objective, and ensures least additional cost due to unused capacity of the plan. This conflict between flexibility and efficiency of the plan is an important issue that has to be dealt with in the detailed architectural and engineering design stage of the plan. Issues such as the spare bearing capacity, to be allowed for in the design of the foundation of the 2 to 3-storey market place structures, has to be a balance between what is practicable and what is economically prudent.

9.6.2 The Plan Should be Able to Respond to Change in Social Values

The eventual weights of the locational and structural potentials were provided at two levels. The first level was the interval level in the measurement of the physical scores of the sub-variables that constituted the locational and structural potentials, see Appendix 6.3.2, page A54 . The interval levels had their basis in the concept of the locational potentials possessing "relative magnitude" and the structural potentials possessing "absolute magnitude", see pages 199 and 284 . The physical weights of the locational and structural potentials were rationalized on the basis of physical behaviour of people and are generally not subject to change.

The second level weights of the locational and structural potentials were provided by the city residents shopping behaviour, see Table 7.8, page 303 . Changes in social values would be wholly reflected by variation in the relative weighting of the stated locational and structural potentials rather than the introduction of completely new ones with significant weights. The uncertainty associated with the selection weights was reflected in the deviation of the individual household's weights from the average city resident's weight for each locational and structural potential. This implication, however, is that the attitude of the income groups, high and low, to the locational and structural potentials and to the shopping establishments, shown in Tables 7.10 - 7.13 , pages 307 to 310 , respectively are subject to significant changes in due course. Any such significant changes shall be reflected in the distribution of the city residents shopping trips to the shopping establishments shown in Table 9.6.1, page 538 . This table is further summarised into Table 9.6.2, page 539 , which shows that Kaduna city retail market places receive 84.1% and 56.2% of the residents food-trips and non-food-trips respectively, whilst

TABLE 9.6.1: Distribution of Shoppers Trips Among the Shopping Institutions in Kaduna city (1984)

Shopping Institutions		Shoppers Food-trips		Shoppers Non-Food-trips	
		Shoppers/ Hour	%	Shoppers/ Hour	%
Market Places	City Central Market Place (CMP)	12471	41.1	14411	45.6
	Special Market Place (SMP)	2331	7.7	636	2.0
	District Market Place (DMP)	9865	32.5	2437	7.7
	Local/Neighbourhood Market Place (L/NMP)	841	2.8	254	0.8
Non-Market Places	Super Stores/Departmental Stores (SS/DS)	3666	12.1	3836	12.1
	Shopping thoroughfares (Shopping Streets)(ST)	159	0.5	7473	23.7
	Shops on Motorway By-Pass (SMBP)	0	0.0	36	0.1
	Corner Shops and Hawkers (CSAH)	947	3.1	2500	7.9
	Regional Shopping Centres (RSC)	37	0.1	0	0.0
Total		30318	100	31586	100

TABLE 9.6.2: Distribution of Shoppers trips Between Market Place and Non-Market Place Shopping Institutions in Kaduna city (1984)

Shopping Establishments	Food Shopping		Non-Food Shopping	
	Shoppers/ Hour	%	Shoppers/ Hour	%
Market Places	25509	84.1	17739	56.2
Non-Market Places	4809	15.9	13847	43.8
Total	30318	100	31586	100

the non-market place shopping receive 15.9% and 43.8% of the residents food-trips and non-food-trips respectively. The question is, "In what direction are those percentages likely to change in due course?" See Figure 5.2, page 162.

The high proportion of trips received by the market places indicates the residents degree of affinity to the retail market places and there is no indication to show that this situation would change significantly in the next generation, i.e. 30 years. But thereafter, evidence from the developed countries of the world would seem to suggest that the importance of the city retail market places would begin to fade with the non-market place retailing becoming stronger. Therefore, the plan, especially the architectural and engineering design, must envisage the possibility of conversion to other forms of shopping arrangements.

9.6.3 The Plan Should be Able to Retain as Far as Possible the Option of Switching Over to an Alternative Strategy

The recommended development planning strategy, SG3, has a high index of interchangeability to the other rejected strategies, SG1, SG2 and SG4. The proposals contained in the alternative strategies are listed in pages 467 - 469 . The index of interchangeability of the adopted plan to the other alternatives is indicated by the per cent of the proposals in each of the other alternatives it possessed. The calculated indices of interchangeability of the adopted plan is shown as follows:

Adopted Plan	Rejected Strategies		
	SG1	SG2	SG4
SG3	70%	77%	91%

Therefore, the indices show that the adopted plan could easily switch over to the alternatives, SG4, SG2, and SG1, respectively.

9.6.4 The Plan Should be Able to Withstand the Effects of Major Happenings which Might Deflect the Kaduna City-Region from Expected Course of Development

Up to the time of the thesis, Kaduna city was second only to Kano in providing the major shopping requirements of Northern Nigeria. The current major threat to Kaduna city in this respect, which might upset the regional shopping status of Kaduna city, is the constructed new Federal Capital City, Abuja. The new city of Abuja is 150 kilometres to the South of Kaduna city. There is high probability that Abuja city would cut off some of the regional shoppers to the South, and might eventually reduce Kaduna city to the third position, Kano still being the first, in the provision of regional shopping facilities to the northern half of the country.

To be able to accommodate such an upheaval, although not very imminent, the development plan should be phased so as to be able to reduce or even halt further development without disastrous investment consequences, should the effect of Abuja become more drastic than was expected.

9.6.5 To be Able to Implement the Plan in Phases

It is possible that in generating the plan some issues had been overstressed, understressed or even overlooked. The phasing of the plan would provide opportunities for review of the recent developments and correction of such errors. The political, administrative and technical problems associated with the implementation of the recommended planning strategy, for the development of Kaduna retail market places formed the subject matter of the next chapter 10. But the materials of the planning are provided by the forecasts for the recommended planning strategy, and this is discussed in the next section 9.7.

9.7 The Forecasts for the Recommended Planning Strategy

The distribution of shopping spaces between the main, secondary and neighbourhood centres is only one of the many factors involved in the most complicated of all the problems that arise in the planning of shopping centres; how big should they be?

In Europe and America it has not been too difficult, in theory, to work out a formula for the area needed to accommodate all the shopping facilities that a given population required. The Census of Distribution indicated how much the nation spent on consumer goods and how this expenditure was apportioned among the various retail trades. From those figures it was possible to calculate the total turnover in each trade that would be generated by a representative cross-section of the population of any given size. By applying to these totals known ratios of turnover to sales area in each trade, the overall sales area needed to serve such a population could be obtained. This in turn was combined with appropriate standards (in terms of space per thousand square metres of sales area) for storage, pedestrian circulation and car parking, together with corresponding estimates of the necessary service-road and junction capacities, would enable an aggregate hectarage requirement to be built up. It would then only remain, in theory, to decide what proportions of this hectarage should be allotted to the main centre, the secondary and neighbourhood centres.

In practice, however, such calculations are subject to many uncertainties and include so many variables that they yield little guidance. What, for example, is a "given population"? Not that of the town as it is defined for local government purposes, or even as it is defined by structural and local plans, or even that of the built-up area; since every town main centre draws custom from surrounding rural and urban communities too small to support shops of a main centre character themselves.

Indeed, in this age of automobility, a main centre that is easy to get at and park also draws customers from other towns with main centres of their own and, conversely, one that is difficult of access and deficient in parking facilities may lose much of its potential business to other towns as well as to secondary centres in the same town. This raises another awkward question, on what basis is the main centre's share of the total business arising from the town and its hinterland to be assessed?

The provision of shopping facilities in Nigeria is a bit more complex than that seen in Europe and America. This is explainable by the conflicting social forces of acquisition of Western style of shopping and attachment to traditional market place values. An urban market place forms a focus of retailing activities and is surrounded by rows of shops which tend to straggle along the road arteries leading to the market place. In big commercial cities the shops surrounding the central market place tend to straggle so far that they at times merge with those of the district centre market place.

Motorised shoppers can choose where they will shop. A radical improvement in the town's centre road system and parking provisions may greatly increase the catchment area of the CMP. So too may a redevelopment scheme that enables a district centre for the first time to offer business potential to some big traders. It is well known that where these undertakings lead, the street-shopkeepers find it pays to follow. In American planning parlance they are "primary customer attractors" as distinct from "traffic users".

A new or rebuilt market place must initially contain specific amounts of selling space and number of stalls. Somebody has the responsibility to decide what those amounts are to be. It is important to the success of the venture that this decision must reflect a good forecast of the centre's initial volume of trade. The making of such a forecast must clearly begin with a careful and comprehensive survey to ascertain the size, composition and purchasing power of the centre's potential shopping population, bearing in mind the relative accessibility and standard of services actually or prospectively offered by other shopping centres within easy walking or motoring reach of this population. All these considerations amount to a realistic assessment of the conditions under which the new or rebuilt market place will actually operate. How closely do these approximate to the ideal conditions that would enable the market place to secure in practice the optimum of its volume of trade.

The 14 locational and structural potentials listed in Table 9.1.8, page 452 , had been carefully designed to include all of the above considerations. These locational and structural potentials acted simultaneously in complement or in conflict with each other to determine the potential volumes of trade and the observed growth rates, shown in Tables 9.1.1, 9.1.4, pages 440 to 442 for 11 Kaduna retail market places. Should the existing locational and structural potentials remain relatively the same, they would maintain the existing growth rates in the market places. But with the adoption of the recommended planning strategy a new growth rate has been introduced for the 11 Kaduna retail market places, see Tables 9.7(1-2) the same page 546. By applying the new growth rates of the demand and supply of activity spaces, predicted by the recommended strategy SG3 in the 11 Kaduna retail market places, the forecasts of demand and supply of activity spaces for the years 1991, 1998 and 2005 respectively are shown as follows:

TABLE 9.7.1: Rates of Growth of Demand for Activity Spaces in 11 Kaduna City Market Places Predicted by the Recommended Planning Strategy (SG3)

Name of Market Place	The Shoppers Food-Trips %	The Shoppers Non-Food Trips %	The Number of Food Traders %	The Number of Non-Food Traders %
CMP	112.78	79.66	142.33	111.59
RSMP	111.81	30.38	99.33	49.10
PMP	.00	.00	.00	.00
M-KGMP	155.81	48.50	139.30	106.47
TWMP	160.94	131.71	151.83	104.12
K-TMP	173.93	240.27	164.08	247.29
URMP	258.78	223.12	267.31	130.53
BMP	322.63	264.23	118.23	225.71
UTMP	.00	65.35	77.41	108.26
BDMP	327.77	274.72	191.63	65.02
USMP	305.24	.	66.14	68.75
KGMP	317.57	274.87	280.97	46.95

TABLE 9.7.2: Rates of Growth of Supply of Activity Spaces in 11 Kaduna City Market Places Predicted by the Recommended Planning Strategy (SG3)

Name of Market Place	The Stallage Food Floor-Space %	The Stallage Non-Food Floor-Space %	The Number of Food Traders %	The Number of Non-Food Traders %
CMP	142.19	89.58	169.17	122.37
RSMP	131.00	62.79	105.47	60.82
PMP	.00	.00	.00	.00
M-KGMP	123.75	91.46	182.26	86.27
TWMP	199.32	128.45	164.11	130.90
K-TMP	159.98	176.38	183.67	250.54
URMP	207.09	210.95	206.71	.
BMP	208.14	102.73	259.82	197.44
UTMP	36.10	39.24	64.83	84.72
BDMP	213.55	112.62	278.47	225.91
USMP	31.97	51.02	243.05	121.13
KGMP	207.81	76.18	281.29	150.12

TABLE 9.7.3: Forecast of the Distribution of Shoppers' Food-Trips for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	3393	12471.49	36921.12	89017.37	205569.2
RSMP	1621	2295.17	6763.83	16233.59	37318.12
PMP	.	.	.	.	.
M-KGMP	1950	2738.82	9747.78	28254.76	78444.24
TWMP	1072	2080.73	7554.13	22335.56	63254.67
K-TMP	1784	4621.97	17615.33	54676.16	162550.6
URMP	295	423.00	2111.54	8584.17	33425.69
BMP	105	202.12	1188.50	5691.45	26105.39
UTMP		.	.	.	.
BDMP	136	195.68	1164.63	5645.03	26207.55
USMP	240	295.33	1665.07	7645.57	33625.54
KGMP	111	148.33	861.73	4077.31	18478.09
TOTAL FOR 11 MARKET PLACES	10707	25508	61556	153643	400379

TABLE 9.7.4: Forecast of the Distribution of Shoppers' Non-Food-Trips for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	7648	14410.88	81906.66	178550.2	496954.0
RSMP	109	140.93	581.25	18616.31	37600.28
PMP	.	.	.	.	.
M-KGMP	456	640.99	3011.24	28272.34	65040.58
TWMP	679	1313.80	9630.48	35735.20	128275.0
K-TMP	105	272.76	2936.18	56375.71	297180.1
URMP	105	209.12	2137.58	11453.26	57330.97
BMP	65	86.37	995.25	6381.13	36005.91
UTMP	54	90.92	475.60	371.96	952.82
BDMP	55	72.74	862.25	6003.85	34852.80
USMP		.	.	.	.
KGMP	4	4.55	53.91	2522.20	14647.36
TOTAL FOR 11 MARKET PLACES	9280	17738	32924	92171	199326

TABLE 9.7.5: Forecast of the Distribution of Number of Food Traders for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	977	4066.00	9093.20	19924.08	42684.18
RSMP	499	765.00	1407.23	2536.20	4469.17
PMP	.	.	.	.	.
M-KGMP	1058	1574.00	3476.09	7521.26	15911.69
TWMP	438	997.50	2318.28	5278.76	11752.35
K-TMP	940	2453.00	5978.37	14275.13	33327.65
URMP	202	280.00	949.15	3152.26	10236.16
BMP	189	252.50	508.52	1003.40	1935.82
UTMP	272	359.00	587.76	942.81	1478.68
BDMP	87	124.00	333.73	879.99	2268.75
USMP	275	363.00	556.57	836.07	1227.98
KGMP	101	163.00	573.08	1974.05	6648.57
TOTAL FOR 11 MARKET PLACES	5038	11397	27936	69895	178855

TABLE 9.7.6: Forecast of the Distribution of the Number of Non-Food Traders for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	1894	6912.00	16120.35	36168.12	77251.95
RSMP	125	157.00	258.02	407.94	613.99
PMP	.	.	.	.	.
M-KGMP	992	1707.00	3884.92	8505.75	17728.61
TWMP	979	1952.50	4392.94	9508.25	19591.95
K-TMP	434	1136.00	4348.70	16014.84	56145.76
URMP	168	220.00	559.02	1366.52	3180.07
BMP	153	211.50	759.33	2622.59	8623.10
UTMP	80	83.00	190.53	420.76	884.57
BDMP	88	83.00	150.97	264.18	440.09
USMP	127	134.00	249.25	446.01	759.77
KGMP	229	250.00	404.96	631.04	936.14
TOTAL FOR 11 MARKET PLACES	5269	12846	28413	65326	157771

TABLE 9.7.7: Forecast of the Distribution of the Stallage Food Floor-Space for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	5162	18975.50	39205.19	79877.88	158877.4
RSMP	2550	3610.00	7114.02	13824.70	26227.03
PMP					
M-KGMP	4634	6510.00	12426.45	23390.84	42983.04
TWMP	2602	5049.00	12892.34	32463.13	79799.82
K-TMP	3459	8961.00	19873.86	43465.10	92800.81
URMP	1008	1570.00	4112.98	10625.40	26797.06
BMP	1044	1478.00	3885.27	10071.64	25487.77
UTMP	1338	1643.00	1907.65	2184.21	2441.42
BDMP	407	721.00	1928.57	5087.09	13099.52
USMP	1643	2140.00	2409.28	2674.82	2899.03
KGMP	549	944.00	2478.84	6418.88	16226.39
TOTAL for 11 MARKET PLACES	24396	52666	127938	828434	321666

TABLE 9.7.8: Forecast of the Distribution of the Stallage of Non-Food Floor-Space for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	17046	32119.50	38948.82	72845.10	124077.1
RSMP	4855	6975.00	7262.77	11663.81	17059.41
PMP					
M-KGMP	5334	7497.00	9181.06	17341.17	29829.73
TWMP	5874	11368.00	16611.71	37439.08	76846.01
K-TMP	1766	4580.00	8096.57	22075.83	54817.39
URMP	888	1247.00	2480.24	7608.56	21256.70
BMP	915	1243.00	1611.82	3223.59	5871.51
UTMP	354	438.00	490.09	535.84	670.34
BDMP	244	487.00	662.31	1389.23	2653.83
USMP	635	785.00	758.29	1129.74	1532.89
KGMP	1004	1477.00	1664.41	2892.83	4578.98
TOTAL FOR 11 MARKET PLACES	38915	118113	186956	321666	648175

TABLE 9.7.9: Forecast of the Distribution of the Number of Food Stalls for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	977	3691.00	7732.82	15908.04	32178.80
RSMP	499	706.00	1129.05	1773.01	2737.66
PMP	•	•	•	•	•
M-KGMP	1058	1487.00	3266.81	7047.27	14948.33
TWMP	438	849.50	1746.30	3525.01	6996.41
K-TMP	940	2432.00	5369.62	11641.51	24816.97
URMP	172	262.00	625.47	1466.20	3379.52
BMP	189	246.50	690.35	1898.47	5133.49
UTMP	299	339.00	434.92	547.90	678.68
BDMP	88	120.00	353.50	1022.54	2908.33
USMP	191	357.00	953.23	2499.29	6443.28
KGMP	128	157.00	465.93	1357.77	3890.53
TOTAL for 11 MARKET PLACES	4979	10647	29251	81844	232887

TABLE 9.7.10: Forecast of the Distribution of the Number of Non-Food Stalls for the Recommended Planning Strategy (SG3)

NAME OF MARKET PLACE	STUDY PERIOD 1977	1984	FORECASTS 1991	1998	2005
CMP	1894	5122.00	10198.76	19184.97	34524.36
RSMP	111	143.00	205.92	280.14	364.59
PMP	•	•	•	•	•
M-KGMP	1102	1549.00	2583.53	4070.82	6136.22
TWMP	979	1894.50	3917.02	7651.07	14296.84
K-TMP	434	1124.00	3528.05	10461.85	29677.89
URMP	•	•	•	•	•
BMP	153	207.50	552.64	1390.52	3347.03
UTMP	69	77.00	127.36	199.01	297.49
BDMP	52	81.00	236.38	651.68	1718.75
USMP	116	131.00	259.38	485.19	868.24
KGMP	179	246.00	550.95	1165.74	2359.59
TOTAL FOR 10 MARKET PLACES	5247	10783	24747	60122	152679

1.	the shoppers food-trips	Table 9.7.3, page 547
2.	the shoppers non-food trips	Table 9.7.4, page 547
3.	the number of food traders	Table 9.7.5, page 548
4.	the number of non-food traders	Table 9.7.6, page 548
5.	the stallage of non floor-space	Table 9.7.7 page 549
6.	the stallage non-food floor-space	Table 9.7.8, page 549
7.	the number of food stalls	Table 9.7.9, page 550
8.	the number of non-food stalls	Table 9.7.10 page 550

9.8 Phasing of the Adopted Planning Strategy

The information contained in the forecast Tables 9.7.(3-10), pages 547 - 550 , show the materials of the planning. This section is devoted to designing a programme and schedule of actions necessary for translating the information into physical reality.

It is not, however, practicable within available resources to implement all the proposals in the adopted strategy at one go. Therefore the implementation has to be phased, while ensuring that the phasing does not jeopardise the success of the strategy. A sketch of the proposed phasing is shown in Figure 9.8.1, page 552 .

PROPOSALS WITHIN THE RECOMMENDED STRATEGY

CA Expand the CMP 2 to 3 storeys upwards
CB Vehicle parking and stationing under/ above ground
CC Railway/Train Station under or above ground

GA Omnibus routes to connect all market places
GB Control illegal extension of structures
GC Separate accesses for shoppers and commodity
GD Provide bulk fresh food storage facilities

HA Ensure right use of activity space
HB Ensure right use of facilities and amenities
HC Increase protection of life and property

IA Present type of CMP structure for the DMPs
IB Appropriate model structure for the SMPs
IC Present type of CMP structure for the L/NMPs

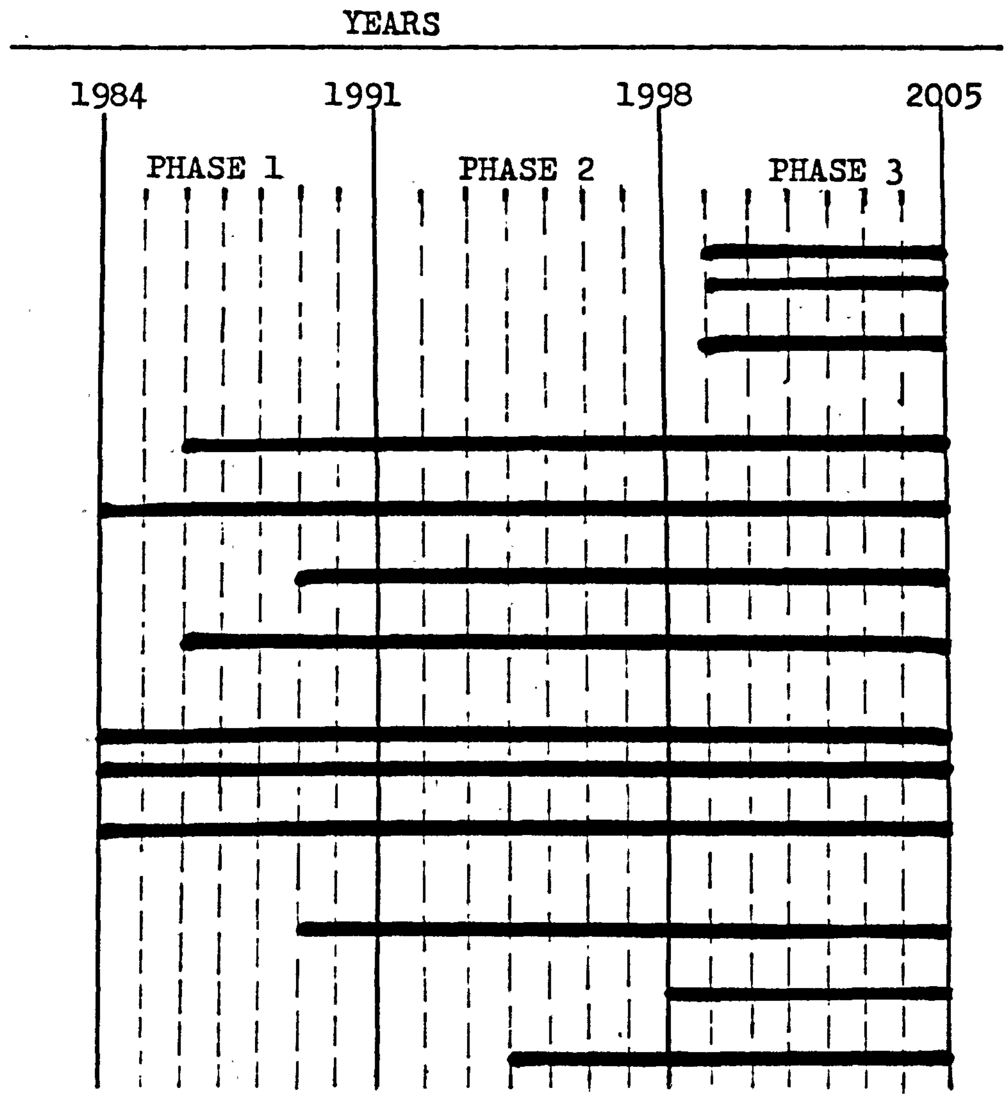


Figure 9.8.1: Implementation phasing of the recommended planning strategy.

Each proposal has an effective date; that is the date in which the executed project(s) may be commissioned and the effect is deemed to have come into force. This implies that by the target year, 2005, all the proposals of the strategy are in full force and the actual achievement of the implemented strategy can be measured. The actual achievements may then be compared with the predicted. The implementation has been divided into three major phases as dictated by the forecast growth periods; these are phase 1, 1984-1991; phase 2, 1991-1998; and phase 3, 1998-2005.

The above phasing also implies that the managers of the implementation exercise have to ensure that the different projects of the phases are designed, executed and delivered by the dates the proposals are expected to come into effect. The issues of plan management are discussed in the next chapter, 10.

CHAPTER 10

PLAN MANAGEMENT, RESEARCH FINDINGS AND POLICY RECOMMENDATIONS

10.0 Introduction

Having adopted a development planning strategy, attention is turned to the ways and means of realising it. Firstly, the plan management requirements necessary for its successful implementation are explored. This completes the research findings for the case study, which are then summarised. The case study is concluded with policy recommendations for the development of the urban market place system in Kaduna city.

10.1 Plan Preparation and Management

The strategy put forward above poses some political, administrative and technical problems that deserve to be discussed briefly to provide some idea about how they may be resolved. In an attempt to resolve these problems, they are divided into areas, subjects, and administrative organisations.

The Constitution of the Federal Republic of Nigeria, in specifying the functions of the local government councils in the 4th schedule, (see Appendix 1.1.1 page A1), among other things, included in paragraph 1e, "establishment, maintenance and regulation of markets, motor parks and public conveniences". But the competence of the local government councils in performing this function had left doubts to their ability in coping with the associated problems. In response to these doubts, the Lagos State Ministry of Local Government and Chieftaincy Affairs had reconstituted the States Market Development Board, and stipulated that in order to prevent the uncoordinated establishment of market places, the location of new market places had become the joint responsibility of the states market place development board and the local government councils, see Appendix 1.1.2, page A4 .

In practice, local government councils perform in two distinct ways in seeking to exercise control over environmental change. In some aspects it has a promotional role initiating changes; in other aspects it has a regulatory role responding to changes initiated by others. In performing these promotional and regulatory roles, the local government is essentially in pursuit of its own statutory duties and political objectives, constrained by statutory powers, finance and manpower at its command. The administrative structure of the local government, shown in Figure 10.1, page 556 , does not seem equipped sufficiently to handle some complex problems such as integrated urban market place development programmes. In Kaduna city, the local government controls only the DMPs, the SMPs and the L/NMPs, whereas the ownership and control of the CMP belongs to KCDB.

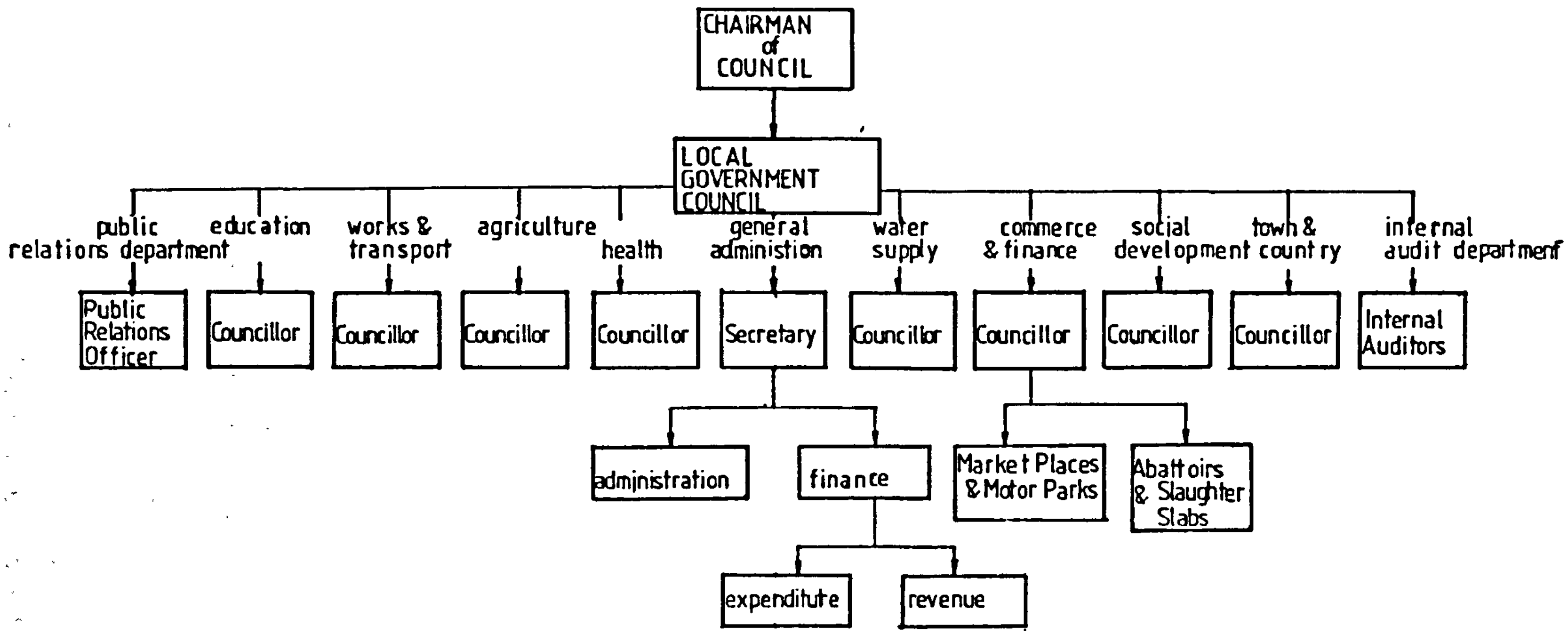


Figure 10.1 : Administrative Structure of Kaduna Local Government Council

The KCDB was created in 1972 under the Town and Country Planning Act, and was charged with the full responsibility of urban planning and development control of Kaduna Capital Territory. It was also charged with responsibility of providing services and public utilities within the area demarcated as Kaduna Capital Territory. After the redevelopment and expansion of the CMP in 1975, the KCDB was also given the responsibility to maintain and control the CMP and it has held to this to date. With only one or two qualified town planners on its staff, the KCDB grossly lacks the capacity to adequately control or guide developments in Kaduna city. Therefore, it cannot implement the proposed plan without outside assistance. The administrative structure of the KCDB is presented in Figure 10.2, page 558.

Therefore, in order to ensure successful preparation and implementation of the proposed plan, it is proposed that Kaduna State Ministry of Local Government establishes "Kaduna State Market Place Development Board" to work jointly with Kaduna Local Government Council and Kaduna Capital Development Board (KCDB) in the preparation and implementation of the plan. The Kaduna State Market Place Development Board, being established at state level, should be adequately equipped with qualified town planners, architects, engineers, quantity and estate surveyors to assist the local government councils in their functions when and where there are needs for their services.

Firstly, the town planners and other related professionals in Kaduna local government council are constituted into the nucleus for the development of "an implementation committee" for the preparation

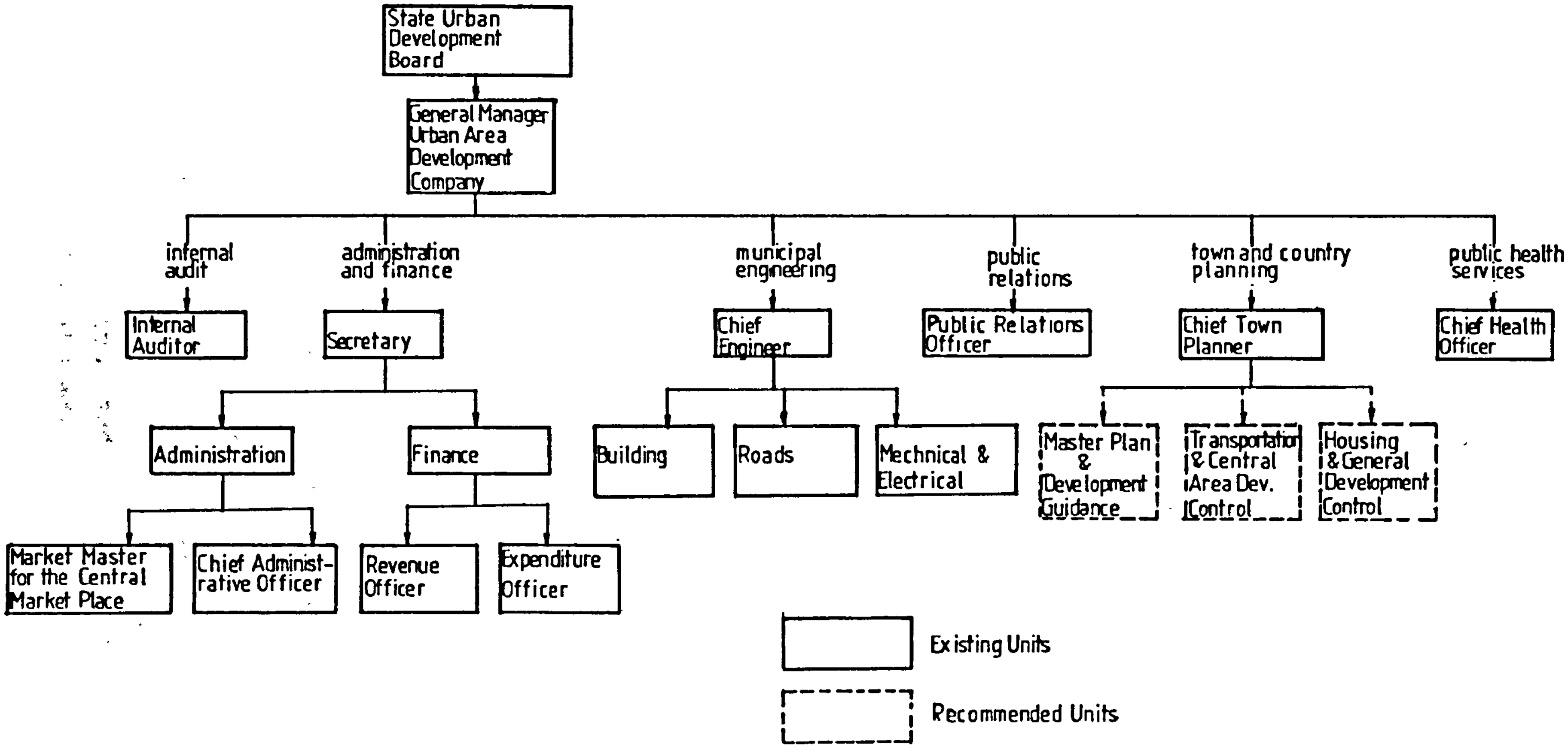


Figure 10·2 : Adminjstrative Structure of Kaduna City Development Company and implementation of the plan. This nucleus is augmented by the town planners and other professionals from the state market place development board, and from Kaduna capital development board. Since development planning is an interdisciplinary exercise, it is emphasized that membership of this implementation committee should include people with a variety of skills and experience. The plan emphasized an integrated urban market place development approach, and one way of giving expression to this need was to ensure that the body charged with the task of promoting integrated urban market place development was intersectoral in orientation. Hence it was necessary, at the enlarged implementation committee level, to include representatives of Federal Ministry of Works and Nigerian Railway Corporation, officials from the state's Ministries of Works, Housing and Transport, of Commerce, of Town and Country Planning and of Lands and Surveys, and representatives of the district council.

The district council consisted of the district head, selected village heads, community development leaders and representatives of cultural organisations, e.g. youth clubs.

The implementation committee operates at three levels, the nucleus, the micro and the enlarged. The proposed framework for Urban Retail Market Place Development Planning is shown in Figure 10.3, page 560 . The implementation committee is under the control of the Kaduna Local Government Council because after the implementation of the projects, the committee at the micro and enlarged levels would be dissolved and the nucleus left to maintain and run the market places.

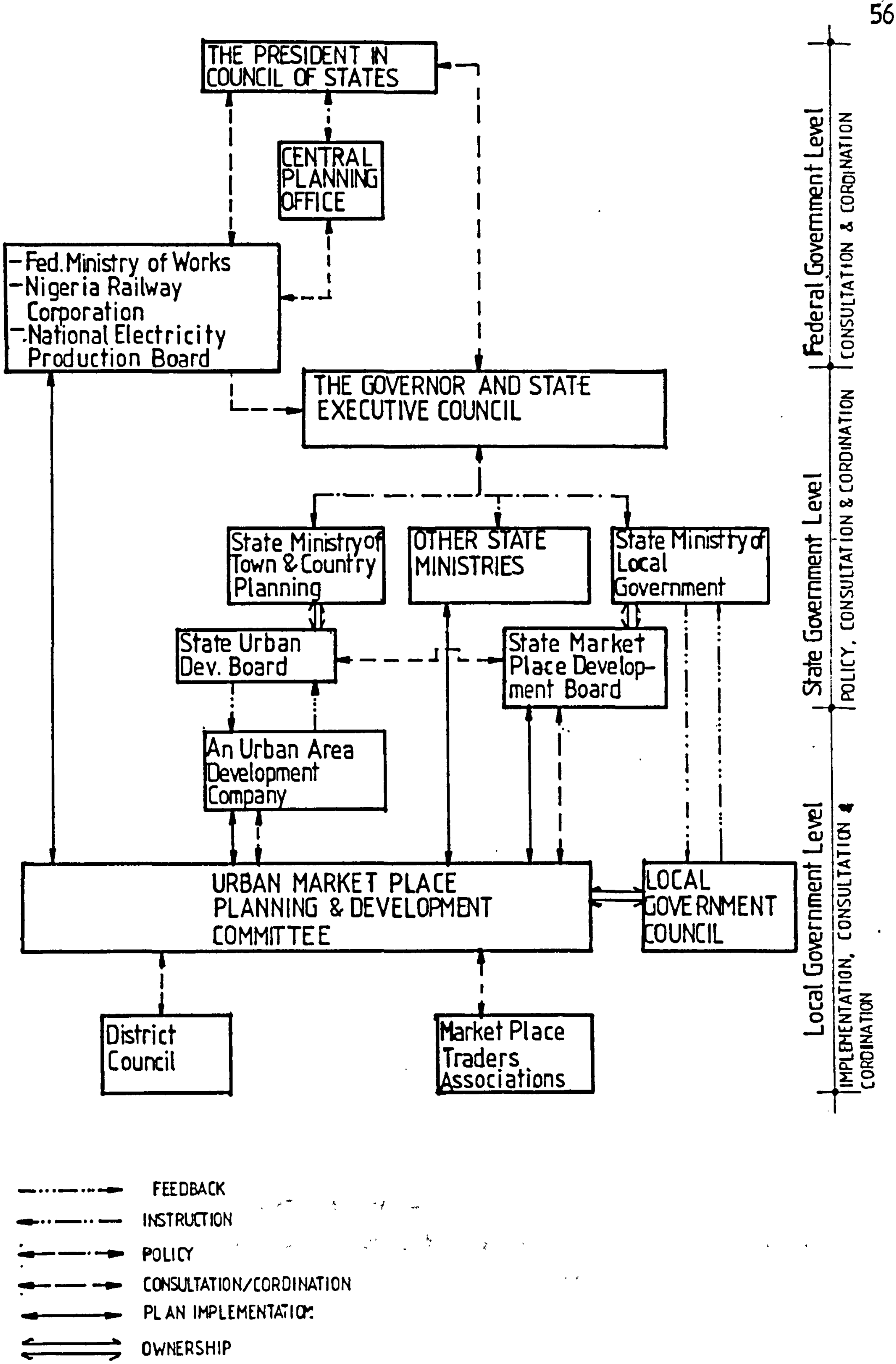


Figure 10.3 Proposed Framework for Urban Market Place Development Planning.

The implementation committee is charged with the following responsibilities:

1. To prepare the scope of each phase of the plan and the implementation schedule.

2. To provide and obtain services of technical experts and consultancy services where necessary.

3. To prepare estimates of recurrent cost implication of projects in addition to the capital costs.

4. To prepare financing plans for the project.

5. To prepare schedules of manpower, material and know-how.

6. To monitor the progress and problems of the projects.

7. To act as intermediary between the local government council, the KCDB, the State and Federal Government organisations.

The plan is implemented in project phases, the sizes of which are to be determined by available resources. Each project should be well-thought-out, intimately described, well calculated and motivated design to accomplish certain activities for the purpose of achieving the stated objectives. Such a design must be prepared to the details and specifications necessary for estimation of the means and ways of execution. Because of the multi-aspect nature of the projects, their preparation and evaluation must be done by a group of experts, architects, engineers, quantity and estate surveyors and social scientists.

Evaluation and monitoring are important exercises in project management. Time and cost estimates of a project are based on assumption and the actual costs incurred almost always vary from forecast values. In this exercise, time, financial costs, project scope and project objectives may frequently be traded off against each other. For example, time and financial costs may be saved at the expense of the scope of the project, or, if the latter remained unchanged, time may be reduced at the expense of financial costs, and vice versa. The thing to do, therefore, is to take stock from time to time, reassess financial costs, quality and physical targets and reorder the priorities where necessary. When each project is completed and is in use, periodic monitoring and necessary feedbacks are facilitated by the use of the proposed locational and structural potentials model. The nucleus implementation committee may from time to time repeat stages 1-4 of the model. This would provide the ncessary feedback for the next planning decision; hence the planning circle continues.

10.2 The Summary of Research Findings

In the process of development of the concept "Locational and Structural Potentials Model for Development Planning of Urban Market Places", data had been obtained from Kaduna city retail market places and from the residents as well. The data has been analysed and it was found:

1a That there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for food shopping, in an urban market place.

1b That there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for non-food shopping, in an urban market place.

1c That the plots of the market places, either for like-pair of food or non-food specific components, consistently fell into two main discrete groups, instead of forming expected hierarchical continuua; and that implied an unbalanced distribution of demand and supply of activity spaces among the urban market places.

The following is an explanation of how the unbalanced distribution of demand and supply of activity spaces among the urban market places is aggravated. The reconstruction of the CMP in 1975 led to excessive demand for activity spaces by the shoppers and the traders, and to the neglect of DMPs, SMPs and the L/NMPs. In order to achieve additional stallage floor-spaces and the number of stalls, reactionary and spontaneous measures were adopted, and these were:

a. extension of the existing stall blocks into the shopping malls.

b. squeezing in temporary stalls in any available open space.

c. construction of temporary stalls on designed flower beds and on storm water drainage channels.

d. construction of temporary stalls on some portions of designed shoppers access and circulation pathways.

e. adjoining temporary stalls to lavatory blocks.

f. erection of temporary stalls too close to the railway.

g. traders usurpation of shoppers access and circulation pathways by organized squatting.

h. parking of private vehicles and stationing of commercial vehicles on thoroughfares in the vicinity of the city central market place.

All those reactionary and spontaneous measures were taken within the fixed 1975 designed boundaries of the city central market place. The effect of those measures was to achieve additional stallage floor-spaces and number of stalls and diminution of the access and circulation pathways and of open spaces. The increased number of traders and shoppers, coupled with the diminished sizes of the 'subservient' stallage and accessibility floor-spaces, resulted in overcrowding of people and vehicles in the subservient stallage and accessibility spaces in the city central market place.

2a That there was strong multiple cubic relationship between the growth rate of the shoppers trips or the stallage floor-space, and the locational and structural potential in the urban market place, either for food or non-food shopping.

2b That there was strong multiple quadratic relationship between the growth rate of the number of traders or the number of stalls, and the locational and structural potential in the market place, either for food or non-food shopping.

2c That the plots of the market places, either for like-pair of the growth rate of food or non-food specific components, consistently fell into two main discrete groups; fairly similar to that formed by the corresponding specific components; see 1c above.

Accordingly, it was envisaged that a development planning strategy which adjusted the locational and structural potential in Kaduna city retail market places would result in adjustments of the growth rates of supply of stallage floor-spaces and number of stalls, and of the demands for activity spaces by the shoppers and the traders in Kaduna city retail market places, and would improve the neglect of the district (centre) market places, special (centre) market places and the local (centre) market places. In pursuance of this, four alternative strategies were developed and evaluated using the non-linear and linear programmes of the proposed locational and structural potentials model, stages 5 and 6.

It was found that alternative SG3 had the best overall performance scores in providing solutions to the problems of congestion of people and vehicles in the CMP and providing a remedy to the neglect and under-utilization of the other retail market places.

Alternative SG3 in its third phase provided for the development of the CMP into a two to three-storeyed retail market place structure.

Two to three-storeyed market place structure had not been the practice in Nigeria, but the author had experienced such three-storeyed retail market place structures in some cities in the former French ruled West African States, such as Dahomey in Benin Republic, Lome and Doualla in Togo and Cameroun Republics, respectively. Table 7.29(g), page 344, shows how the Kaduna city residents would prefer commodities to be located in a three-storeyed CMP structure. This conforms fairly well with what the author had observed in the two to three-storeyed market places he had experienced. They seemed to have survived and worked quite well. Food commodities were located on the ground floor, textiles on the second floor and other general merchandise on the first floor.

Table 7.28(b) page 336 , showed that 60% of the food traders and 68.5% of non-food traders in Kaduna CMP expressed no objection to location on the first floor of a three-storeyed market place, while the other 40% and 31.5% respectively said that they were not sure. To location on the second floor, 42.2% of food traders and 54.8% of non-food traders in Kaduna CMP expressed no objection. The traders interviewed unanimously gave their consent with the proviso that "all the other traders dealing in their commodities must be located on the same floor level with them".

The strategy is not abruptly to change the historic dominant position of the city central market place, but to mould it more firmly to the city-region's advantage. Figure 9.8.1, page 552 , shows the strategy's growth phases in the first 7 years, 14 years and 21 years, respectively.

The adopted strategy and the other alternatives considered were completely valid in themselves; but the adopted strategy had the advantage that it achieved most in providing short and long term solutions to the shopping problems of the city. The community of interests in the city is reflected and being strengthened by the reconstruction of the special (centre) market places, the district (centre) market places and the local (centre) market places.

There is high probability of sustained population growth within the existing district boundaries, and there are potentials for more growth outside the present district boundaries, and this would lead to the creation of new districts with subsequent new district (centre) market places, local (centre) market places, and probably new special (centre) market places. An investigation of this and the capacity and detailed planning of the anticipated new retail market places must be carried out in the preparation and implementation of the plan.

There are some who might argue that retail market place institutions should give way to superstores on the high streets, as is the case in the cities of developed Western countries. This might be contrary to the objective of equal opportunity to choice of shopping centres that is usually thought of as a proper aim of strategic planning. Although there is no presumption on any intrinsic merit in balanced communities, or that the quality of life of any one social group is essentially better than that of the other, but in a very large area of low income households it is more difficult to provide superstores that offer a range of goods and services at prices affordable by the majority of households. For this group when the relatively high overhead costs of running superstores are eliminated, as it is accomplished by the city retail market places, the prices of the commodities are reduced to affordable limits. Also there are some households who are willing to exchange the extra charges on the commodities for the glitter of the environment of the superstores. It is necessary to note that essentially both the city retail market places and the superstores do offer the same commodities for sale, but actually in varying social and environmental settings which are matters of preference. The thesis, therefore, favours the continued coexistence of the city retail market places and the high street superstores.

The conclusions which have been described in the sections 10.1&2 reflect three particular characteristics of the adopted strategy:

(i) It is not a plan for immediate deployment of bricks and mortar. It is a framework within which it is believed there is room for a sensitive design to achieve a balanced hierarchical-continuum of urban retail market places and optimise the locational and structural potentials.

(ii) It is a framework whose design and costs implications must be examined more fully by the plan preparation team. The strategy is not meant to be immutable; it needs to be detailed further as the plan preparation and further consultations proceeded.

(iii) It has introduced new factors which may suggest new solutions to certain long established local problems. Growth may be an opportunity in certain areas, as well as a pressure to be carefully balanced in others.

In the form in which it is being recommended, the strategy has been developed as justifiable prior to physical design investigation, which would require the services of other professionals, such as architects, engineers, quantity and estate surveyors. The strategy had been examined to the same depth as the other rejected alternatives described in section 9.2, pages 466 - 469. The examination had concentrated on those factors affecting the choice between the strategies. There still remain some physical design considerations which were not fundamental to the selection of an appropriate urban retail market place development planning strategy.

The strategy may have raised new questions as it had provided answers to old ones. This is only the fault of time, of the nature of planning, which is a continuing and not a once and for all exercise at the strategic level involved and finally of the nature of thesis writing; the main thrust of the thesis being the development of a model and its application in problem analysis and in evaluation of alternative strategic plans. The proposed locational and structural potential model consisted of 7 stages; and the use of the first 4 stages provided a monitoring technique for the users of the model.

Physical design considerations are important in the realisation of the full promises of the planning strategy. To ensure this, the following design brief of requirements provided the neccessary guidelines.

10.3 Physical Design Brief of Requirements

Kaduna city retail market places exist and operate on the principle of the thoroughfare-traffic-free precinct and the thesis is driven to conclude that comprehensive or piecemeal reconstruction of old market places must not disrupt this cherished ideal, and that in the construction of new ones, the aim should be to bring about the closest approximation to the precinct that is reasonably practicable. The essence of the precinct principle is that most of the stalls in the market place front on to a continuous system of footways; vehicular access is confined to their back entrances. The principle of precinct is the only satisfactory basis on which the following physical design brief of requirements are to be achieved.

10.3.1 Road Traffic

The modernisation of the town's highway system should precede the replanning of its retail market places. Every large town needs both an outer ring road or by-pass system to divert through traffic round its built-up area, and an inner ring road or by-pass system to keep cross-town traffic out of its central area. Only if the central streets are effectively reserved for traffic that has business in them can the central area's shopping potential be fully realised and its layout intelligently replanned.

In the study of road vehicle entry and departure census in the CMP in 1984, the peak traffic demand by all types of vehicles, including hand carts, was 5648 vehicles an hour, (5518 vehicles an hour excluding hand carts). This occurred between 11.00am and 12.00 noon, see Table 7.19, page 320 , and Figure 7.2, page 321 . When these were disaggregated into classes of vehicles, it was 2834 private vehicles between 11-12 noon and 2900 commercial vehicles between 9-10 am. These figures represented 8.6 vehicles per 1000 private vehicles, and 14.4 vehicles per 1000 commercial vehicles (auto) registered in Kaduna State during 10 years (1974-83) preceding the year of the study; see Tables 7.25-26, pages 329 - 330 , and Figures 7.4.1-2 page 332. Alternatively, these figures represented 55.6 private vehicles and 56.9 commercial vehicles per 1000 square metres selling floor-space of stalls. This traffic was carried in 12 entry and exit carriageways.

The mean hourly road traffic in each CMP entry and exit carriageway is shown in Table 7.20, page 322. At the peak hour it was 460 auto-vehicles or 471 vehicles including hand carts. Hand cart traffic, expressed as percentage of commercial vehicle traffic, is shown in Table 7.26b, page 330 . The maximum and minimum percentages were 5.18 and 3.41 between the hours of 7-8 am and 1-2 pm, respectively.

If we allowed tolerance of 20%; the thesis therefore recommended that the total entry and exit carriageway should be designed to accommodate 10.4 vehicles per 1000 private vehicles and 17.3 vehicles per 1000 commercial vehicles (auto) registered in Kaduna State during the 10 years preceding the year of commencement of the project, or alternatively 66.8 private vehicles and 68.3 commercial vehicles (auto) per 1000 square metres selling floor-space of stalls. Additional 6% of the commercial vehicles (auto) traffic should be allowed for the hand carts traffic;

10.3.2 Siting and Stationing of Commercial Vehicles

The study also showed that in the CMP in 1984 the peak stationing demand by commercial vehicles was 480 vehicle spaces per hour and the figure represented 2.5 vehicle spaces per 1000 commercial vehicles registered in Kaduna State during 10 years preceding the year of the study, or 9.4 vehicle spaces per 1000 square metres selling floor-space of stalls; see Tables 7.22, 7.23, 7.27 and Figures 7.3, 7.4.2, pages

326, 327, 331, and 325, 332 , respectively. If we allowed tolerance of 20%; the thesis therefore recommended that on no account, however, should the stationing spaces provided be less than 3 vehicle-space per 1000 commercial vehicles registered in Kaduna State during the 10 years preceding the year of commencement of the development project, or 11.3 vehicle-spaces per 1000 square metre selling floor-space of stalls.

From each car park and bus stop an arcade or lane flanked by service trades (shoe, watch repairers, and the like) and by the smallest shops, takes the customer between the stall blocks into the heart of the market place - where the pedestrian is king.

10.3.3 Private Car Parking

Ring roads and a modern central street pattern will not alone suffice to save the town centre from decline. No less essential is the complementary provision of adequate off-street parking spaces for the vehicles that do have business in the central area. The town centre gains nothing from the ability of motorists to reach it and drive freely about it if they cannot get out of their cars until they have left it.

The demand for parking space is of two distinct kinds; that of the town worker who prefers to go to work in his car, parks it throughout the working day, and then drives home again; and that of the shopper, the tourist or travelling businessman who wants to park his car for short periods while he paid visits to the CMP, the other shops, restaurants, public buildings or offices. The accommodation of the all-day parkers' cars contributes nothing to the well-being of the town centre; without it he would simply have to travel by public transport. The accommodation of the short-period parker's car, on the other hand, is in most cases vital to the well-being of the town centre: without it he would stay away and take his business elsewhere.

In these circumstances, planning authorities do seek to shift the burden on to the shoulders of private developers by requiring, as a condition of planning consent, that they should provide, within the curtilage of any shop building they propose to erect or reconstruct, a fixed number of car spaces proportionate to the building's total floor area. This clumsy device could not make a significant contribution unless the ratio of car spaces to floor area is fixed so prohibitively high that new shops are in effect obliged to accommodate the customers of existing shops as well as their own. It is in any case inequitable, even as between one new shop and another, since it applies the same arbitrary parking standard to shops which depend mainly on the carriage trade and to those which cater for other groups. Any contribution it does make is grossly uneconomic: the amount of circulation space required when a hundred cars are parked in one unit on cheap back land is only a fraction of the amount required - often in the costly form of lifts and ramps - when the parking of a hundred cars is dispersed among a dozen or a score of separate shop buildings where it may absorb anything up to 30 percent of the highly valued ground-floor selling space.

The thesis recognised that both new and established traders (as well as shoppers and the local authorities) share in the benefit derived from the provision of parking space for the shoppers' cars and should bear their share of its necessary cost. The physical provision of such parking space could be provided by the local authority in an economical and effective form on appropriate sites. The trader should be able to discharge his obligation by contributing a fairly assessed proportion of the economic cost of its provision in that form, and the shopper charged such a nominal fee that would not push him into deliberately risking being fined for parking under "No Waiting" signs in the vicinity of the CMP. Since the money spent by the shoppers in the CMP greatly enhances the rental resources of the CMP, the local authority to whom the rent is paid has to subsidise the costs of providing and running the parking. This thesis strongly recommends that the government should treat as a matter of urgency the passing of legislation to make this proposition possible.

10.3.3.1 Siting and Capacity of Parking

In recommending that parking space for shoppers should be provided on back land, the thesis is by no means inconsiderate of the motorist's unwillingness to walk any considerable distance between parking space and the CMP. The research found out when special car parks had been provided for London's Christmas shoppers, those on the fringe of the central area had remained almost entirely unused, while illegally parked cars had been towed away by the dozen from streets close to the big stores. Experience has shown that shoppers will deliberately risk being fined for parking under "No Waiting" signs in shopping streets rather than use free official car parks only a quarter of a mile (198 metres) away. The thesis recommends that no stall block in the CMP should be more than 150 metres from the nearest car park or from the nearest bus stop. This recommendation is mindful of the fact that shoppers will be bearing their purchases, some of which could be heavy. In Great Britain the recommendation of the Multiple Shops Federation was 180 metres.

In the study of road vehicle entry and departure census in the CMP in 1984, the peak parking demand by private vehicles was 1743 vehicle spaces per hour, and this figure represented 5.5 vehicle spaces per 1000 private vehicles registered in Kaduna State during 10 years preceding the year of the study or 35.2 vehicle spaces per 1000 square metre selling floor-space of stalls; see Tables 7.22, 7.23, 7.27 and Figures 7.3, 7.4.2, pages 326, 327, 331 and 325, 332, respectively. If we allowed tolerance of 20%; the thesis therefore recommended that on no account, however, should the amount of short-period parking space provided be less than 6.6 vehicle-spaces per 1000 private vehicles registered in Kaduna State during the 10 years preceding the year of commencement of the development project or 42.2 vehicle-spaces per 1000 square metre selling floor-space of stalls.

This is conservative. In British older cities, the Federation recommendation was 50 car spaces per 1000 square metres of selling space. In the British new town centres and new American shopping centres, the figures were 75 car spaces per 1000 square metres. The car parking spaces were provided in units. The most economic size of the units were 100 car spaces, together with racks for bicycles and motorcycles. Therefore, the thesis recommended that vehicle parking spaces be provided in units of 100 vehicles per unit.

10.3.3.2 Dual Use of Parking Spaces

One of the benefits of the public provision and management of car parks in large units is that land can be economised by arranging for the alternate use of the same space by two classes of parkers whose peak demand occurs at different times. Thus parking spaces provided on that side of the CMP which adjoins an entertainment establishment can be made available at night to theatre goers, while in the commercial zone adjoining the CMP, the space normally used for all-day parking by office workers can help to meet the peak shopping demand on Saturdays. As the incidence of car ownership rises towards saturation point, it may well prove impossible to meet all parking demands without some such arrangement.

It is, of course, essential that the spaces provided for shoppers and other short-period parkers should be effectively reserved for their use, and not pre-empted before their arrival by all-day parkers working in a nearby commercial area. To a large extent, this can be ensured, where the car park is free, by keeping it closed until the influx of shoppers gets underway, by which time most office workers are already at their desks. Where a nominal charge is made, as in metered kerbside parking places, a punitive increase in the rate of charge after the first two hours or so is a more effective deterrent to the misuse of short-period car parks, particularly where ample provision is made (at economic rates) for all-day parkers nearer their workplaces.

10.3.4 Internal Planning of the Market Place

With reference to Table 7.2 8(a), page 335, the research did not find any appreciable difference between the sizes of stalls demanded by the traders and what existed at the CMP. The number of traders actually demanding stalls of larger floor-space is insignificant. Although most of the CMP traders did not indicate to demand more floor-space, it was observed that they had used wood and tarpaulin or polythene to extend their stalls temporarily every morning and removed them at the end of the day's marketing. On the average the floor-space achieved by this form of temporary extension of stall is about 0.5 of the official floor-space of the stall. Therefore it has to be concluded that the actual size of each stall is 1.5 of its official size.

But it is also to be expected that changes will go on taking place, perhaps more rapidly than ever, in the range of goods stocked by traders in each line of business, as well as in the proportion in which the total volume of trade is shared among the different types of retail institutions - the superstores, the shopping streets, the corner-shops and hawkers. For example, if the average shopper's disposable income continues to rise, most of the surplus will be spent on the more specialised goods. Here lies the dilemma; whether the tendency would shift to luxury goods shopping done in the superstores and shopping streets and less in the market places. For the majority of the people there is no indication of such happening too soon.

We now come to the core of the market place precinct - the stall blocks, and the footways on which they front - where the pedestrian is king. Its forms and quality must largely be determined by the civic designer's skill in organizing diverse elements into a coherent whole and in turning site limitations to good account. But here, too, there are important factors that he must bear constantly in mind if the market place is to be as successful as possible from social and economic points of view. Also, it has to be remembered that for a foreign visitor the quality of the environment in the market place is his number one barometer for assessing the quality of the urban life.

10.3.4.1 Unit Dimensions

It is essential that the stall blocks, as well as the market place as a whole, should be flexible in plan, so that some of the units into which they are divided can later be extended by absorption of others or by expansion to the rear. Even if the volume of business done by the market place proves no larger than was originally expected, it is likely that a continuation of present trends will bring about an increase in the average size of stall units, and that rate of unit expansion will be highest in the CMP, DMPs, and SMPs.

It is not to be supposed, however, that because retailers' requirements are subject to frequent and often unpredictable change, any sort of standardized stall will do. Planners and architects must realise that the dimensions and internal layout of a stall are vitally important to the effective arrangement of counters, to the free circulation of customers, and to the economical handling and storage of commodities.

At the other end of the scale, the level of rent that is required to cover the cost of units of large standard dimensions may keep out of a new or reconstructed market place the many small and highly specialised businesses that need only narrow frontage or minimum storage space, and whose exclusion would deprive the market place of any sense of intimacy, besides narrowing the range of consumer choice.
A layout with frequent access ways between stall blocks creates plenty of opportunities for accommodating units, with a wide variety of the many small and highly specialised businesses, between the short ends of the stall blocks. Such small businesses include shoe shining, patch-tailoring and waiting places for head-loaders.

10.3.4.2 Continuity of Display

At the front of the stall block compactness and continuity must be the keynote. The main footway (shopping malls) should be between six to twelve metres wide and lined with stalls windows on both sides, so that the shopper's eye no sooner turns from one window display than it is caught by another alongside it or across the mall.. These footways should be so linked together that the stream of pedestrian traffic, drawn by the sight of more stalls ahead, flows naturally from one stall block to another, never encountering needless set-backs or projections. Projections, whose only function is to close vistas or break in the continuity of display-frontage, might allow a shopper's interest to flag, or discourage him from exploring further. It certainly does not, of course, imply that the frontage to a main walkway should be unbroken by crossways, open or arcaded. Indeed, the more frequent the access from car park to walkway, the better, within reason, provided only that the access ways have stalls on both sides and are no wider than they need be for pedestrian circulation.

10.3.4.3 Zoning by Commodity

The size of the zones should not be too small or too large as to jeopardise the purpose of the zoning, which is to facilitate the shopper's logistics in the market place and help the trader to complement the associated trades and compete with his rivals as well. The designers should use design hedges and landmarks to indicate the zones as to facilitate their distinction. But care must be taken to avoid compartmentalization of the zones by use of divisive demarcators.

10.3.4.4 Zoning by Trade

As can be seen in Plates 3.2 (a & b), 3.3, 3.4, pages 78, 82 and 82 , respectively, considerable number of the traders engage in wholesale as well as retail trade. The scale of the wholesale trade is not sufficient to consider any segregation by trade. But the triangular area bounded by Ibrahim Taiwo Road, Kano Road and Lagos Street, is rapidly evolving into a wholesale and warehousing district. What used to be residential apartments is being transformed into wholesale or warehouse premises, and these generate their own share of traffic and help to heighten the attractiveness of the CMP. It is essential that the long goods vehicles which they attract to themselves should not be allowed to congest the main approaches to the CMP. The business carried out in this district is a desirable development process that may not be disturbed now, but rather organised to use a separate system of link and service roads independent of those of the CMP. At the present level of development the wholesale zone should co-exist with the central retailing zone, the CMP, side by side; refer to page 97 for historical evidence in support of this suggestion.

10.4 The Policy Recommendations

The thesis recommends the Urban Retail Market Place Development Planning Strategy which evaluation, using the proposed locational and structural potential model, has shown to have outstanding advantages over the other three most realistic alternatives. It is 16.75% better than the next best alternative, and 49.93% better than the other two alternatives which tied for the third position. The growth rates in 11 Kaduna city retail market places promised by the recommended planning strategy are shown in Tables 9.7.1 and 9.7.2, same page 546 . The forecasts of the demand and supply of activity spaces achievable by the recommended strategy for the years 1991, 1998 and 2005 are shown in Tables 9.7.(3-10) pages 547 to 550 . The economics of the strategy, like any other optimisation technique, is based on minimizing investment costs subject to meeting the standards of provision which the strategy had predicted.

10.4.1 Proposals in the Recommended Planning Strategy

The recommended planning strategy comprises the following 13 proposals:

(i) Expand the CMP into 2-3 storeys vertically;

(ii) Roads to be on the ground level, vehicle parking and station are on and above ground level;at the CMP

(iii) Railway, train station to be under or above ground level; at the CMP

(iv) All the city's retail market places to be fully integrated in the omnibus and minibus route circuits;

(v) Control of illegal extension of structure in and around the CMP;

(vi) Separate access for the shoppers from those of goods and services;

(vii) Provide bulk fresh food storage facilities in the CMP;

(viii) Ensure right use of activity spaces in the CMP;

(ix) Ensure right use of the facilities and amenities in the CMP;

(x) Increase protection of life and property in all the city's retail market places;

(xi) Construct the present standard of the CMP market place structure in the DMPs;

(xii) Construct appropriate structure, to the standard of the present CMP, in the SMPs;

(xiii) Construct a smaller model of the present standard of the CMP in the L/NMPs.

10.4.2 Flexibility of Plan

(i) The spare bearing capacity to be allowed for in the design of the foundation structures of the two to three-storeyed marked place building(s) has to be a balance between what is practicable and what is economically prudent. For example, the foundations are to be designed to bear 3 floors. The ground and first floors are to be developed in say phase 1, leaving the second floor to be developed probably in phase 3 of the project.

(ii) The architectural and engineering designs are to envisage the possibility of conversion to other forms of shopping arrangement. To this end, the buildings are to be framed structures with the partitions constructed of possible demountable elements. The nature of the demountable elements is to prevent the probability of crimes across the partitions.

(iii) The plan has to be able to retain as far as possible the option of switching over to one of the initially rejected strategies. The adopted strategy SG3 will easily switch over to alternative SG4 or to alternative SG2 with some modifications.

(iv) The plan has to be able to withstand the effects of major happening which might deflect the Kaduna city-region from the expected course of development. For instance, the development of Abuja has to be watched and necessary adjustments made in the phases of the plan in order to avoid commitment of resources in the projects that would not be economically used.

(v) The plan has to be reviewed between phases. In generating the plan it is possible that some issues had been overstressed, understressed or even overlooked. The in-between-phase review provides opportunity for correction of such errors.

10.4.3 Plan Implementation

(i) Kaduna State Government is to establish a Kaduna State Urban Market Place Development Board (UMPDB). The location and development of market places in an urban area is to be the joint responsibility of the Board and the Local Government Council.

The Board is to have power to establish, regulate and develop market places (both wholesale and retail). The Board is to be empowered to prescribe levy, stallage fees and methods of their collection, as well as collection of advance payment from the market stall allottees. The local government will carry out the actual collection, to be supervised by the Board.

The Board is to be authorized to award contracts for construction, maintenance and repair of market place structures.

The Board is to be empowered to borrow money, on behalf of the local government, and to be guaranteed by the state government, by means of bank loans among others, and to insure the market places against all forms of risk.

It is to promote peace among the market place traders (men and women). It is to remove and prevent street traders and illegal structures used for such or purported to be used as such street trading. The Board is to be empowered to seize goods, wares, and articles of trade offered for sale in the streets and dispose of them as laid down in the urban market place and street trading edict.

The state government is to back up the establishment of the Urban Market Place Development Board with an edict and give the Board the necessary authority and powers to carry out its responsibilities.

(ii) The planning department of Kaduna Capital Development Board (KCDB) is to be considerably enlarged to comprise three units and each section to be headed by a senior town planner as follows:

(a) Master plan unit: to deal with the periodic review of the master plan and other long term planning issues associated with guiding the direction of development and growth of the city.

(b) Urban transportation and central area development control unit: to deal with the city's transportation matters and city central area land use control. This unit is to be charged with the responsibility of participating in the urban market place planning committee. It should be necessary at this juncture to specify clearly the type of central area structure that is to be pursued vigorously.

(c) Housing and development control unit: to deal with housing issues in both old and new growth residential areas. It should be charged to deal with water bodies, parks, gardens, cemeteries, other open spaces, forestry conservation and urban design furniture.

Each of the above three units should participate in plan approval as it affects its area of interest.

(iii) Irrespective of ownership of a market place, the local government council is to have regulatory control in all the market places within its area of jurisdiction. It should be possible for local government council officials to enter market places during official hours for regulatory inspections and operators of such market places have to pay tax on such an enterprise to the local government council in whose area of authority the market place situates.

(iv) Within the local government council there is to be the urban market place management committee to be chairmanned by the councillor for market places and motor parks. The state urban market place development board is to have member on the committee with specified roles. The state urban development board is to provide this committee with professional and technical expertise as may be required. This committee when enlarged to include membership from the KCDB, it becomes and performs the functions of urban market place planning committee. The planning committee when enlarged to include membership from the Nigerian Railway Corporation, Federal Ministry of Works, the other state ministries, the district council and market place traders association, it becomes and performs the functions of urban market place plan implementation committee.

The urban market place planning committee is to be charged with the following responsibilities:

(a) To prepare the scope of each phase of the plan and the project implementation schedules;

(b) To provide and obtain the services of technical experts and consultancy;

(c) To prepare estimates of recurrent cost implication of projects in addition to the capital costs;

(d) To prepare financing plans for the projects;

(e) To prepare schedule of manpower, material and know-how requirements for successful construction and operation of the projects;

(f) To monitor the progress and problems of the projects;

(g) To act as intermediary between the local government council, the KCDB and the States and Federal Government organisations.

(v) The plan is to be implemented in project phases and the sizes of which are to be determined by available resources.

(vi) Some projects are to be implemented through competitive contracts and others by direct labour through the local government council staff.

(vii) The projects are to be closely and regularly monitored and evaluated during the implementation so as to be able to determine where and when time, financial costs, project scope and project objective may be traded off against each other.

(viii) Periodic monitoring and feedback are to be carried out by the use of the proposed locational and structural potentials model. The monitoring is to be carried out by the urban market place management committee by repeating stages 1-4 of the model. This would provide the necessary feedback for the next planning decision.

10.5 Proposals in the Alternative Plan

Since planners are not always sure of how the decision takers arrive at their decision, plus the fact that decision takers invariably prefer to be furnished with a recommended plan and an alternative plan, the following proposals constitute the alternative plan. The alternative plan has 77% same contents as the recommended plan. The differences are only in the first three proposals; the rest (iv-xiii) are exactly the same.

(i) Expand the CMP horizontally on the ground level into adjoining vacant land;

(ii) Expand the CMP horizontally on the ground level into adjoining built-up plots;

(iii) Introduce intra-city train with the existing railway and train station on the ground level at all market places on the railway;

(iv) All the city's retail market places to be fully integrated in the omnibus and minibus route circuits;

(v) Control illegal extension of structure in and around the CMP;

(vi) Separate access for the shoppers and commodity;

(vii) Provide bulk fresh food storage facilities in the CMP;

(viii) Ensure right use of activity spaces in the CMP;

(ix) Ensure right use of the facilities and amenities in the CMP;

(x) Increase protection of life and property in all the city's retail market places;

(xi) Construct the present standard of the CMP market place structure in the DMPs;

(xii) Construct appropriate structure, to the standard of the present CMP, in the SMPs;

(xiii) Construct a smaller model of the present standard of the CMP in the L/NMPs.

However, there is a limit to which the central market place (CMP) may be expanded horizontally on the ground before the problem of "market blight" would set in. If the diameter of the CMP becomes too large, the problem of the length of time and difficulty of penetration to the central locations from the outside would force many shoppers to be inclined to doing their shopping at perimeter rows of stalls. The traders at the central locations would receive fewer customers, and they would tend to move to the perimeter rows of stalls in order to be able to get more customers, thereby abandoning the former central locations to rot without activities. When this type of situation is reached, it is technically described as "market blight". Continued horizontal expansion of the CMP would inevitably result in this type of "market place central decay" without imaginative layout of spaces. Therefore, it is recommended that further horizontal expansion has to be matched with clearly distinguishable zones served by direct accesses from the perimeter roads.

CHAPTER 11

GENERAL DISCUSSION AND CONCLUSIONS

11.0 Introduction

To bring the research exercise to a conclusion, the performance of the proposed locational and structural potential model is summarised. The model is then discussed as a development in Land-use/Transport planning of urban market places. Discussed also is the Kaduna city retail behaviour in relation to the 6 locational and 8 structural potentials of Kaduna city market places. And finally, the tests for the flexibility of the model are expanded to include those not actually carried out because of data and time constraints and areas for further research indicated.

11.1 The Performance of the Proposed Locational and Structural Potential Model

The proposed "Locational and Structural Potential Model" for development planning of urban market places is not a physical model. It is an abstract one; and is designed so as not to be severely limited in its ability to describe a kind of system behaviour in which the planner is usually interested. It has been briefly described by the author as follows:

> "An Analytical Planning Model for the Study of the Demand and Supply of Activity Spaces, and of the Locational and Structural Potentials in A System of Urban Market Places, and the Formulation of a Development Planning Policy aimed at Achieving Balanced Demand and Supply of Activity Spaces, with the view to Optimising Locational and Structural Potential"

The market places of Kaduna, Nigeria, were used for the case study. This section is devoted to examining the ability of the model to perform the tasks described under sub-headings such as (i) system description and problem definition, (ii) situation explanation and solution generation, (iii) strategy evaluation and choice, and (iv) strategy implementation and monitoring.

The model is an abstraction from reality, which is used to gain conceptual clarity by reducing the variety and complexity of the system of urban market place institutions to a level we can understand, and clearly specify. The value of the model is that it can be used to improve our understanding of the ways in which the urban market place system behaves in circumstances where it is not possible (for technical, economic, political or moral reasons) to construct or experiment with a real-world situation. With these in view, one would expect the model to be exposed to some constraints. These constraints are also discussed. In the section named application method, the model is duly specified to ensure success in its selection of the most preferred solution.

11.1.1 System Description and Problem Definition

The focus of attention is the unbalanced demand and supply of activity spaces in the system of urban market places, which result in the congestion of people and vehicles in selected urban market places, and in the neglect of others, in Nigerian cities. Review of existing approaches to retail analysis show that none of them offers sufficient explanation to this phenomenon, in a manner that can be useful for planning purposes. This inability is due to the fact that (i) none of the existing approaches contains explicit inclusion of time in its structure, (ii) they are designed to predict what is likely to happen as a result of some assumptions, and not the possible range of performance in relation to defined locational and structural potentials in the urban market places.

As a new approach to retail study, which includes the above two factors, 'locational and structural potential model' for development planning of urban market places, is proposed. The proposition is based on the assumptions:

1a That there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for food shopping, in an urban market place;

1b That there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for non-food shopping, in an urban market place; and

2 That there is strong multiple causal relationship between the growth rate of any demand or supply of activity space, and the locational and structural potential in the urban market place.

In order to facilitate the analysis of a case study data quantitatively, the above proposed model is expressed mathematically in the form of 'generic equations' as follows:

$$D_{a_1} = \alpha D_{a_2} + C_a \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1a)$$

$$D_{b_1} = \beta D_{b_2} + C_b \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1b)$$

$$\sigma D_o = \left[L_1X_1^i + L_2X_2^i + \ldots\ldots + L_{n-1}X_{n-1}^i + L_nX_n^i\right] + \left[S_1Y_1^i + S_2Y_2^i + \ldots\ldots + S_{m-1}Y_{m-1} + S_mY_m^i\right] + K + E \qquad \ldots\ldots\ldots (2)$$

'a' and 'b' are notations to indicate:

(1) 'a' for food shopping

(1) 'b' for non-food shopping

'a' and 'b' are treated as parts of the letters preceding them, that is D_{a_1} and D_{a_2} are a pair of demand and supply of activity spaces, for food shopping and are called "food like-pair";

D_{b_1} and D_{b_2} are a pair of demand and supply of activity spaces, for non-food shopping, and are called "non-food like-pair";

σD_o is the growth rate of any demand or supply of activity space. The notation 'o' may be substituted with 'a' or 'b' for food or non-food shopping, respectively.

X_1, X_2, ... X_{n-1} and X_n are locational potentials, and n is an integer;

Y_1, Y_2 ...... Y_{m-1} and Y_m are structural potentials and m is an integer;

α, β, L_1, L_2, ... L_{n-1}, L_n, S_1, S_2, ... S_{m-1} and S_m are coefficients;

C_a, C_b and K are constants;

E is an error term;

i is an exponent to be estimated.

Equations '1a' and '1b' expressed the hierarchical relationships between the 'food like-pairs' and between the 'non-food like-pairs' of demand and supply of activity spaces, respectively. Equation '2' expressed the multiple causal relationship between the growth rate of any demand or supply of activity space, and the locational and structural potential of the urban market place.

The 6 locational and 8 structural potentials of the urban market places are listed in Table 1.2 , page 25.

The shopper, (T) and the trader (Q) are defined as the client groups demanding for activity spaces, while the stallage floor-space (Z) and the number of stalls (R) are defined to supply the activity spaces. Each of these basic components may be divided into food and non-food specific components, to give; the shoppers food-trips (T_a), the shoppers non-food-trips (T_b), the number of food traders (Q_a), the number of non-food traders (Q_b), the stallage food floor-space (Z_a), the stallage non-food floor-space (Z_b), the number of food stalls (R_a) and the number of non-food stalls (R_b). Accordingly, $đT_a$ and $đT_b$, $đQ_a$ and $đQ_b$, $đZ_a$ and $đZ_b$, $đR_a$ and $đR_b$ are the growth rates of the shoppers food-trips and non-food trips, the numbers of food and non-food traders, the stallage food and non-food floor-spaces, the numbers of food and non-food stalls respectively. By substituting the appropriate like-pairs of specific components in equations '1a' and '1b', 12 hierarchical equations are obtained (6 for food shopping and 6 for non-food shopping). By substituting the appropriate growth rates in equation '2', 8 predictive equations are obtained (4 for food shopping, and 4 for non-food shopping).

A diagrammatic representation of the model, meant for the improvement of understanding and systematic examination of the assumptions, is presented in Figure 5.3, page 175 . It was generated from the contingency approach to a stochastic system; one aim being to improve understanding of the interplay between the shopper, the trader, the stalls and the stallage floor-space, and the locational and structural potential in the market place. The procedure used in the generation of the model is known as triangulation technique. It is the use of multiple method of data generation and examination, aimed to achieve control and to improve analysis of the various relationships in the model.

SPSSX (Statistical Package for Social Sciences, 'X' version) was employed on the VAX computer to run simple regression analyses and scattergrams of (1a) pairs of specific components of demand and supply of activity spaces for food shopping, and of (1b) pairs of specific components of demand and supply of activity spaces for non-food shopping (i.e. solving the 6 food equations derived from generic equation 1a, page 594).

Of the six hierarchical relationships for food shopping;

$$0.9987 \leqslant R > R^2 \geqslant 0.9213 > 0.5; \text{ and}$$

$$0.0000 \leqslant \text{Signif } t \geqslant 0.0000 < 0.05.$$

The above statistics overwhelmingly confirmed that there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for food shopping, in an urban market place (see Table 7.31(a), page 357, for the summary statistics).

Of the six hierarchical relationships for non-food shopping;

$$0.9951 \leqslant R > R^2 \geqslant 0.9225 > 0.5 \quad \text{and}$$

$$0.0000 \leqslant \text{Signif } t \geqslant 0.0001 < 0.05$$

Also the above statistics unequivocally confirmed that there is strong hierarchical relationship between any pair of demand and supply of activity spaces, for non-food shopping, in an urban market place (see Table 7.31(b), page 358, for the summary statistics).

The hierarchical relationships are between:

1.1a the shoppers food-trips and the stallage food floor-space;

1.1b the shoppers non-food trips and the stallage non-food floor-space.

1.2a the shoppers food-trips and the number of food stalls;

1.2b the shoppers non-food trips and the number of non-food stalls.

1.3a the stallage food floor-space and the number of food stalls;

1.3b the stallage non-food floor-space and the number of non-food stalls.

1.4a the stallage food floor-space and the number of food traders;

1.4b the stallage non-food floor-space and the number of non-food traders.

1.5a the number of food stalls and the number of food traders;

1.5b the number of non-food stalls and the number of non-food traders.

1.6a the shoppers food-trips and the number of food traders;

1.6b the shoppers non-food-trips and the number of non-food traders.

The examination of the 'standardized scatterplots' and of the 'scatterplots' produced by the relationship between any of the 12 pairs of demand and supply of activity spaces, for food and non-food shopping; shown in Figures 7.7.1, 7.7.1b, pages 353, 354 and Apppendices A7.2.1 to A7.2.5, p. A102 - A120 respectively, strongly and unanimously revealed that the CMP has atypically far greater values on both variables than all the other city retail market places; it is not an outlier and not statistically different. But since its values are far removed from the others, the majority of the cases appear bunched together in order to permit the atypical CMP to appear on the same plot. These plots, 24 in number, unequivocally revealed a big gap between the CMP at the upper extreme, and the other market places at the lower extreme. The fact that the plots of the market places consistently fell into two main discrete groups, instead of forming expected hierarchical continuua, was a sign of unbalanced distribution of demand and supply of activity spaces among the market places. Since the CMP is not an outlier and not statistically different from the other market places, the unbalanced distribution must be due only to high concentration, in the CMP, of the like-pairs of the demand for and supply of activity , in the proportions similar to those found in the other market places.

11.1.2 Situation Explanation and Solution Generation

The urban market places draw their clients, the shoppers and the traders, from the same catchment area; the urban-region. Therefore, it may be said that the demographic, geographic, socio-political and economic characteristics of the shoppers and traders, who may demand activity spaces, remain the same for all of the urban market places. Conceptually, if each urban market place were to lose all its locational and structural potentials, each would be reduced to a dot, without road or railway linkages, and probably all the market places would be occupying the same spot. This concept is clearly demonstrated in the definition, and in the measurement parameters of the locational and structural potentials, detailed in section 6.2.3, page 198 . Consequently, if in an urban area the market places have varying growth rates for the specific components, the only assumption is that the varying growth rates are largely dependent on the locational and structural potentials of the market places.

The study, therefore proposed and examined the strength and form of the causal relationships between any of the 8 growth rates of demand and supply of activity spaces, for food and non-food shopping, and the locational and structural potentials in the market places. Subsequently 8 different equations were generated from the generic equation (2) shown above. SPSSX package was employed on the VAX computer to run multiple regression of each of the 8 predictive equations, using backward elimination procedure; i.e. solving the 8 predictive equations derived from the generic equation (2) page 595 (see Table 7.36, page 394 , for the summary statistics).

Of the 8 causal relationships for food and non-food shopping,

$$0.9996 \leqslant R > \text{Adjusted } R^2 \geqslant 0.9777 > 0.5,$$

$$0.0000 \leqslant \text{Signif } F \geqslant 0.0001 < 0.05 \quad \text{and}$$

$$0.0000 \leqslant \text{Signif } t \text{ (for each of the independent variables in the 8 equations)} \leqslant 0.0451 < 0.05$$

The above summary statistics, no doubt, confirm that there is strong multiple causal relationship between the growth rate of any demand or supply of activity space, and the locational and structural potential in an urban market place. For the growth rates of the shoppers food-trips and non-food trips, and for the stallage food or non-food floor-space, the exponent 'i' was estimated at 3. For the growth rates of the numbers of food and non-food traders and for the numbers of food and non-food stalls, the exponent 'i' was estimated at 2. However, this does not imply that for every study the value of i has to be 2 and 3. It can be any figure, but it is most unlikely to be 1. The 8 calibrated equations for the prediction of the growth rates of:

2.1a	the shoppers food-trips ;	dT_a
2.1b	the shoppers non-food-trips ;	dT_b
2.2a	the number of food traders ;	dQ_a
2.2b	the number of non-food traders ;	dQ_b
2.3a	the stallage food floor-space ;	dZ_a
2.3b	the stallage non-food floor-space ;	dZ_b
2.4a	the number of food stalls ;	dR_a
2.4b	the number of non-food stalls ;	dR_b

are shown in Table 7.37 , page 398 . It is these growth rates that have exacted over the ten year interval (1975-1984) to produce the observed unbalanced distribution of demand and supply of activity spaces among the market places.

The model showed considerable clarity in its ability to explain the cause of the unbalanced distribution of demand and supply of activity space among the market places. For example, in Tables 9.1.3 and 9.1.4, page 442, 442 , respectively, it quickly and efficiently revealed the unbalanced growth rates of demand and supply of activity spaces in the market places. These tables showed that between 1977-1984, i.e. an interval of 7 year period, the stallage floor-spaces for food and non-food in the CMP increased by 256.8% and 88.4%

respectively, the number of stalls for food and non-food increased by 277.7% and 170.4% respectively, and the number of traders for food and non-food increased by 316.2% and 264.9% respectively. Those growth rates are quite alarming in themselves. It can be observed also that the growth rates associated with food shopping are higher than those related to non-food shopping. This is abnormal, as one would rightly expect the reverse to be the case, with recourse to central place theory. According to the central place theory, the CMP being at the apex of the city's retail trade, should provide for non-food shopping more than for food-shopping, and the rate of growth of demand for food shopping ought to be less than that for non-food. The implication of the above contradictions is that the lower market places in the hierarchy have failed in their duty to provide a great portion of the city's demand for food shopping.

Since it has been shown that the precise size and structure of the growth rates of demand and supply of activity spaces in the market places are chiefly influenced by the locational and structural potentials in the market places, balanced relationship between demand and supply of activity space can be achieved by optimising locational and structural potential. It was thus concluded that it is possible to formulate a development planning policy that can achieve balanced demand and supply of activity spaces with a view to optimising the locational and structural potential in the market place.

Based on the views of some individuals, organisations, on the extrapolation of past trends and on the relevant experience of other countries, the above stated policy goals sought to achieve a pattern and capacity of shopping in Kaduna city; that would provide the best use of available resources, best marketing and shopping environment, greatest convenience to the consumers, and the ability to adapt to change whilst ensuring that social and economic advancement is maintained. That goal was translated into 3 sets of operational objectives that can be measured. The first set comprised the 8 general objectives of optimal demand and supply of activity spaces in the urban market places. The second set comprised the 6 particular objectives of optimal demand and supply of activity spaces required by vehicles at the CMP. The third set relate to 12 objectives of achieving balanced demand and supply of activity spaces between the like-pairs of specific components for food shopping or for non-food shopping. The three sets of objectives are set out in Tables 9.4, 9.6, and 9.9, pages 486, 493 and 512, respectively.

To achieve the listed objectives, a check-list of criteria technique guided the generation of the 27 development planning proposals. Each proposal was generated on the basis that it was capable of achieving some or all of the stated objectives. Secondly, they were action programmes which were limited to the range covered by the locational and structural potentials in Kaduna city market places. Thirdly, they lay within the ambits of the sub-variables that constituted the 6 locational and 8 structural potentials. The proposals were eventually grouped into 9 different policy solutions, shown in Table 9.2.1, pages 463 - 465 . The principle that governed the grouping together was the major advantages to be gained, and the avoidance of serious conflicts, in ensuring that the various proposals within a policy solution were all capable of successful implementation with available resources.

Also in narrowing down the range of possible policy solutions, subjective judgement was applied. This delimitation of the broad areas for further investigation was based on the criteria of justifying the functional location of the CMP in the heart of the urban centre and of disqualifying the imposition of taxation without justification, on moral grounds. The urban market places, being the traditional and chief shopping facility in the West African setting, the proposal to move the CMP away from the city central area was considered to have no merit, and was therefore excluded in the formation of the alternative strategies. Also the proposal to control the size of the CMP by increased taxation was rejected on the ground that, without recent financial investment in the CMP development, increased taxation with the sole aim to reduce the number of potential users, could not be jusfified easily. This is because the location and development of urban market places have economic as well as social and political implications. It is also only the Local Government Council and the State Market Place Development Board that can locate and develop urban market places. On this ground this proposal was also excluded from the strategy formation. Out of the remaining 7 policy solutions, 4 alternative development planning strategies, SG1, SG2, SG3 and SG4, were formed and are shown in Tables 9.2 (2-5), pages 467 - 469 . To this list was added the trend strategy, SG5, as the fifth one. The trend strategy is the policy stance which would permit existing physical, demographic, geographic and socio-economic trends to determine the growth rates of demand and supply of activity spaces in the urban market places. In essence, the trend strategy implies the continuation of the observed growth rates. It was adopted as the reference strategy, over and above which the performances of the alternative strategies are to be evaluated.

11.1.3 Strategy Evaluation and Choice

The proposed locational and structural potential objectives-achievement matrix, shown in Figure 9.3.1, page 471, was developed for tracing the incidence of a development planning proposal on the objectives of the market places. Where a proposal has incremental incidence in a locational or structural potential on an objective in any market place, the symbol of the proposal (AB, AC or AC.......U) is indexed to indicate its incremental incidence. Where a proposal has decremental incidence, its symbol is indexed with a negative sign before the symbol. Where a proposal has no incidence, no symbol is indexed at all, i.e. a blank space represents no incidence by the proposals.

A development planning proposal could be incidental in more than one locational or structural potential, as a proposal could increase the importance of one locational or structural potential in one market place, whilst at the same time decreasing the importance of other locational and structural potentials in another market place. Thus, in order to assess the actual effect of any proposal on the urban market place system, it is necessary to weigh-up and aggregate the various advantages and disadvantages the proposal might bring about if implemented. That would aid the decision takers in the task of evaluating each proposal and of determining the optimality criteria. This is why, in the design of the matrix, a proposal is not rigidly fixed inside a single locational or structural potential. It is, rather, placed in a position where it is possible to trace its incidence in any locational or structural potential (where applicable) across the objectives of each of the urban market places.

The calculation scheme shown in Appendix 6.3.2 page A54 was used to calculate weighted scores of the locational and structural potentials prescribed by each alternative strategy. In addition to those of the trend strategy, there are 5 sets of scores of the locational and structural potentials in the urban market places. The principle developed for the measurement of the general objectives-achievement of the alternatives covered the following steps; predicted growth rate, predicted distribution score, predicted distribution level, efficiency criterion performance situation, and efficiency score. These steps are outlined in pages 481 - 485 . At any of those steps the model produced data and statistics. This enabled the planner to take decision for the next step of the evaluation process, for example, Table 9.7.1 and 9.7.2 page 546, are part of the statistics produced in the "achieved growth rate" step. The achieved growth rates were obtained by applying the weighted scores of the locational and structural potentials prescribed by the alternative strategies, in the 8 predictive equations shown in Table 7.37, page 398. The prescriptions by one alternative are applied at a time. The achieved growth rates are quickly compared with Tables 9.1.3 and 9.1.4, page 442 . The comparison showed the improvement in the balancing of growth rates of demand and supply of activity spaces predicted for the target year 2005 by alternative SG3. The particular objectives of demand and supply of activity spaces required by vehicles at the CMP were evaluated for, in a manner similar to that of the general objectives with some deviations. The deviation was that the calibrated equations did not apply and the trend strategy was not used for reference; instead, the maximum incidental score on the locational and structural potential objective-achievement matrix was used for reference. The performance of each alternative was evaluated relative to the achievable maximum score. The steps taken are outlined in section 9.3.4, pages 493-496.

The measurement of the achieved balanced demand and supply of activity space is a combined index comprising:

(i) the "improved hierarchical-continuum score" measured by the number of market places introduced into the gap between the CMP at the upper extreme and the bunch of other market places at the lower extreme;

(ii) the "improved slope of the regression score" measured by the probability of the regression of the predicted like-pair of demand and supply approaching the diagonal, i.e. having a slope value of 1.

Hence the "improved slope of the regression score" achieved by an alternative over and above that of the trend strategy in the target year is:

for food shopping

$$\bar{V}_a = \frac{\bar{\alpha} - \hat{\alpha}}{(1 - \bar{\alpha})(1 - \hat{\alpha})} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.a)$$

for non-food shopping

$$\bar{V}_b = \frac{\bar{\beta} - \hat{\beta}}{(1 - \bar{\beta})(1 - \hat{\beta})} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.b)$$

where $\hat{\alpha}$ and $\hat{\beta}$ are the slopes when the values of the demand and supply of activity spaces predicted by the trend strategy in the target year are applied to the generic equations 1a and 1b, page 594.

where $\bar{\alpha}$ and $\bar{\beta}$ are the slopes when the values of the demand and supply of activity spaces predicted by an alternative strategy in the target year are applied to the generic equations 1a and 1b.

The numerical value of $\bar{V}_a$, $\bar{V}_b$, are adopted irrespective of the positive or negative sign. The achieved efficiency score for balanced demand and supply of activity spaces between the like-pairs of specific components for food and non-food shopping, is given by the product of the improved hierarchical continuum score and the improved slope of the regression score.

Subsequently the test of the performance of an alternative strategy in improving the unbalanced hierarchical relationship between any like-pair of demand and supply of activity spaces consisted of the following steps: the measurements, the balancing statistics and improved balancing score. These steps had been outlined in section 9.3.6.1, pages 508-509. The achievement of each strategy was its improvement on the unbalanced hierarchical continuum due to the trend strategy.

The gross efficiency scores by the alternatives in respect of (i) the 8 general objectives of optimal demand and supply of activity spaces in the urban market places, (ii) the 6 particular objectives of optimal demand and supply of activity spaces required by vehicles in the CMP, and (iii) the 12 tests of balanced demand and supply of activity spaces in the market places, are summarised. They are eventually ranked according to their overall performance over and above the trend strategy. The best preferred strategy was then subjected to equity consideration.

Since the shoppers trips usually originated from either his district of residence or place of work, two groupings were considered in order to determine what adjustment should be made to the estimates of gains and losses to the various groups so as to reflect their relative significance for the welfare of society as a whole. It is assumed here that the measures made of gains and losses are judged to be reasonably accurate indications of prospective changes in the individuals well being. On this basis, the achievement of the recommended strategy in each market place was broken down for examination on two backgrounds, as follows:

(i) places of work as implied by the city's central area structure;

(ii) residential population of the administrative districts of the city.

Where imbalance was found to exist, policy decision was taken to adjust the strategy in order to eliminate social inequity. The adjusted strategy, together with the plan management requirements necessary for its successful implementation, was recommended as the adopted plan for the retail market system of the city. The strategy that was second best preferred was recommended as an alternative plan. The policy recommendation is contained in section 10.4, pages 583 to 591.

11.1.4 Strategy Implementation and Monitoring

In the evaluation of the alternative strategies, as mentioned under the sub-heading of "overcoming constraints", cost analysis was not carried out. Therefore, the implementation of the adopted plan, in addition to the cost-minimization technique; both financial investment appraisal, and cost-in-use techniques are required in executing the various phases of the plans. Financial investment appraisal gives an estimate of the future streams of capital and operating costs, and revenue, that may result from the implementation of the investment projects. Since the market has both socio-political and economic implications, and both government and community investment are advocated, it is necessary to apply cost-in-use technique to ascertain community and government, capital and operating costs involved. The estimate may be expressed in average per capita costs for various phases in the implementation of the plan.

In the implementation process the model may be used as a monotoring technique by occasionally repeating stages 1-4. This would produce a situation report which could facilitate adjustment of policy and reordering of priorities.

11.1.5 Overcoming Constraints

The proposed locational and structural potential model for development planning of urban market places is a quantitative technique, and as such the problem is expressed in linear and non-linear programmes. The thesis concerned itself with the principles of linear and non-linear programming technique. It did not deal with the mathematical methods for solving linear and non-linear programming problems, as there are standard computer programmes which handle the solution without the user knowing so much about the mathematical methods employed. The model has formulated the relationship between the demand and supply of activity spaces in linear generic programmes, and the relationship between the growth rate of any demand or supply of activity spaces, and the locational and structural potential in a non-linear generic programme. The user of the model should understand what the programmes are doing, even if he does not understand how the computer is solving the mathematical problems. The essential statistics required to understand what the programmes are doing are presented in section 7.3.1, pages 369 - 379.

Both the objective functions of demand and supply of activity spaces and the applicable constraints of locational and structural potentials in the urban market places were specified in advance. The locational and structural potentials were weighted from two points of view - those of the shopper and the planner. The shoppers weighting of the locational and structural potentials was derived from the frequencies with which they influenced the shoppers choice of shopping centres. The planner by his training is equipped to measure the apparent magnitude of the locational potentials and the absolute magnitude of the structural potentials. This concept of measurement, borrowed from astronomy, relies on the fact that a locational potential has a relative value to the site of the market place, whereas a structural potential has an intrinsic value in the market place. Even qualities which cannot be quantitatively measured, the planner is trained to assign weights to reflect their importance or ranked in order of observed importance. Since it is not possible to know how decision-takers do weigh up the various advantages and disadvantages of plans, they are presented with the best two alternatives to enable them to apply their weighting when they make the final choice between the two strategies submitted for their approval.

Data collection problem was enormous since all possible design solutions had to be allowed for. In addition, the difficulty faced with internal validity factors, led to the employment of an unusual research design. With the overall objective of maximizing the amount of data, several research techniques were adopted to complement each other, since multiple and independent measures do not share the same weakness and potential for bias.

Firstly, we carried out (i) a semi-structured interview of the administrators of the urban market places, (ii) physical survey of these market places to obtain their locational and structural potential scores. The several techniques used in the study were developed, specially for this project, from standard data collection procedures. Secondly, we administered structured interview questionnaire to households to obtain the behaviour pattern of shopping trips distribution to the shopping establishments in the city. Thirdly, we carried out road vehicle entry and departure census at the CMP. Fourthly, we carried out census survey of the stalls in all the urban market places to obtain classification of the traders, the stalls and the stallage floor-spaces in them. Fifthly, we administered structured interview questionnaire to the traders in the CMP to obtain micro-details information on stallage and trading activities in the CMP. Samples of the questionnaires are shown in Appendices 6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.5.1, pages A5, A8, A38, A63, and A66, respectively. Sixth, we acquired data from consultants, institutes, the Federal, the State and Local Government offices. The analyses took into account all these sources of data, and consequently the data analysis was complex and extensive. The author is not aware of any study that used a chart such as that in Figure 7. 5, page 345, developed for the exploration of the survey data.

In most optimisation models, uncertainties surrounding much of the evidence as to the measurement of the achievement of objectives create certain difficulties. Although the sensitivity may be tested, the model results change with change of measurement of assumptions. The results from locational and structural potential model do not change with change of measurement assumptions, provided the assumptions which were in effect when the equations were calibrated remained the same when the evaluation of the alternative strategies is done. The strategies were evaluated in three different stages which included facilities for multiple stage decision process. The three different stages were; the 8 general objectives involving all the market places; the 6 particular objectives of the CMP in respect of transport means, and the 12 tests for balancing demand and supply of activity spaces and optimising locational and structural potential.

The aim of the model is to maximize the benefits resulting from a given amount of new urban development, as well as minimize the associated capital and operative costs. The measurement of the achieved objective is not difficult, but costs are not included in the evaluation process. The approach adopted in project implementation is based on minimizing investment costs subject to meeting standards of provision that are considered the plan should attain. These standards relate to optimization of the locational and structural potential of the urban market places. These are based on the physical design team producing alternative schemes for achieving the stated objectives for comparison.

11.1.6 Application of the Model

A graphic representation of the model is given in Figure 5.3, page 175 . It's framework should be regarded as an aid to systematic application of the model.

Despite those constraints discussed above, the model has considerable potential in (i) helping analyse the problem of unbalanced demand and supply of activity spaces, and of underutilized locational and structural potential in a system of urban market places, (ii) selecting a development planning strategy which can achieve balanced demand and supply of activity spaces, by optimising locational and structural potential. This is not to suggest that the parameters obtained here would apply elsewhere; rather that the general relationships (1) between demand and supply of activity spaces; (2) between the growth rate of any demand or supply of activity spaces, and the locational and structural potential in the market place are widely applicable. The application of the model, consists of the following stages:

STAGE 1: Using the questionnaires shown in Appendices 6.1.1, 6.2.1, 6.3.1, 6.4.1, and 6.5.1, pages A5 , A8 , A38 , A63 , and A66 , respectively, obtain data on (a) the locational potentials in all the market places in the city, (b) behaviour pattern of shopping trips by the urban residents, (c) road vehicle entry and departure census at the CMP, (d) census survey of the stalls in all of the market places, (e) administer structured interview to the traders in the CMP, (f) obtain from Government offices data on vehicle registration at least for the previous ten years and also data on population and socio-economic growth indices. Using the flow chart shown in Figure 7.5, page 345, explore the survey data to obtain the observed, (1) shoppers food-trips, and non-food-trips, (2) numbers of food traders and non-food traders, (3) stallage food and non-food floor-spaces, (4) numbers of food and non-food stalls, (5) locational and structural potential scores, for all the urban market places, (6) also explore the survey data, still using the flow chart, to obtain the data on the micro-detail information on marketing and shopping activities in the CMP. Items 1, 2, 3, 4 and 5 constitute the specific components of the primary cells of the model, Figure 7.1, page 286.

In deriving the specific components of the primary cells of the model, you shall require some data transformation procedures. Employing a statistical package, e.g. SPSSX, and a standard computer, e.g. VAX, you require the following procedures; frequencies, compute, cross-tabulation, breakdown, multi-response, condescriptive, and match-file.

STAGE 2: Using a statistical package (e.g. SPSSX) on a standard computer (e.g. VAX) run simple regression analyses and scattergrams of the linear equation (1a), for the 6 pairs of the specific components of demand and supply of activity spaces, for food shopping. Also run the simple regression analyses and scattergrams of the linear equation (1b), for the 6 pairs of the specific components of demand and supply of activity spaces, for non-food shopping. The interpretation of the scatter-plots produced by the scattergrams require some theoretical knowledge of retail behaviour analysis, and of the relationship between central area and market place sub-systems shown in Table 1.1, page 23 . The situation revealed by the scatterplots may need to be explained; see Figure 7.6, page 348).

STAGE 3: Employing a statistical package, e.g. the SPSSX, on a standard computer and using backward elimination procedure, run multiple regression analyses of the non-linear equation (2), for all of the 8 growth rates of demand and supply of activity spaces. Explore the data until best fit and predictive equations of the growth rates of demand and supply of activity spaces are obtained. Write out the 8 calibrated equations; (as shown in Table 7.37 , page 398); Also see Figure 7.7, page 367.

STAGE 4: The observed situation as revealed by stages 1, 2 and 3 are summarized in Figure 7.11, page 409. Planning decisions are required to be taken at this stage. Objectives are to be formulated based on an attempt to improve the situation revealed by the scatterplots. Generate alternative development planning strategies. Apply the alternatives on the proposed locational and structural potential objectives-achievement matrix shown in Figure 9.3.1, page 471, to generate crude locational and structural potential scores for each alternative. After transformation, standardisation and weighting, prescribed weighted locational and structural potential scores are obtained for each alternative. These are to be used in the evaluation.

STAGE 5: Using each strategy in turn, apply it's prescribed weighted locational and structural potential scores in the 8 calibrated equations; shown in Table 7.37, page 398. Each strategy will predict a growth rate for any of the demand and supply of activity spaces in the market places. The predicted growth rate, in the target year, would give a predicted distribution of demand and supply of activity spaces among the urban market places; see Figure 9.3.2, page 482.

STAGE 6: Repeat Stage 2, now, using the predicted distribution of demand and supply of activity space; see Figure 9.3.4, page 507.

STAGE 7: The predicted situation as given by stages 5 and 6 are summarized in Figure 9.3.7, page 517. The data and summary statistics in stages 7 and 4 could be compared.

Stages 6 and 7 are meant for cross-checking. The forecasts that are phased for implementation are obtained in stage 5 above.

Having summarized how the model copes with the task of description, explanation, prediction and prescription for the development planning of a system of urban market places, it is useful to see how the model is a development in land-use/transport planning of urban market places.

11.2 Proposed Locational and Structural Potential Model as a Development in Land-use/Transport Planning of Urban Market Places

A special issue of the Journal of the American Institute of Planners (1959) marked the advent of the use of mathematical models in planning. In its preface, the editor, Melvin Webber said:

> "The models that are described here are merely descriptive not prescriptive. The authors, humbly, do not suggest what choices should be pursued - what kinds of cities are most desirable..... And they can tell us something about our chances of success in pursuing the various cities of our dreams".

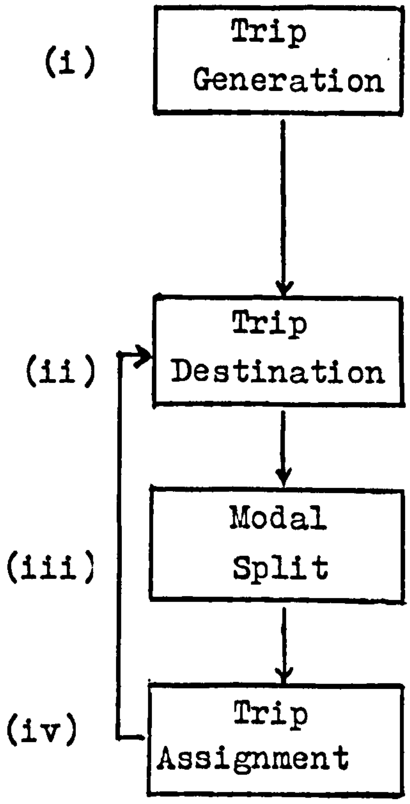
The view of this piece of work is that the attempt to describe a city system is not such a 'humble' pursuit as Webber put it. It might even be more important than the establishment of normative plans, because it may influence future actions. By the separation of the description of the retail system from the prescription, this model has brought as a consequence, an abstraction of our understanding of the urban system that we intended to plan. Thus, the understanding can be criticized in orderly, accumulative way, which helps to make planning a more socially and educationally responsible discipline. This abstraction process not only applies to areas of scientific interest - of how this urban socio-political and economic system works - but also exposes our ideologies and thus makes possible the rational discussion of the benefits accruing to different sections of the urban society by our actions.

The problem which necessitated this thesis was thought of by some others as a transportation problem in isolation, which caused congestion of people and vehicles in some parts of the city centre. But this thesis focuses attention on it as a problem of unbalanced demand and supply of activity spaces in urban market places, resulting in the congestion of people and vehicles in some selected ones. Another consequence of the development of the model is the pressure put on the need for dealing with more than one problem at a time. This notion of system modelling is the direct product of attempts to build models which were not able to estimate the critical inputs. The improvement of roads connected with city central area without corresponding investment in the means of public mass transportation, not only caused more attraction of some traffic but also generated changes in the locational potential of some land uses, producing in turn new congestion. Such failures put great pressure on the development of a more comprehensive land-use/transport model of urban market places.

11.2.1 Origin and Development of Locational and Structural Potential Model

The rapid increase of private cars since the end of the civil war produced serious hazards in terms of environmental deterioration and cost in time and money due to congestion. These problems were perceived by all sections of the population in a direct form; from the politician to the worker in an industry, from the housewife to the bureaucrat in a government office. Thus, in contrast to other urban problems, such as housing, we were all involved in the perception of the problems, where to build a new urban motorway, or a new bridge across a river or a new mass transport system to relieve congestion. Thus the Federal and State Governments commissioned studies to calculate the costs and benefits of the options.

The approaches adopted produced assessment of the existing transportation facilities and an estimate of the demand for travel by the population. The basic method of the approaches was the origin-destination survey. One such study was the traffic study for the Kaduna city centre development programme done by Bestarc International (1983). Given the provision of transport facilities and the location of land uses, four steps are necessary:



Which calculates number of trips starting from each zone and arriving in each zone based on the number of activities in each zone;

Which estimates the trips between each origin and each destination;

Which attempts to calculate the proportion of such trips in each transport mode;

Which allocates these trips to alternative routes.

The model recalculates the cost of travel due to congestion after assignment is achieved. Thus a new iteration is started until the system reaches equilibrium. This type of model was well documented in the 1960s (see Chicago Transportation Study, 1960; Detroit Transportation Study, 1961). A number of computer packages were developed which perform the calculations (see U.S. Department of Transportation, 1972). The success of the models in replicating existing patterns of travel gave added incentive to the notion of generality. Since then improvement within this overall design has been achieved (see Wilson *et al.*, 1969).

What the above transport model pointed out clearly is that traffic generation depends largely on the activities associated with each zone, thus with the pattern of land uses. This fact implies the need to estimate future land uses in order to be able to run the model with new transport facilities. Two alternatives were available to transport planners:

(i) the determination of land uses follows certain laws, which can be modelled; or

(ii) the determination of future land uses is the concern of land use planners, and therefore they must provide them as data inputs to the transport model.

In Britain, as well as in Nigeria, as a general rule, the land use planner provided the necessary inputs for the second option. But the ability of the land use planner to control land use development is highly questionable. He may be able to zone a commercial area, but he does not control the level of commercial employment or visitors to the area. He may be able to impose a maximum density restriction in a residential zone, but he is not able to control how many people would like to live in that zone.

The North American models which grew up in response to the first alternative tried to estimate land use based on empirical evidence which demonstrated that there were remarkable regularities in the density and distribution of land uses, Clark (1951) and Hamburg and Creighton (1959). The models produced at that time simply followed a 'natural law' of density decline from the city centre, and which also changed consistently through time. However accurately the descriptive models may depict existing land use patterns, there is no assurance that they will also describe land use in the future, (Webber, 1961). Such descriptive models provided little room for the planners intervention.

The reason behind the apparently deterministic output was found to be the concept of accessibility. The town centre is the most accessible place, therefore it attracts a large share of the town's activities. As the town expands, the density curve shifts subject to a maximum constraint due to the availability of land. Later models then attempted to explain the process of land use intensity by a more generalised concept of accessibility. In essence the level of accessibility is 'the potential of opportunities for interaction' (Hansen, 1959) in any point of the city, and it is measured by the cost (distance or time) of travel from that point to all other points weighted by the levels of activity at the other points (Stewart, 1948):

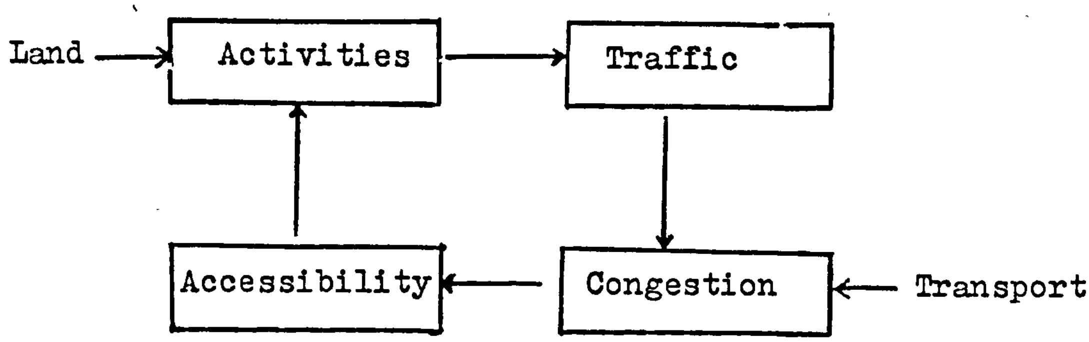
$$A_i = \sum_j \frac{S_j}{f\,(C_{ij})}$$

where A_i = accessibility of place i

S_j = level of activity at place j

C_{ij} = cost of travel between i and j

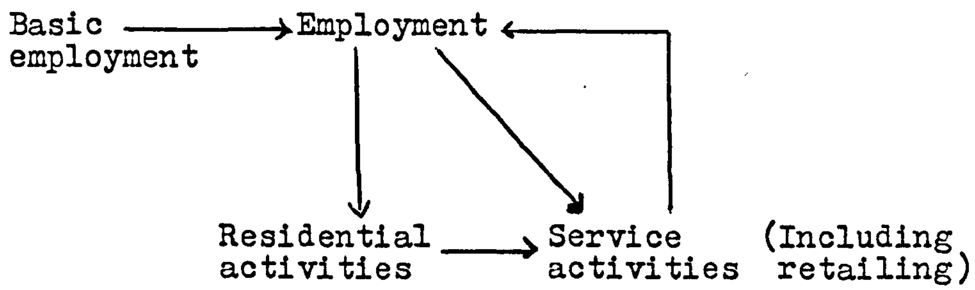
This is a gravity model. By measuring the level of activity in each place and its level of accessibility, it was demonstrated that there was a strong correlation between them. This provided the necessary link between transport and land use. The transport provision was reflected in the cost of travel which determines the level of land uses and which in turn determines the traffic generation. It was thus possible to integrate transport model with land use model as follows:



However, there is no record of experiment with this simple model. In preference the influence of accessibility was accounted for in new traffic generation, which provided a method for land use planners to intervene in the process of control and direction of urban development through the control of transport provision and land provision. One such experiment was the transportation and urban land study for Baltimore (Wingo, 1961).

The possibility of mathematically modelling the land uses encouraged a new wave of more general urban models. These new models of the early 1960s were financed by central government agencies, such as the Housing and Home Finance Agency in the United States with their community renewal programmes. As such, the emphasis in those applications was less concerned with the transport problem, but rather with the provision of housing and slum clearance. As a result the transport sub-model became less explicit.

The work of Lowry (1964) provided one of the first operational comprehensive urban models, in its adoption for the Pittsburgh community renewal programme (Steger, 1965). The Lowry model was a logical extension of Hansen's accessibility model, distinguishing several land uses. The main concept was that "The location of residential land uses was a function of the accessibility to employment, and the location of service land uses was a function of accessibility to residential and employment activities. In order to start this process an initial input of employment (basic) needed to be given":



Lowry's model was the first successful attempt to include retail in urban models (others had been geographic or economic in nature). The retail component of Lowry's model has been discussed in some detail in section 4.5.3, pages 138-141 .

An improvement on Lowry's framework has been by the inclusion of time progression and stepwise iteration. One such improved model is Hill's (1965) EMPIRIC model for the Boston Metropolitan Region. It is fundamentally a statistical model that derives changes based on the level of activity in each zone (land uses) as a function of the changes of other variables such as accessibility, existing level of activities, provision of services, etc. The model is calibrated by a set of simultaneous linear regression equations, from data from two points in time (ten year interval). The fact that certain changes were correlated to others does not imply causality. Because of its simplicity and highly accurate 'forecasting', this model has been popular in the modelling of American cities (Washington, D.C., Atlanta, New Orleans, Minneapolis-St. Paul, Denver and Seattle).

Since the earliest conception of the above approach to land use modelling critics have demanded a more behavioural approach which calls for modelling the processes and not the final state of the city. Response to such demand is echoed in several behavioural models, and started with the work of Herbert and Stevens (1960). Other successful ones include those of Ingram, Kain and Ginn (1972) in the United States, and the opportunity claimant model due to Parry Lewis and Traill (1968) in Britain.

There are some retail location models; they are not behavioural models as such, but retail interaction models, and therefore relate to the area of interest of this work. These are (i) the intervening opportunity model of retail location by Harris (1964) as part of the Penn Jersey Study; (ii) Reilly (1931) retail gravity model; (iii) retail market potential model developed by Lakshmanan and Hausen (1965); (iv) the central place theory that started with the works of Von Thünen (1826), Christaller (1933) and Lösch (1939); and (v) the application of the method of entropy maximisation to problems of retail location given by Wilson (1967B). Inevitably these models exclude some factors that have bearings on the problems of retail location, and as a consequence they must always be used with care and supplemented with experience and human judgement. Nevertheless, the criteria of their reliability for long term planning is at present judged on the extent that they answer the following questions:

(a) Does the model produce a system that is in equilibrium?

(b) Are service and trip lengths in different parts of the area comparable; and

(c) Does the distribution provide a reasonable simulation of the market process?

But none of the above approaches to retail analysis (or a combination of them) proved a satisfactory answer to the research question: "What development planning strategy, at urban level, can achieve balanced demand and supply of activity spaces in the market places, with the view to optimising the locational and structural potential?" This is because: (1) none of these approaches contain explicit inclusion of time in its structure, and (2) they are designed to predict what is likely to happen as a result of some assumptions, and not the possible range of performance in relation to defined locational and structural potential of the urban market places.

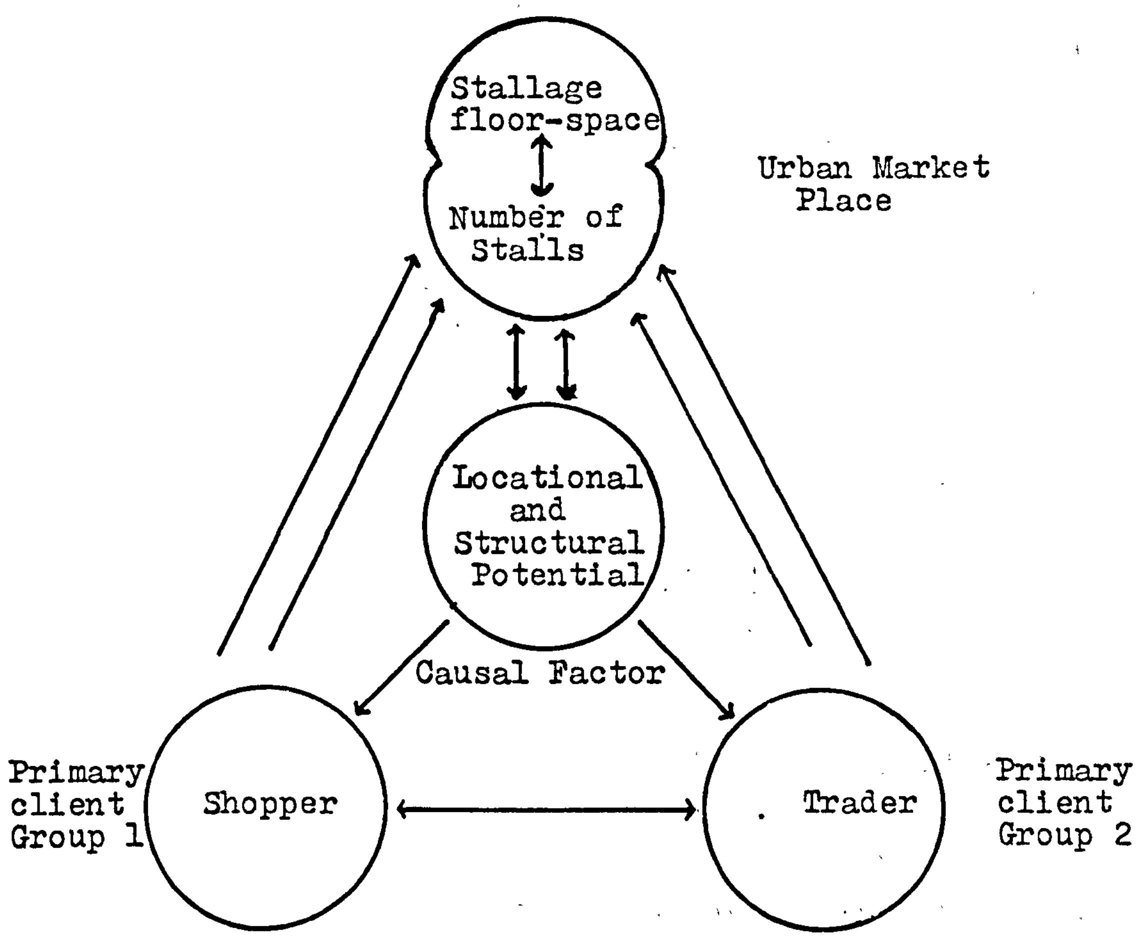
Confronted with the problem of unbalanced demand and supply of activity spaces in a system of urban market places, resulting in the congestion of people and vehicles in selected urban market places, the study found it more appropriate to adopt a behavioural approach to land use and transport planning, based on the following rationale:

If there is a consistency underlying the pattern of use of the activity spaces in urban market places, it is probably not a consistency in pattern *per se*. Rather the consistency is in the economic and social behaviour of the individuals who choose the location of their houses and of the individual traders who choose the market places in which to locate their stalls. None of these individuals is seeking to shape the urban-wide market place use pattern, of course; nor is he seeking to increase his neighbour's welfare. His motivations are private; he is seeking a location that, according to his private calculus will serve to increase his own welfare. The search for the appropriate shopping centre or the appropriate market place for his stall represents a search for environmental attributes that might best suit his peculiar preference or needs. The environmental attributes of the urban market places fall into two basic groups regarded as "locational and structural potentials" of the urban market places (see Table 1.2, page 25 , for the list of the locational and structural potential of urban market places).

Nevertheless, his capacity to compete for the choice of market place that represents the "optimum combination" of these "attributes" is limited by his income, and is conditioned by his preference for other things that his money might buy. Others may be willing and able to spend more for that "optimum combination"; he would then be forced to accept a different one, having fewer of the attributes he regarded as his personal optimum.

In the intricately competitive web within which each of the several million households and several thousand traders seeks to approximate its own optimum, a consistency does emerge. If, as a consequence of the economic and social behaviour of the shoppers and traders, the urban phenomenon of congestion of people and vehicles does emerge in selected urban market places, the logical inference is consistency in unbalanced demand and supply of activity spaces in the urban market places. But it is only detailed research that can prove the exact relationships between the demand and supply of activity spaces, and the locational and structural potential of the urban market places. To formally initiate an analytical research process, it is proposed that:

In the behavioural relationships between the shopper, the trader and the urban market places, there are strong relationships and causal influence between the demand and supply of activity spaces (stallage floor-space, and number of stalls), and the locational and structural potential of the market place :



The urban market place component of the model consists of two basic components, the stallage floor-space and the number of stalls; whereas the locational and structural potential component of the model comprise land use facilities and transport facilities. Therefore, it may be concluded that the proposed locational and structural potential model is a comprehensive land use/transport model.

Since the model is calibrated by sets of simultaneous linear and non-linear regression equations, from data from two points in time (ten years interval); and the fact that certain changes are correlated to others does not imply causality; and because of its simplicity and highly accurate forecasting, it is an EMPIRIC model, similar to D.M. Hill's (1965) EMPIRIC model. However, Hill's EMPIRIC model was calibrated by a set of simultaneous linear regression equations. His model in some ways is more like the Lowry type than the economic-behavioural type. Since this model is based on socio-economic behaviour, it would have been surprising if the causal relationships were not non-linear. By inclusion of time progression this model is an improvement on the existing retail analysis models. In addition to providing a considerable description of the retail system, it provided a predictive facility of significant accuracy. It is in addition designed to predict the possible range of performance in relation to defined 6 locational and 8 structural potentials of the urban market places; which makes it a planning model.

Also the proposed locational and structural potential model represents an advancement on M. Hill (1966) Goals-Achievement Matrix method. M. Hill put forward his original idea of goals-achievement matrix in his Ph.D. dissertation, "A Method for Evaluating Alternative Plans: goal-achievement matrix applied to transportation plans". M. Hill had argued that the technique should be restricted to investigating single-sector projects and effects.

In section 8.7, page 427, this thesis has reviewed various attempts to adapt the technique in one form or the other in the evaluation of multi-sectoral regional, sub-regional and urban structure plans. Commenting on M. Hill's goals-achievement matrix, N. Lichfield _et al_. (1975) has this to say:

> ".... the objectives employed in Hill's matrix are not valued in themselves but for their achievement of certain higher level goals (ideals) which denote very general policy aims, concerned with areas such as 'social justice' and 'choice and opportunity'. Conceptually, the objectives are said to be derived from a consideration of the postulated ideals"

The above statement accounts for the robustness of M. Hill's "goals-achievement matrix" procedure in evaluation of strategic plans. Confronted with difficulties of multi-sectoral nature of many an urban and regional planning study, many planners simply try to rationalize established evaluation procedures and make them appear more systematic by adopting Hill's "goals-achievement matrix" and attempt to substitute goals directly with objectives. Lichfield, N. and others are critical of the method of substituting goals directly with objectives in multi-sectoral projects, where the objectives are valued in themselves, but only sum up to give the attainment of stated goal(s). What the proposed locational and structural potential model has achieved is that it used the predictive equations to establish empirical relationships between the goal(s) and the objectives. This method, undoubtedly, provides a realistic way of transferring objectives-achievement to comprehensive goals-achievement.

Again, in response to the argument which calls for modelling the process and not the final state of the city, the proposed locational and structural potential model adopts a behavioural approach to derive the relationship between people and their urban environment. The relationship is therefore dynamic and not static. Accordingly, the model does not suggest that the parameters obtained in one case study would quite necessarily apply in another one. The model is rather a general framework illustrating the possible relationships that can facilitate the estimation of the necessary parameters that would enable the user to generate appropriate proposals aimed at solving the revealed problems. And being a development in linear and non-linear programming, it can swiftly and efficiently search out preferred solution from the possible range of performance in relation to defined locational and structural potential of the urban market places. It can also be used as a plan monitoring technique. The model has considerable capability in analysing the retail behaviour of a defined urban area in relation to the specified locational and structural potential of the market places.

11.2.2 Kaduna City Retail Behaviour in Relation to the 6 Locational and 8 Structural Potentials of Kaduna City Market Places

Table 7.36, page 394, shows the significance level of each of the 6 locational and 8 structural potentials of Kaduna city market place system, in the calibration of the eight predictive equations for the growth rates of demand and supply of activity spaces. The efficiency of the model, to a large extent, depends on how accurately the significance levels of the locational and structural potentials of the urban market places explain the observed urban retail behaviour. As each shopper or trader seeks to approximate to what represents his personal optimum combination of the locational and structural potential of the urban market places, a consistency in economic and social behaviour does emerge. The consistency in the significance levels, shown by the locational and structural potential, should no doubt explain the observed phenomenon of congestion of people and vehicles in selected urban market places, as a consequence of the consistency in the economic and social behaviour of the shoppers and traders.

In the first set of 8 predictive equations for the growth rates of demand and supply of activity spaces (i.e. when the regression analyses were run without any constraint), the locational and structural potentials showed significance levels, measured by the number of times each potential was included in the equations, as shown in Table 7.38, page 399 , column 2. It is observed that, food and non-food capacity and zoning of the market place by commodity were the most significant predictors of growth rates of demand and supply of activity spaces. The importance of the zoning of the market place by commodity was collaborated by the serious concern expressed by the shoppers, the traders and the administrators of the large market places, about the breaking down of the zoning of the market place that was once strong.

The structural potential - food and non-food capacity - which is a measure of the existing level of activities, may be assumed to reflect the cumulative effect of the other locational and structural potentials acting over a period of time. Therefore, it was necessary to run the regression equations a second time, with the food and non-food capacity omitted. The locational and structural potentials assumed new significance levels, as shown in Table 7.38, column 3.

In the first set of equations, the locational potential - immediate surrounding residential population - was the third important predictor of the growth rates. Of course, population is '<u>sine qua non</u>' for the existence and survival of a market place. Also it is a variable that a land use planner has highly questionable control over, see page 622 . Therefore, in running the regression analysis for the third time, both the existing level of activities and immediate surrounding population were constrained out and a third set of 8 predictive equations were obtained. The significance level of the locational and structural potentials are indicated in Table 7.38, page 399, column 4.

The Kaduna city retail behaviour, deduced from the significance levels of the locational and structural potential of the urban market places, is presented in the succeeding pages, as follows:

The structural potential - food and non-food capacity - which is a measure of the existing level of activities, is the logical consequence of the cumulative effect of the other locational and structural potentials over a period of time. It tended to mask the effect of structural potentials such as security of life and property, environmental design qualities, fresh food stuffs, because there is nothing that encourages the shopper or the traders as much as the fact that he sees other people doing what he wants to do. What the significance levels imply is that for a group of market places, assuming all other causal factors are the same, except the varying magnitude of security of life and property, or environmental design qualities, the trader and shopper would prefer the market place that offers better security and environmental qualities. This provides the impetus for the growth in the market place. Eventually the economy of scale sets in, and the issues of security of life and property and environmental qualities, even though still important, become submerged in the subconscious minds of the trader and the shopper.

The high correlation between the existing level of activity with the road transport linkages is explained by the fact that the means of public transport are not a social service, but are strongly rooted in entrepreneurial economics. The taxi cabs and minibuses are owned and operated by private individuals who prefer to channel their unprogrammed movements, en-route good roads, towards the large market places with promises of full passenger loads. And since transport fares are basically priced 'per drop' and not strictly on the length of the journey or the time taken to perform the journey, the users of public transport usually seek to visit the market places where the majority of the taxi cabs and minibuses are willing to go, in order to maximize their net gain. This is also reinforced by the fact that a large market place promises more prospects of combined shopping.

The size of the market place and zoning by commodity were strongly inversely correlated. This was collaborated by serious concern expressed by the shoppers, the traders and the administrators of large market places, about the breaking down of the zoning of the market place. The implication is that zoning by commodity is very helpful in the description of any market place. It becomes essential, but paradoxically difficult to sustain, with increasing size of the market place.

The removal of the influence of the size of the market place from the regression analyses, resulted in the reduction of the significance of a locational potential - the immediate surrounding other shopping centres. This locational potential showed strong association with the growth rate of the number of traders and stalls. Whereas a trader's strategy is to locate in a large market place with greater prospect of customers, he would as well prefer a location with more neighbouring shopping centres; as this would mean more overflow of custom to him. With recourse to Reilly's (1931) law of retail gravity, if his own market place increased in size, the traffic between his own centre and the neighbouring ones would increase. This would result in greater competitive opportunity at his disposal because of these other neighbouring shopping centres, and vice versa.

The omission of the size of the market place from the predictive equations, showed that the locational potential - immediate surrounding places of work - was a stronger potential than it appeared in the presence of the size of the market place in the same equation. That this was so is explicable. Assuming other potentials, but immediate surrounding places of work, remained the same for a group of market places, the market with higher value of immediate surrounding places of work would grow faster. When the market place becomes large, the significance of the influence of surrounding places of work becomes relatively less than that of the size of the market place.

The causal effect of the locational potential - immediate surrounding residential population - was very significant in 6 out of the 8 initial regression equations. This was understandable, as population is very crucial for the existence and survival of a market place. But it was interesting to note that with the omission of the size of market place from the regression analyses, the effect of immediate surrounding residential population was eliminated from the equation,which predicts the growth rate of the non-food trader. The implication of this is that a non-food trader does not necessarily lay emphasis on locating in his local/neighbourhood market place, but rather on locating his stall in any part of the city where other locational and structural potential would guarantee him at least the minimum number of customers to keep him in business. It does imply that a non-food trader has a greater chance of success in a large market place than in a small one. Subsequently many of the non-food traders at the CMP live far away from it and have to come to the CMP in auto vehicles.

Out of the 8 initial predictive equations, the locational potential - immediate surrounding wholesale shops and warehouse - occurred only twice in the presence of the size of the market place and the immediate surrounding residential population. In both the raw and transformed data, immediate surrounding wholesale shops correlated strongly with these two variables, but showed very significant effect in their absence. Also in the absence of the size of the market place and immediate surrounding residential population, the structural potentials - building design factors, and facilities and amenities - became quite significant. The implication of this is that these three factors - immediate surrounding wholesale shops, building design factors and facilities and amenities, have negligible significance with the majority of the city's residents, but are very influential with the minority of the residents who give such factors consideration when they decide where to shop for food or non-food.

It was interesting to note that the structural potential - parking of vehicles - was not included even once out of the 113 times the independent variables were included in the three sets of 8 equations each (i.e. 24 equations). This implies that up to the elimination of the two domineering independent variables - the size of the market place and the immediate surrounding residential population -

vehicle parking was not yet of considerable influence on the retail behaviour. This is explainable by the fact that private car ownership in Kaduna and Nigeria as a whole is small. In spite of the appalling vehicle parking situation in the CMP, it is only a problem that affects only a very small portion of the urban population. For the commercial vehicle operators, the appalling stationing spaces for their vehicles could not deter them from their bid for stationing spaces in the CMP, which promises lucrative adventure in the traffic-jammed motor station.

The train is not yet used for intra-city mass transportation of people and goods, and therefore the locational potential - railway traffic linkages - did not exhibit any influence on the retail behaviour. But, however, the railway station market place is largely sustained by food produce brought from the South and the Middle Belt of the country by long distance train service. Nevertheless, when the train becomes a means of intra-city transport for people and goods, its' significant effect on retail behaviour will be evident.

The observed phenomenon of congestion of people and vehicles in the CMP, and of neglect of the other market places, did emerge as a direct consequence of Kaduna city retail behaviour in relation to the 6 locational and 8 structural potentials of the city market places.
The above discussion was focused on how the consistency in the economic and social behaviour of Kaduna city residents, (as each individual chooses the location of his house, his place of work, and his preferred shopping centre(s); or chooses the market place for the location of his stall), underlie the problem of unbalanced demand and supply of activity spaces in Kaduna city market places.

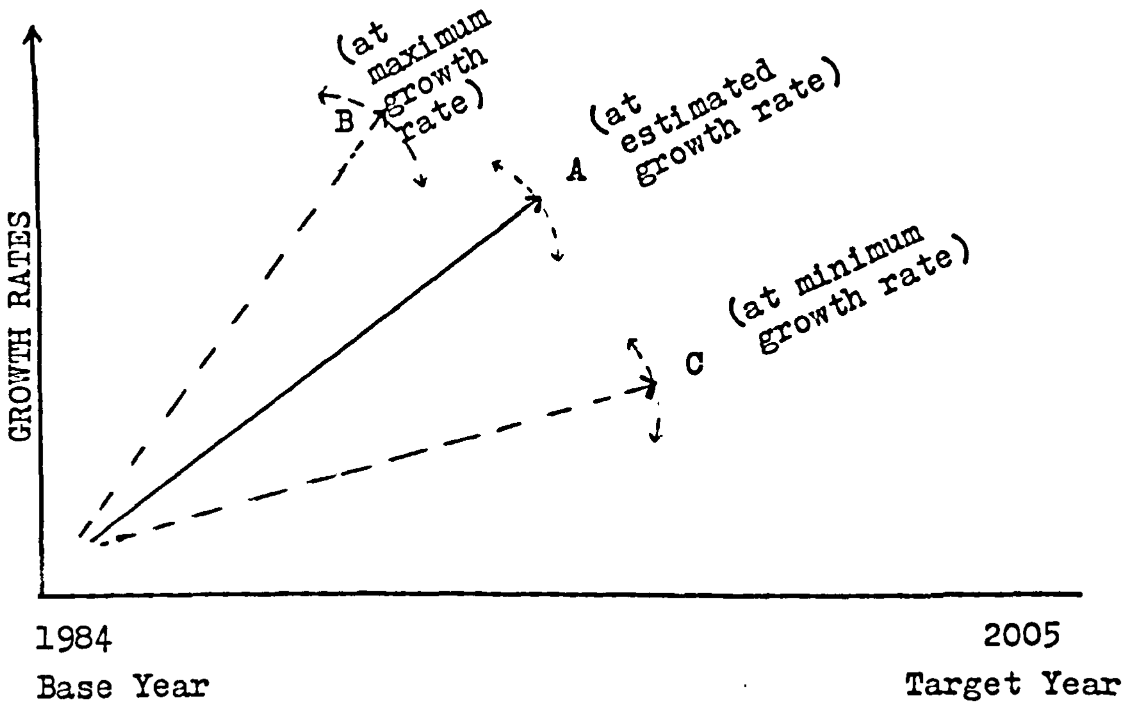


Figure 12.1: Conditions to consider in the Flexibility Tests of the Proposed Locational and Structural Potential Model.

And in order to achieve balanced demand and supply of activity spaces, with the view to optimising the locational and structural potential of Kaduna city market places, development planning policy recommendations were formulated and presented in section 10.4, pages 583 to 591 .

In the process of the development and application of the model, some questions on statistical methodology, and on conceptual issues of the model specifications arise. These questions are treated in the form of reflective epilogue in the last chapter 12.

CHAPTER 12

REFLECTIVE POSTSCRIPT TO STATISTICAL METHODOLOGY AND TO CONCEPTUAL ISSUES OF THE MODEL SPECIFICATIONS.

12.0 Introduction

In response to questions that arise, concerned primarily with points of statistical methodology, and conceptual issues concerning the specifications of the model, an epilogue to the dissertation is presented, to address the following issues:

1. An acknowledgement of the fact that, although the general concept of locational and structural potential model originated from the approach of dynamic systems theory, the actual model calibrated is a comparative-static type. This is followed by a brief discussion of the differences between (i) dynamic and (ii) comparative-static analysis;
2. An explicit recognition of the difficulities in using the model - with its independent variables observed at cross-section (1984) - as basis for predicting future values of dependent variables;
3. An explicit discussion of the other demographic, socio-economic and environmental factors influencing the model, and of how to incorporate them into the model;
4. A discussion of regression analysis which reviews the problems posed by multicollinearity in a data set. This addressed the relationship between parking of vehicles variable and size of market place and residential population;
5. A discussion to indicate clearly how to include dummy variables in the model, and test for their significance;
6. A clear distinction between causal relationship and statistical association;
7. Further tests and areas for further research.

The discussion of these issues are presented in the succeeding pages.

1. Dynamic/Comparative-Static Analysis

Knowledge of dynamical systems theory (which itself is historically a direct outgrowth of the Lagrangian viewpoint of classical mechanics, see for example, Rosen, 1970), suggests that the dynamical analysis of any system has two basic parts: (1) It must be decided what constitutes an instantaneous description of the system of interest; (2) the mechanisms that translate this information from one point in time to another must be understood and expressed in formal terms. An ordered n-set of observations, $(X_1, X_2 \ldots\ldots X_n)$ arising from a finite set of instantaneous measurements represents a possible state of the system of interest and this notionally expresses the first step in the dynamic description. But now the manner in which this system changes over time must be specified; this is much more difficult. Sometimes it is possible to give conditions that help in the specification of the functional dependencies that express the rate of change. A general example is that the rate at which a particular state variable $X_i(t)$ is changing at time t depends only on the existing state $\left[X_1(t), X_2(t) \ldots\ldots X_n(t)\right]$ i.e.

$$\frac{d\,X_i}{dt} = f_i\,(X_1 \ldots\ldots X_n); \quad i = (1 \ldots\ldots n), \qquad (4)$$

and n can be any positive integer

Thus in this case the dynamics of the system are determined by specifying the instantaneous description $(X_1 \ldots\ldots X_n)$ and the functions $f_1 \ldots\ldots f_n$.

However, it is worth distinguishing dynamical systems theory from classical approach to control theory. The latter is based on a Laplace transform of a linear input-output differential equation that gives a high level of abstraction that is suitable for control problems in engineering, but is rather opaque to the mechanisms and behavioural changes common within urban systems.

In urban and regional planning dynamical systems approach can be used as a dynamic optimising approach, or adapted as an heuristic or simulation method. M. Cordey-Hayes and D. Gleave (1975) found the approach useful simply as a general structuring framework for experimental analysis of growth and change. They applied it in their modelling of rates of change of population of a set of city regions due to migration. Also McFarlene (1973) and Paelinck (1973b) have used similar approach in analysis of urban systems.

It is very rare that we are able to specify the functional dependencies adequately for urban systems, and it is considered here that the observational deduction of these functions is the fundamental long term problems in the analysis of growth and change. The functions are essentially an expression of the endogenous 'forces' that are acting in the system and which are responsible for its dynamic behaviour. The thesis problem of interest is how to structure observational analysis in order to deduce the functional dependencies whilst concurrently addressing policy questions.

In a simple application of the above dynamic systems equation the study set off with a proposition presented as a dynamic model of the rate of growth of demand or supply of activity spaces in a set of urban market places in terms of the probability of transition (change) in the locational and structural potential of the market places as:

$$\frac{dD_r}{D_r} = \lambda \sum \left[\bar{L}_p(X_p^i + dX_p)_r + \bar{S}_q(Y_q^i + dY_q)_r \right] \quad \ldots\ldots \quad (4.1)$$

$$p = (1 \ldots\ldots n)$$
$$q = (1 \ldots\ldots m)$$

Where D_r denote demand or supply of activity spaces at time r

$\frac{dD_r}{D_r}$ is rate of growth of demand or supply of activity space at time r

λ is the sum of socio-economic factors

X and Y are locational and structural potentials of the market place respectively at time r

dX_p and dY_q are rates of change of locational and structural potentials respectively at time r

$\bar{L}$ and $\bar{S}$ are coefficients of locational and structural potentials respectively

i is an exponential to be estimated.

In an interval of time, say, from time t_1 to time t_2, suppose the growth of demand or supply of activity space is dD and the changes in the locational and structural potentials are dX and dY respectively, the equation becomes

$$\frac{dD}{D} = \lambda \sum \left[\bar{L}_p(X_p^i + dX_p) + \bar{S}_q(Y_q^i + dY_q) \right] \quad \ldots\ldots\ldots \quad (4.2)$$

If during the interval time the changes dX_p and dY_q are so small compared with the sizes of X_p^i and Y_q^i respectively then we have

$$\frac{dD}{D} = \lambda \sum \left[\bar{L}_p(X_p^i) + \bar{S}_q(Y_q^i) \right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.3)$$

By replacing $\frac{dD}{D\lambda}$ with $d\bar{D}_o$, opening up the series p and q and allowing for error term $\bar{E}$ and a constant $\bar{K}$, we obtained

$$d\bar{D}_o = (\bar{L}_1 X_1^i + \bar{L}_2 X_2^i + \ldots\ldots + \bar{L}_{n-1} X_{n-1}^i + \bar{L}_n X_n^i)$$

$$+ (\bar{S}_1 Y_1^i + \bar{S}_2 Y_2^i + \ldots\ldots + \bar{S}_{m-1} Y_{m-1}^i + \bar{S}_m Y_m^i) + \bar{K} + \bar{E} \quad .. \quad (\bar{2})$$

This is the proposed generic predictive equation (2) in page 171 except that, λ , the sum of socio-economic factors, is now incorporated. (see the specification of λ in pages 657-658.

Although the general concept of locational and structural potential model originates from the approach of dynamic systems theory, the actual model calibrated in this study is comparative-static type, because, whereas the dependent variable of demand or supply of activity spaces is measured at two points in time, the independent variables (locational and structural potentials) were observed at a single cross-section.

In principle the main differences between dynamic and comparative-static analyses are: whereas dynamic analysis is interested in rate of changes in some time period and the variables involved are measured in time series, static analysis examines the relationships between the variables (of a system) which are all observed at a single cross-section. Comparative-static analysis which is midway between dynamic and static analyses examines the relationships between the growth rates of certain variables and other variables observed at cross-section.

The development and application of some simple comparative-static land use models in the UK are well documented by Massey and Cordey-Hayes (1971), Barras <u>et al</u>. (1971) and Broadbent (1973). However there are some difficulties that have to be contended with in the application of comparative-static models, such as the proposed locational and structural potential model, for predictive purposes.

12.2 Difficulty in Predicting with Locational and Structural Potential Model

The validity of the regression model for predictive purposes depends on the validity of the four assumptions made about the regression residuals. When the null hypothesis of independence is true the regression residuals have:

1 a Gaussian distribution;

2 zero mean throughout the range of the predicted variable;

3 constant variance throughout the range of the predicted variable;

4 zero correlation between successive residuals.

(When these assumptions are not met the customary inference procedures are invalid, often to an unknown extent).

Of these four, the assumption that the residuals have a constant variance is most often problematical when the independent variables are cross-sectional, deriving from a snapshot of many cases at one instant of time. The violation of this assumption can be checked formally by looking at a plot of the residuals $(Y - \bar{Y})$ against the predicted values $(\bar{Y})$ or at a plot of the standardized values of both. If there is a marked pattern of great spread in some portion of the scatterplot than in others, then "heteroscendasticity", i.e. non-constant variance of residuals, is a problem. Otherwise the residuals are said to be "homoscendastic", and the inference can proceed unabashed (provided the other assumptions are tenable). However, the user must be aware of a kind of trick that can be played on the eye by a clustering of cases which have nearly the same predicted value, i.e.

bunching together of some cases can create a false impression of heteroscendasticity.

When the data are time series, arising from repeated observation of the cases over time period, then the problem of heteroscendasticity usually gives way to the problem of 'autocorrelation', in which successive residuals are not independent. This means that knowledge of the residuals for a time period can be used to predict the size of the residuals at a subsequent time period (usually the next). One graphical way to detect this problem is to plot a scattergram of the residual for one time period against the residual for a subsequent time: if a strong association is apparent autocorrelation is a problem. Another common approach is to compute the Durbin-Watson statistic.

Only models where the relationships can be expected to remain reasonably constant over time need to be used in forecasting. In the building of the locational and structural potential model the independent variables were observed at cross-section (1984). There has been no verification to confirm that the established relationships would remain reasonably constant over a long period of time. This implies that the model can only be useful in forecasting for the near future; and long term forecasting may not yet be undertaken with confidence. Therefore whenever the model is to be applied, it needs to be recalibrated and then used. After some recalibration of the model over time then the successive residuals need to be examined for autocorrelation problems which was not possible when the independent variables were observed at single cross-section (1984).

Another problem which confronts the user of the model is the question of sensitivity of the model. Even though the theoretical basis of the operational model was sound enough, the model must be tested much more rigorously for sensitivity of the output to different inputs, or the effect of errors in computation due to rounding up values, or the effect of compounding cumulative errors when sub-models are linked (see Alonso, 1968a). This type of test is essential because it could happen that errors in the model are larger than the expected change in the urban system which is being modelled. This is particularly serious in cities which have a slow rate of environmental, economic, demographic and social changes.

12.3 Demographic, Socio-economic and Environmental Factors Affecting the Model

In a changing urban society shopping behaviour, like any other human activity, is subject to changes over time. The changes in shopping behaviour are likely to be affected by a range of demographic, economic and social factors - many of them external to the urban society in question. Such factors include

1. changes in population structure;
2. changes in the amount of money;
3. changes in real income;
4. changes in the state of trade;
5. changes in the distribution of wealth;
6. changes in tastes.

The above changes are manifested in the amount and nature of demand for activity spaces in the urban shopping institutions, of which the market places constitute a great part. In their efforts to supply the changing demands for activity spaces, the market places are influenced by the following factors

7. administrative/political set up;
8. physical constraints to expansion;
9. the state of the technology;
10. urban development resources.

12.3.1 Changes in Population Structure

Other things remaining the same, although other things are not likely to do so, the total demand for any consumer good will obviously vary with the size of the consuming population. If the population of the town increases as a result of migration, the migrants will probably have somewhat different tastes from the others. Thus the demand for goods particularly desired by the migrants, such as certain food-stuffs or dressing materials, to which they are accustomed, will increase more than the demand for other things.

Apart from migration, the population of a town changes through births and deaths. A town whose population is increasing rapidly as a result of these will have a high proportion of children and low proportion of old people; conversely, a town whose population is declining or tending to decline will have the opposite proportions. A change of the former type will increase the demand for things wanted mainly by children, such as perambulators, toys and bread, faster than the demand for things wanted mainly by elderly people, such as bath chairs or walking sticks.

An increase in the number of persons of marriageable age (which may come about without any change in the total size of the population) will lead to an increased demand for furniture and other household hardware.

12.3.2 Changes in the Amount of Money

It is money which is offered in exchange for consumer goods, and hence an increase in money incomes and in the money values of assets is likely to lead to an increase in the demand for consumer goods and would thereby raise their prices. If we can imagine two neighbouring towns A and B which are similar in all respects except that the quantity of money is twice as great in A as in B, all money incomes and prices would tend to be twice as high in the former as in the latter. In such a situation goods would stream from town B to A where they would fetch more money. In relationship with other towns in Nigeria, Kaduna enjoys the position of town A, or occupies the position of town B in relation to others.

12.3.3 Changes in Real Personal Income

The real income of a person consists of goods and services which he can buy with his money income. If a person's real income improves his disposable income is likely to increase, and the reverse if his real income decreases.

Let us suppose that the real income of a typical consumer increases, say by about 15%, and that his tastes remain unchanged. It is most unlikely that he will distribute his expenditure over different goods in the same proportions as before. It is probable that he will increase his purchases of some goods by more than 15% and of others by less than 15%. He may diminish the quantity of some goods which he buys or may even cease to buy them at all, and he may now purchase goods which previously he did not buy at all. It seems fairly certain that if peoples income increased, the proportion of their income which they spent on food would diminish and the proportion which they spent on bread would considerably diminish, vice versa. For example, see the inquiry conducted by the Federal Office of Statistics, Lagos, into household expenditure in Nigeria in 1975 and 1979 (Tables 12.1, page 676)

When a person's real income rises he will tend to substitute what may be termed 'superior' goods for cheaper and 'inferior' goods which satisfied the same kind of need. Thus he may substitute butter for margarine, fresh milk for powdered or condensed milk and hats for caps. He will tend to increase his expenditure on more appetizing kinds of food-stuffs, such as fruits, vegetables, dairy produce and meat, more than on such things as bread, potatoes or yam. He may purchase a wireless set, a refrigerator/deep freezer or even a personal car. If he bought a refrigerator/deep freezer his food storage capability has improved. He may even buy a whole weeks food requirements at one purchase and this would reduce the frequency of his visits to food market places, but would increase the amount of time he spends at the market place per a visit. If, in addition, he bought a personal car, his ability to carry home his purchases will increase, and he may buy bigger purchases at a go. His personal car will widen the range of shops and market places he may choose to visit. Studies in UK have shown that increased ownership of refrigerator/deep freezer and personal cars have led to greater increase in the development of out of town warehouses, cash and carry, superstores and hypermarkets (see Hillman, M. "The car and personal mobility", Political and Economic Planning, 1973).

Thus a rise in real personal incomes will tend to increase the demand for some durable goods previously regarded as luxury or semi-luxury more than food commodities, especially the ones regarded as most essential. The percentage increase in a person's demand for a good due to a 1% increase in his real income or more generally the percentage increase in the amount of good demanded divided by the percentage increase in his real income, is sometimes called his "income-elasticity of demand" for that good. Therefore, it may be concluded that with increase in real personal income positive income elasticity of demand is generally in favour of non-food commodities.

12.3.4 Changes in Distribution of Wealth

A person's power to demand consumer goods depends on the size of his real income and of his assets, in so far as he is prepared to sell assets or to borrow against them in order to spend the proceeds on consumer goods. A man who spends £2,000 a year on consumer goods exerts ten times the demand of one who spends £200 a year in the market places; for one man's pound is as good as anothers.

However, if the distribution of wealth is made less uneven, say by taxation of the rich and subsidization of the poor, the demand for the good bought mainly by the rich, such as lace attire or pearls, will fall. So will the demand for goods bought mainly by the very poor, such as second hand goods and cow-skin meat. On the other hand, the demand for goods which the poor used to regard as semi-luxury will increase.

12.3.5 Changes in the State of the Trade

Fewer people and resources are unemployed, output is greater, total money income is greater, and the demand for nearly everything is greater, as a rule, during a period of boom economy, than during a period of recession. If prosperity is expected to continue, and possibly to increase, demand for consumer goods is likely to increase and the traders will anticipate good or rising profits and will therefore plan expansion of their business, that would mean importing more goods and acquiring larger floor-spaces in the market place for display and storage of goods.

The opposite will happen if trade is bad and is expected to remain bad or to become worse, or if the sources of a particular good dries up. Consumers, being on the whole poorer than before, will tend to reduce their expenditure on durable consumer goods such as furniture and household appliances. During a period of depression the demand for producers' goods will fall off more than the demand for consumer goods. Many people who have lost their employment in the production sector would tend to engage in retail trade of consumer goods. This would probably lead to many small traders demanding for floor-spaces in the market places while the big time traders would be collapsing the sizes of the businesses and releasing unwanted floor-spaces in the market places.

12.3.6 Changes in Tastes

The tastes of consumers may change, even for inexplicable reasons. This work does not attempt to explain the vagaries of fashion which may at one time decree that girls shall wear short skirts, thus decreasing the quantities of skirt materials demanded by girls, and at another time that women's head-tie shall be longer, thus increasing the quantity of head-tie materials demanded.

It is almost as difficult to explain changes of tastes in matters of diet. Even advertisement and propaganda may even lead to change of taste for some food and other branded articles. For the consumer changes in demand arising from external circumstances such as changes in the weather, are placed under the general heading of changes in tastes, for the spring from changes in the scale of preferences, although we may know well enough the root of the change. Wet season increases demand for items such as umbrella and rain boots, while demand for cold soft drinks and water in the market place increases in the hot season. Whereas the threat by downpour of rain keeps potential traders and shoppers away from the open air market places, hot sunny days encourage both shoppers and traders to visit open air market places.

Political and even religious beliefs and circumstances circumscribe the attendance of some market places by some people. In some strong muslim communities housewives in purdah can neither visit the market place to trade nor to shop. Their men folk do all the trading and shopping. At times the allocation of stalls in a market place to a potential trader may be influenced by his ethical origin, political inclination or religious belief.

12.3.7 Administrative/Political Set Up

The capacity of a market place to supply the demanded activity spaces depends considerably on the type of role the Local Government Council plays in its development. The Local Government Council is capable of playing development control role or development promotional role. The role which it plays, however, depends on the answer to such questions as, (i) where and on whose land is the market place located; and (ii) who has the right of ownership and responsibility of development of the market place?

Urban administrative structure and the political set up specify and regulate ownership of land and what types of development are permitted on any parcel of land. Where a market place belongs to the LGC and is located on public land, the LGC would play development promotional role; in which case it would use its statutory and political powers to promote development of the market place and thus supplying activity spaces. In the cases where the State Government creates some special quasi-government bodies such as Urban Development Board or Market Place Development Board to be responsible for any market places, they are also given statutory and political powers to promote the development of the market places under their charge. It is easier for LGC or Quasi-Government Body to acquire needed land and raise Government guaranteed loans for the purpose of expansion and redevelopment of a market place.

In the cases where ownership and the land on which the market place is located belong to some individuals or some organisations, the LGC would play only development control role. In such situation the individuals or organisation do not possess the political powers to acquire land and obtain government guaranteed loan for the development of the market place. Thus supply of activity space would be hampered.

12.3.8 Physical Constraints to Expansion

Generally urban market places are located in heavily built-up areas where land values are high. In most cases the surrounding land uses are more intensively developed than the market place. In the special case of the central market place, it is usually surrounded by plots of land which have been developed several storeys high, whereas the CMP may be operating in single storey building structures. In some cases too, the railway or a very busy road beside the market place inhibits the expansion of the market place in certain directions. Again in some cases the cost and other socio-economic or environmental consequences involved in shifting the railway or road are inconceivable. Often the location of the market place is so central to the residential population and places of work that the thought of relocation of the market place to a more spaceous location would seem unacceptable to majority of the users. Generally the market places serve as urban public transport nodes and interchange points and any redevelopment quite often necessitates reorganisation of the road network in its vicinity and this would incur considerable costs.

12.3.9 The State of the Technology

The present environmental and administrative attributes of urban market places are a reflection of the state of the technology - building construction techniques, transportation systems, shopping, cooking and diet methods. It is not intended to go into discussion of these attributes, but it has to be recognised that as long as these attributes are subject to changes in time, they will obviously impose changing demand and supply of activity spaces in the urban market places. Based on the experiences of the developed countries, extrapolation of past trends and the opinion of some individuals and organisations, it is expected that by the next generation the demand for activity spaces in the urban market places would be on the decline.

12.3.10 Urban Development Resources

The simple question here is how well equipped are the urban managers to deal with the issues of demand and supply of activity spaces in the urban market places? This is because one major aspect of planning is ability on the part of the planner to anticipate changes reasonably correctly and then work out appropriate interventions. Another merit of any good strategic planner is opportunism, the ability to exploit gainfully an advantageous or disadvantageous situation arising from the plan. No matter how good a plan (or be it a model) may be, poor execution would turn what would have been an advantage to a disaster. Accordingly the quality of the urban planning staff and the materials at their disposal constitute a significant factor in development planning of urban market places.

The demographic, socio-economic and environmental factors described above, which affect the model, constitute a "system of organized complexity". These are large number of components and variables with the property that there are strong interactions between some of the components thereby producing what are better known as socio-economic indicators. Based on Weavers argument in 1958 and buttressed by A. Wilson (1975), the system is similar to many of the problems of modern science. A classical example would be the study of the human brain (cf Beer, 1972). It has a large number of components at least 10^{10} neurons for example, but it is highly organised and produces thoughts and actions which may be quite simple at an aggregative level. A tremendous amount may be known about the nature of the micro components and much about the outputs but relatively little about the process that produces the latter from the former.

Thus we shall conclude that the factors we have discussed above do interact in millions of ways and that the distribution of the various energy states are aggregated at any point in time into observable socio-economic indicators such as:

number of households in the city	P
household monthly expenditure on food commodities	F_a
household monthly expenditure on non-food commodities	F_b
household income elasticity of demand for food commodities	G_a
household income elasticity of demand for non-food commodities	G_b
number of competing market places in the city	C

These socio-economic indicators are associated with the existing model, shown in page 171 as follows.

$$dD_o = \left[\frac{G_oPF_o}{C}(1+dP)(1+dF_o)\right]\left[(\bar{L}_1X_1^i+\bar{L}_2X_2^i+\ldots+\bar{L}_{n-1}X_{n-1}^i+\bar{L}_nX_n^i) + (\bar{S}_1Y_1^i+\bar{S}_2Y_2^i+\ldots+\bar{S}_{m-1}Y_{m-1}^i+\bar{S}_mY_m^i)+\bar{K}+\bar{E}\right] \quad \ldots\ldots \quad (\bar{2})$$

Where $\bar{L}$ and $\bar{S}$ are the new coefficients of locational and structural potentials respectively

$\bar{E}$ and $\bar{K}$ are the new error terms and constant respectively

G_o is household income elasticity of demand for commodity (which could be food or non-food)

F_o is household monthly expenditure on commodity (which could be food or non-food)

dF_o is change in household monthly expenditure on commodity during the time t_1 to time t_2

dP is change in number of households in the city during the time t_1 to time t_2

'a' and 'b' are notations to indicate
(i) 'a' for food shopping
(ii)'b' for non-food shopping

To obtain the equation for prediction of any demand or supply of food activity spaces, the notation 'o' is substituted with the notation 'a'.

To obtain the equation for prediction of any demand or supply of non-food activity spaces, the notation 'o' is substituted with the notation 'b'.

Data on the socio-economic indicators could be obtained during the field survey from the State Government Ministry of Economic Development, which would enable the term

$$\lambda = \left[\frac{G_o PF_o}{C} (1 + dP)(1 + dF_o)\right]$$

to be calculated and incorporated into the existing model (the proposed generic predictive equation in page 171) as follows:

$$dD_o = \lambda\left[(\bar{L}_1 X_1^i + \bar{L}_2 X_2^i + \ldots + \bar{L}_{n-1} X_{n-1}^i + \bar{L}_n X_n^i) + (\bar{S}_1 Y_1^i + \bar{S}_2 Y_2^i + \ldots + \bar{S}_{m-1} Y_{m-1}^i + \bar{S}_m Y_m) + \bar{K} + \bar{E}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots (\bar{2})$$

Therfore

$$d\bar{D}_o = (\bar{L}_1 X_1^i + \bar{L}_2 X_2^i + \ldots + \bar{L}_{n-1} X_{n-1}^i + \bar{L}_n X_n^i) + (\bar{S}_1 Y_1^i + \bar{S}_2 Y_2^i + \ldots + \bar{S}_{m-1} Y_{m-1}^i + \bar{S}_m Y_m^i) + \bar{K} + \bar{E} \quad \ldots (\bar{2})$$

This is the generic predictive equation shown in page 644

12.4 Multicollinearity Problems in the Regression Analysis

Regression analysis is one of the best tools planners have for testing or building causal theories. Often the value of the regression coefficient may not be useful even if there are simple direct causal links. One reason for this could be multicollinearity which manifests itself in regression analysis by producing biased estimates of the regression coefficients. This discussion is, therefore, focused on the reliability of the estimates of some regression coefficients.

Regression coefficients are random variables: the coefficients estimates from one data set will always differ to some extent from those estimates from a different data set. In the same way that the sample mean is a random variable, which fluctuates from sample to sample and therefore has a standard error, so each regression coefficient has standard error.

Just as we can use 'Highest Density Regions' (HDR) centered on the sample mean to determine an interval with specific probability of bracketing the true value of the coefficient in the population as a whole, so we can construct HDRs centered on the sample regression coefficient and having a specified probability of bracketing, the true value of the coefficient in the population. When working with the sample mean $\bar{Y}$ the HDR has the form

$$\text{HDR for population mean} = \bar{Y} \pm C_{n-1} \times SE\bar{y} ,$$

where

$SE\bar{y} = Sy/\sqrt{n}$ is the standard error of the sample mean

Sy = sample standard deviation of Y

C_{n-1} = a specified percentile of student's t distribution with n-1 degrees of freedom

n = number of data cases.

Likewise when working with the regression coefficient of the predictor variable X_i, the HDR has the form

$$\text{HDR for population coefficient} = B_i \pm C_{n-k-1} \times SE_{Bi} ,$$

where

Bi = estimated regression coefficient

$SE_{Bi} = \dfrac{(SEE/S_{Xi})}{\sqrt{(n-1)(n-R^2_{Xi})}}$ = standard error of regression coefficient

SEE = standard error of estimate of regression equation

S_{Xi} = sample standard deviation of predictor variable Xi

n = number of data cases

k = number of predictor variables

R^2_{Xi} = coefficient of determination of regression which predicts the value Xi from all the other predictor variables

C_{n-k-1} = a specified percentile of student's t distribution with n-k-1 degrees of freedom.

The HDR will be narrow, and therefore our estimate of the true value of the regression coefficient in the population will be firm, whenever the standard error is small. The standard error, in turn, will be small if

1. the regression predicts well, so that SEE is small;
2. the data set embodies wide-ranging experience with Xi, so that S_{Xi} is large;
3. the number of cases n is large relative to the number of predictor variables k ;
4. the variable Xi adds fresh information in the sense that its value cannot be estimated well from the other predictors, as indicated by a low value of R^2_{Xi}.

The fourth observation imply that: If predictors are too highly associated with each other, it will be impossible to isolate their individual effects. Thus if the information available in variable X_i is so redundant that we can accurately forecast the value of X_i from knowledge of the other predictors, then we cannot expect a firm estimate of its coefficient.

We can use the above established formulae to examine the problem of multicollinearity sensed, for example, between parking of vehicle variable (Y_3), size of market place (Y_8), and residential population (X_3). We shall do the examination in two parts, A and B.

Part A: Using the regression equation which predicts the growth rate of Food-trips (RCHTA) from parking of vehicles (Y_3) and residential population (X_3) we have

$$\widehat{RCHTA} = 76.7406 + 2.3802X_3 + 7.6494Y_3 \quad \text{(A1)}$$

$$R^2 = 0.7748$$

$$SEE = 40.7954$$

$$\widehat{Y_3} = 0 + 0.4845X_3 \quad \text{(A2)}$$

$$R^2Y_3 = 0.5762$$

$$SEE_{Y_3} = 4.0965$$

In the sample of n = 11 market places there was strong association between parking of vehicles and residential population, (R^2Y_3 = 0.5762, see regression equation A2 above). This multicollinearity will tend to muddy the waters. Table 12.2, page 677, shows the samples standard deviations: 6.2 spaces for parking of vehicles and 8.946 persons for residential population.

All the facts needed to compute the standard errors of regression coefficients have been assembled above. Using the formula

$$SE_{Bi} = \frac{(SEE/S_{Xi})}{\sqrt{(n-1)(1-R^2_{Xi})}}$$

we have

$$SE_{Y3} = \frac{40.7954/6.2}{\sqrt{(11-1)(1-0.5762)}} = 3.1963$$

$$SE_{X_3} = \frac{40.7954/8.946}{\sqrt{(11-1)(1-0.5762)}} = 2.2152$$

The standard error is about half the size of the coefficient in the case of Y_3 and about the same size of the coefficient of X_3. To construct 95% HDRs we note in the Table of Percentiles of Student's t Distribution that for $n-k-1 = 11-2-1 = 8$ degrees of freedom the 97.5% point occurs at $C_8 = 2.306$.

Using the formula

$$HDR = B_i \pm C_{n-k-1} \times SE_{Bi}$$

we find

$$\begin{aligned} 95\% \text{ HDR for } B_{Y_3} &= 7.6494 \pm (2.306) \times (3.1963) \\ &= 7.6494 \pm 7.3631 \\ &= 0.2868 \text{ to } 15.013 \end{aligned}$$

while 95% HDR for B_{X_3} $= 2.3802 \pm (2.306) \times (2.2152)$
$= 2.3802 \pm 5.1082$
$= -2.728$ to 7.4884

The magnitudes of both HDRs exhibit evidence of uncertainty, even the sign of the coefficient of X_3 is slightly doubtful (see page 374, para. 2).

<u>Part B</u>: Using the regression equation which predicts the growth rate of food-trips (RCHTA) from parking of vehicles Y_3 and size of the market place (Y_8) we have

$$\widehat{RCHTA} = 73.1031 + 5.8924Y_3 + 1.4349Y_8 \quad \ldots\ldots\ldots \quad (B1)$$

$$R^2 = 0.8138$$

$$SEE = 37.0946$$

$$\widehat{Y_3} = 0 + 0.2228Y_2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (B2)$$

$$R^2_{Y_3} = 0.7683$$

$$SEE_{Y_3} = 3.0291$$

In the sample of n = 11 market places there was strong association between parking of vehicles and size of market place, ($R^2_{Y_3}$ = 0.7683, see regression equation B2 above). This multicollinearity will tend to muddy the waters. Table 12.2, page 677, shows the samples standard deviations: 6.2 spaces for parking of vehicles and 24.48 stalls for size of market size of market place.

All the facts needed to compute the standard errors of the regression coefficients have been assembled above. Using the formula

$$SE_{Bi} = \frac{(SEE/S_{Xi})}{\sqrt{(n-1)(n-R^2_{Xi})}}$$

we have

$$SE_{Y_3} = \frac{37.0946/6.2}{\sqrt{(11-1)(1-0.7683)}} = 2.5822$$

and $$SE_{Y_8} = \frac{37.0946/24.48}{\sqrt{(11-1)(1-0.7683)}} = 0.654$$

The standard error is about half the size of the coefficient in the case of Y_3 and also about half the size of the coefficient of Y_8. To construct 95% HDRs we note in the Table of Percentiles of Student's t Distribution that for n-k-1 = 11-2-1 = 8 degrees of freedom, the 97.5% point occurs at C_8 = 2.306.

Using the formula

$$HDR = B_i \pm C_{n-k-1} \times SE_{Bi}$$

we find

$$\begin{aligned} 95\% \text{ HDR for } B_{Y_3} &= 5.8924 \pm (2.306) \times (2.5822) \\ &= 5.8924 \pm 5.9546 \\ &= -0.0622 \text{ to } 11.847 \end{aligned}$$

$$\begin{aligned} \text{while } 95\% \text{ HDR for } B_{Y_8} &= 1.4349 \pm (2.306) \times (0.654) \\ &= 1.4349 \pm 1.5081 \\ &= -0.0732 \text{ to } 2.943 \end{aligned}$$

The magnitudes of both HDRs exhibit evidence of uncertainty, even the signs of both HDRs are doubtful.

From the above debate there are conclusive evidence to suggest that the independent variable, parking of vehicles, was not included in the predictive equations, not because of its insignificance, but because it was made redundant by its very high correlation with other independent variables, such as residential population and size of the market place. Since evidence, as shown in Table 7.13, page 310, strongly supports the fact that parking of vehicles is an important factor that dissuades some households from shopping at CMP, it seems that the theoretical foundation of the regression model could be strengthened by the inclusion of parking of vehicles in the form of "dummy variable", (see pages 668-669).

12.5 Inclusion of Dummy Variables in Regression Analysis

Sometimes one is naturally led to predicting variables that are nominal or ordinal and not metric. There are ways to include these in regression analysis. There is no restriction to using just metric predicting variables, as against the restriction that the predicted variable must be metric.

Suppose there is a society where annual income depends on sex, we can define a 'dummy variable' SEX which takes on the value 0 if the person is a female and the value 1.0 if the person is male, (the choice is arbitrary - we could as well assign the value 0 to males and 1.0 to females). Then the bivariate regression equation is

$$\widehat{\text{INCOME}} = B_0 + B_1\text{SEX}$$

where B_0 is the income constant, and the coefficient B_1 summaries the sex differential in income.

Therefore, the prediction of a woman's income would be $B_0 + B_1 \times 0 = B_0$ and the prediction of man's income would be $B_0 + B_1 \times 1 = B_1 + B_1$.

Suppose it was felt that race as well as sex was important to determine income. Two categories of race - white and non-white might be defined and assigned arbitrary values

0 to white and 1.0 to non-white. RACE is said to be the second dummy variable and the multiple regression equation is given by

$$\widehat{INCOME} = B_o + B_1 SEX + B_2 RACE$$

We would expect the values of B_o and B_1 to be different from those of the bivariate case above and B_2 summaries the race differential in income. The predicted income will depend on both race and sex in the following way

White male	-	$B_o + B_1$
White female	-	B_o
Non-white male	-	$B_o + B_1 + B_2$
Non-white female	-	$B_o + B_2$

This last model has assumed that the race differential is the same for either sex and the sex differential the same for either race. A more general model would include a third dummy variable defined as the product of RACE and SEX which takes the value 1.0 for non-white males and 0 for all others. Now the predictive regression equation would be

$$\widehat{INCOME} = B_o + B_1 SEX + B_2 RACE + B_3 RACE \times SEX$$

Then the income prediction would be

White male	$B_o + B_1$
White female	B_o
Non-white male	$B_o + B_1 + B_2 + B_3$
Non-white female	$B_o + B_2$

This result could be extended to include any categorized independent variable with more than just 2 categories. Suppose we wanted to predict Growth Rate of Food-Trip (RCHTA) from knowledge of the physical Appearance of the Building Design Factors variable (Y_1) of the market place, and suppose further that appearance is an ordinal variable with 5 categories: very bad, poor, fair, good and very good. We need to create 4 dummy variables (always one fewer than the number of categories) called X_1 through X_4 and give them values as follows:

Category of Appearance	X_1	X_2	X_3	X_4
Very bad	0	0	0	0
Poor	1	0	0	0
Fair	0	1	0	0
Good	0	0	1	0
Very good	0	0	0	1

Thus each market place in our data set would be associated with 5 values: RCHTA, X_1, X_2, X_3, X_4. The regression equation would be,

$$\widehat{RCHTA} = B_o + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4$$

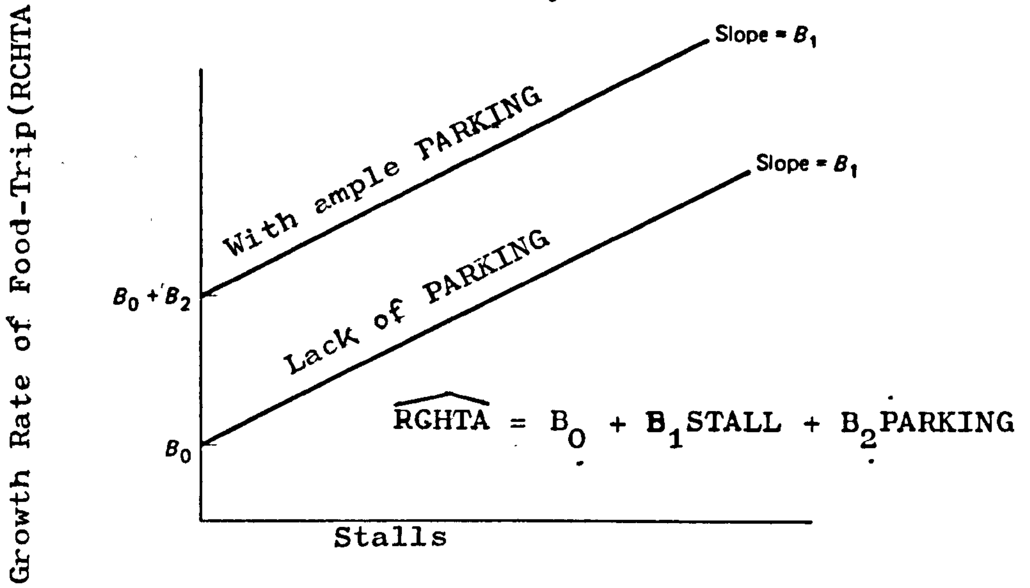
The predicted difference in RCHTA between, say a market place in a building with 'poor' appearance and a market place in a very good' building would therefore be $B_4 - B_1$. It is also possible to specify our RCHTA prediction model the same way with Security of Life and Property variabl (Y_4)

Category of Security	X_1	X_2	X_3
Very Secure	0	0	0
Fairly Secure	1	0	0
Poorly Secure	0	1	0
Not Secure At All	0	0	1

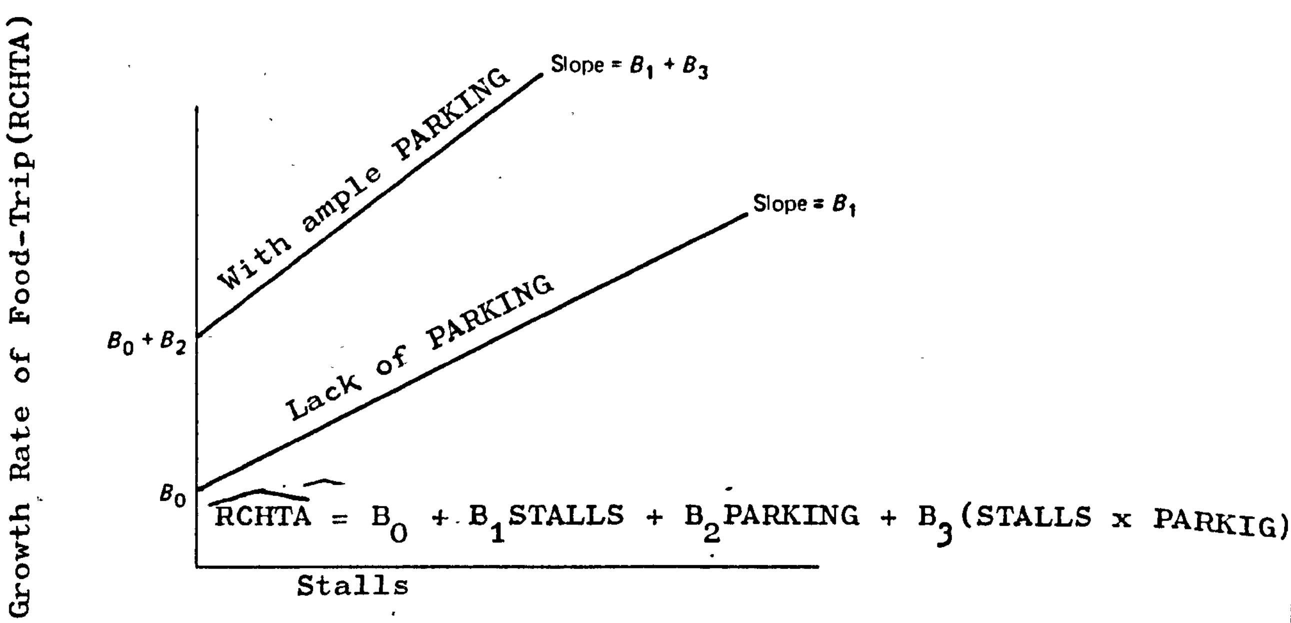
in which case the prediction equation would be

$$\widehat{RCHTA} = B_o + B_1X_1 + B_2X_2 + B_3X_3$$

Figure 12.1(a&b) Predicting From a Mixture of Metric and Dummy Variables



(a) The use of a Dummy Variable to shift the intercept of a regression line



(b) The use of a Dummy Variable to shift both the intercept and slope of a regression line

It is common to make prediction from a mixture of metric and dummy variables. Suppose we wish to predict Growth Rate of Food-Trip to a market place. We suspect that both the size of the market place (as measured by the number of STALLS) and its facilities for PARKING of Vehicles will influence Rate of Growth. We might define a dummy variable

PARKING = 1 for ample parking facility
= 0 for lack of parking facility

and predict

$$\widehat{RCHTA} = B_0 + B_1 STALL + B_2 PARKING$$

This model implies that we expect the type of PARKING impact on RCHTA by only adding to (or subtracting from) the intercept of the RCHTA curve as shown in Figure 12.1(a) page 668a . More generally, we could allow for the possibility that both the intercept and the slope would differ between types of parking facility (the marginal growth rate per stall might differ). This more general specification would include a new predicting variable formed by multiplying STALLS x PARKING ; Thus we would have

$$\widehat{RCHTA} = B_0 + B_1 STALLS + B_2 PARKING + B_3 (STALLS \times PARKIG)$$

The resulting prediction rule are depicted in Figure 12.1(b), page 668a , which shows a separate intercept and slope for each type of market place.. This equation shows the significance of PARKING in the prediction of Growth of Food-Trip.

Now, we may go back to our decision that the theoretical foundation of locational and structural potential model stands strengthened by the inclusion of parking of vehicles, in the form of dummy variables; see pages 668 to 669.

It might be possible to measure some of the locational and structural potential variables in metric and the others as dummy variables. A mixture of the metric and dummy variables might be used in the calibration of the models.

The metric variables would include

- X_1 - Railway transport linkage;
- X_2 - Road transport linkage;
- X_3 - Immediate surrounding residential population;
- X_4 - Immediate surrounding places of work;
- X_5 - Immediate surrounding other shopping centrs;
- X_6 - Immediate surrounding whole shops and warehouses;
- Y_2 - Facilities and amenities;
- Y_8 - Size of market place,

and the dummy variables would include

- Y_1 - Building design factors;
- Y_3 - Parking and stationing of vehicles;
- Y_4 - Security of life and property;
- Y_5 - Environmental qualities;
- Y_6 - Zonning of market place by commodity;
- Y_7 - Preservation of food commodities.

The dummy variables could be categorized as was done in the case of APPEARANCE or SECURITY or PARKING above. The general specification would include new predicting variables formed by multiplying METRIC x DUMMY variables. In this way the significances of the dummy variables could be tested as shown in Figure 12.1(a & b) page 668a.

12.6 Statistical Relationship and Causality

To this point we have been treating regression analysis solely as a tool for prediction. However, for better or for worse, regression analysis is often used to test or to create causality theories, so we must consider this use formally. In practice we are often interested in studying associations among attributes as a way of building theories of causal relationships which could help reasonable people make well considered intervention.

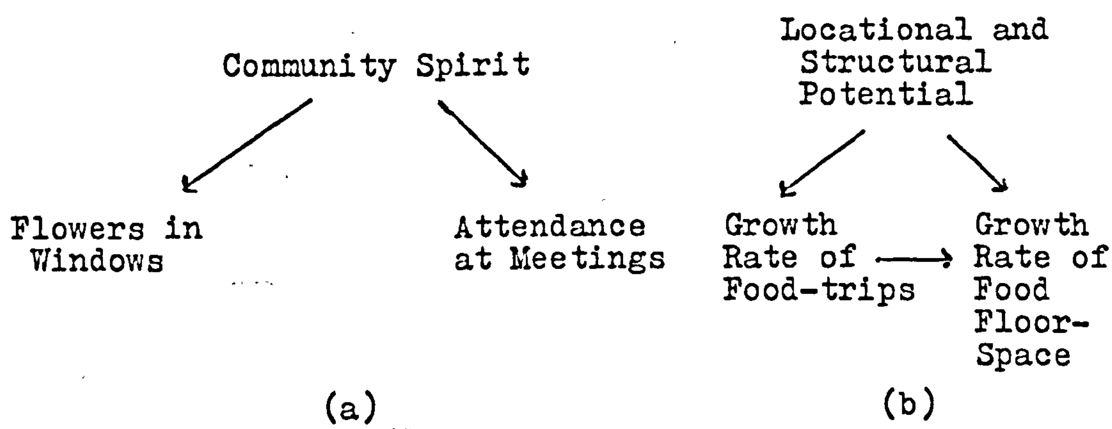
It is important first to understand the distinction between observational and experimental studies. An observational study records the world as it is normally, whereas an experiment records the world as it reacts to a change in the normal order. Association discovered in regression analysis arising from observational studies is interpreted as follows: "If I happen upon a case for which attribute A has the value 'a', then I can expect to find that the case also has value 'b' for attribute B". For instance, Professor Thomas Nutt-Powell, in his days as a community organizer in Baltimore in the 1960s, always targeted his efforts to boost attendance at community meetings towards people with house plants prominently displayed in their windows. Such people were found to be usually receptive to appeals of community organizers. This interesting association between the display of plants and attendance at meetings is a fine example of an association, useful for predictive purposes, but not for explaining causality. Few people would argue that the plants drove their owners to the meetings. When seeking causality, such an association is referred to as a spurious correlation; both keeping plants and attending the meetings probably derived from certain 1960s ethos of plant owners at that time.

In contrast to observational studies, experiments involve recording the response to a change in the normal order. Without actually intervening in a system, it is never quite possible to make a solid case for causal link between two attributes. Even after conducting a planned change, it may be difficult to make the case, although an experiment is usually more enlightening (sometimes more dangerous) than an observational study. F. Mosteller and J. Tukey (1971) make the point that a strong argument for causality usually requires (1) experimental evidence of response to change, (2) confirmation of that evidence by replication, and (3) elucidation of a plausible causal mechanism. Unfortunately, it is often difficult or impossible for the planner to perform experiment, so astute analysis of observational studies combined with solid professional judgement may be the best that can be hoped for.

To illustrate how multivariate analysis can help expose causal relationships not properly perceived in bivariate analysis, we consider three phenomena: spurious correlation; causal intermediaries; and multivariate causation. As for Professor Nutt-Powell's example of spurious correlation, a simple minded causal interpretation of the bivariate analysis would conclude that the flowers in the windows cause attendance at the community meetings. By controlling for peoples community spirit (somehow measured) showed that within each group, those without flowers have the same probability of attending meetings as those with flowers. Thus a more plausible causal hypothesis is that both meeting attendance and flower cultivation arise from a common source in the consciousness of the people, as indicated by the directions of the causal arrows in Figure 12.2(a), page 672. An even more sophisticated theory would allow for reciprocal causation between community spirit and attendance at meetings, wherein each reinforces the other. In any event, controlling for community spirit demonstrated that the presence of flowers in windows did not impact on attendance.

The most direct way to see the impact on one variable of a change in a second variable is in fact to change the second. However, opportunities for such direct control are not plentiful, so regression analysis of observational data is a very common activity. In such studies the attention of the analyst centers not so much on prediction but on the values of the regression coefficient. It could be tempting to read a regression coefficient as the amount of change in the dependent variable that would be produced by a change of unit in the independent variable, with all other independent variables held constant. If this interpretation were really true, planners could know with great confidence ahead of time what would happen if they were to initiate certain changes in the systems for which they plan. Unfortunately, although this interpretation is usually made, it is almost always improper in a planning context; for the following reasons.

Figure 12.2 (a & b): Causal Relationships



Firstly, the planner may not really be interested in the answer to the question as it is commonly phrased. While it may be theoretically interesting to know what would happen if say, X_1 were varied while X_2 were held constant, it may be that X_2 itself is related to X_1, that changing X_1 would entrain changes in X_2 as well, leading rather to different net effect than was expected.

This would be the case, for instance, if there were multivariate causation of the form

$$\begin{tikzcd} & X_2 \arrow[dr] & \\ X_1 \arrow[ur] \arrow[rr] & & Y \end{tikzcd}$$

Here holding X_2 constant would keep us from knowing what would really happen to Y if we manipulated X_1. Of course, if X_1 and Y were linked solely through X_2 as a causal intermediary

$$X_1 \longrightarrow X_2 \longrightarrow Y$$

then it is clear that varying X_1, but somehow compensating to keep X_2 constant would thwart any change in Y.

Secondly, the association summarized in a regression analysis may not be causal after all. For instance, if there is a spurious correlation between X_1 and Y because both are caused by some variable X_3 not in the analysis, then manipulating X_1 will not change the value of Y:

$$\begin{tikzcd} X_1 & X_3 \arrow[l] \arrow[d] \\ & Y \\ X_2 \arrow[ur] & \end{tikzcd}$$

Thirdly, the value of the regression coefficient may not be useful even if there are simple direct causal links of the form

$$\begin{tikzcd} X_1 \arrow[dr] & \\ & Y \\ X_2 \arrow[ur] & \end{tikzcd}$$

Three reasons could account for this: (i) multicollinearity which manifests itself in regression analysis by producing very uncertain estimates of the regression coefficient, which, nevertheless, tends to be centered on the correct value; (ii) Errors in measurements lead to coefficients that center on the incorrect values;

(iii) sensitivity of the least-squares criterion to outliers - either unrepresentative cases or outright blunders in the data.

Since some degree of multicollinearity and error in measurement are present in just about any regression analysis undertaken by planners and key-punching and other processing mistakes are all too common, prudence requires maintenance of some skepticism about the numerical values of regression coefficients. Accordingly the analyst's responsibility for understanding urban systems is not to surrender too much to a curve-fitting procedure, but, rather, to develop well-thought-out theories, and use triangulation techniques to seek out data of high quality and replicate analysis on as many data sets as possible.

In this study a simple-minded causal interpretation of the bivariate analysis of the hierarchical relationships would be to conclude, say, for example, that food floor-space causes food-trips. This would be spurious correlation, though not as whimsical as Professor Nutt-Powell's example that the flowers in the windows cause attendance at the community meetings. The more plausible hypothesis is that both the growth rates of food floor-space and of food-trips depend on a common cause in the locational and structural potentials of the market place. Although no experimental evidence of response to change was adduced, the study employed a well articulated triangulation technique (i) to collect and derive data of high quality, and (ii) to cross-reference and confirm evidence of replication of causal relationships between locational and structural potential, and each of the eight specific components of demand and supply of activity spaces in the urban market places. The causal relationships are as indicated by the causal arrows shown in Figure 12.2(b), page 672. Here, for example, locational and structural potential, and growth rate of food-trips both impact on the growth rate of food floor-space; (iii) The plausible causal mechanism has been elucidated in Chapter 5 and in the postscript sections 12.1-3.

12.7 Further Tests and Areas for Further Research

Data and time constraints limited the tests of the model for flexibility. Only one flexibility test was carried out, using the population and socio-economic growth rates estimated by Kaduna State Ministry of Economic Development. Further tests should have considered extreme conditions, which could result in severe depression or rocketing of the population and socio-economic growth rates. See Figure 12.1, page 639a.

The flexibility test carried out by the thesis was that of 'A' position. The author would like to suggest that in applying this model the user may be required to test his strategies for flexibility at the maximum 'B' and minimum 'C' population and socio-economic growth rates. This would enable the user to ascertain whether the strategy that achieved the best performance at A position would do so at B and C positions too, or otherwise. The outcome of this test could influence the choice of the preferred strategy.

A final point should be made which is intended to encourage those who may like to challenge and/or explore this new approach to retail study. Supposing you were to turn to page 535 , you would see that the predictive error of the non-linear equations was between ± 9.58% and ± 34.85%. As a pioneer work, this range of error should be acceptable. It should be hoped that future research should improve the measurement of the locational and structural potential. This would reduce the predictive error and thereby improve the efficiency of the proposed locational and structural potential model for development planning of urban market places.

TABLE: 12.1 : PERCENTAGE MONTHLY HOUSEHOLD EXPENDITURE BY TYPE AND BY EMPLOYMENT STATUS OF HEAD 1975 AND 1979

TYPE	WAGE EARNERS 1979	SELF EMPLOYED 1979	ALL URBAN HOUSEHOLD 1979	ALL URBAN HOUSEHOLDS 1975
FOOD	39.96	43.68	42.32	38.10
NON FOOD	39.40	32.34	34.92	38.23
MONETARY TRANSACTIONS	13.56	8.95	10.64	17.40
TOTAL CASH	92.92	84.97	87.88	93.73
NON CASH*	7.08	15.03	12.12	6.27
GRAND TOTAL	100.00	100.00	100.00	100.00

* Non Cash : Refers to the value Consumption from own production, income in kind and imputed rent.

Source: Federal Office of Statistics, Lagos.

TABLE 12.2: Correlation of Growth Rate of Shoppers Food-Trips, Residential Population, Parking of Vehicles, and Size of Market Place.

* * * * MULTIPLE REGRESSION * * * *

Listwise Deletion of Missing Data

	Mean	Std Dev	Label
RCHTA	76.294	76.887	RATE OF GROWTH OF FUDTRIP
X3	-1.140	8.946	WTDLPOT ZSCORE CRESIDE
Y3	.296	6.200	WTDSPOT ZSCORE PARKING
Y8	1.007	24.480	WTDSPOT ZSCORE COMBSHP

N of Cases = 11

Correlation:

	RCHTA	X3	Y3	Y8
RCHTA	1.000	.850	.874	.872
X3	.850	1.000	.930	.947
Y3	.874	.930	1.000	.874
Y8	.872	.947	.874	1.000

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APPENDIX 1.1.1

CONSTITUTIONAL PROVISIONS ON LOCAL GOVERNMENT UNDER THE 1979 CONSTITUTION

SECTION 7

1. The system of local government by democratically elected local government councils is under this Constitution guaranteed; and accordingly, the Government of every State shall ensure their existence under a Law which provides for the establishment, structure, composition, finance and functions of such councils.

2. The person authorised by law to prescribe the area over which a local government council may exercise authority shall:-

(a) define such area as clearly as practicable;
(b) ensure, to the extent to which it may be reasonably justifiable, that in defining such area regard is paid to:-

(i) the common interest of the community in the area,

(ii) traditional association of the community, and

(iii) administrative convenience.

3. It shall be the duty of a local government council within the State to participate in economic planning and development of the area referred to in subsection (2) of this section and to this end an economic planning board shall be established by a Law enacted by the House of Assembly of the State.

4. The Government of a State shall ensure that every person who is entitled to vote or be voted for at an election to a House of Assembly shall have the right to vote or be voted for at an election to a local government council.

* 5. The functions to be conferred by Law upon local government councils shall include those set out in the Fourth Schedule to this Constitution.

* 6. Subject to the provisions of this Constitution:-

(a) the National Assembly shall make provisions for statutory allocation of public revenue to local government councils in the Federation; and

(b) the House of Assembly of a State shall make provisions for statutory allocation of public revenue to local government councils within the State.

* Asterisk - (The authors)

FOURTH SCHEDULE

FUNCTIONS OF LOCAL GOVERNMENT COUNCIL

1. The main functions of a local government councils are as follows:-

(a) the consideration and the making of recommendations to a State commission on economic planning or any similar body on:-

(i) the economic development of the State, particularly in so far as the areas of authority of the council and of the State are affected, and

(ii) proposals made by the said commission or body;

(b) collection of rates, radio and television licences;

(c) establishment and maintenance of cemeteries, burial grounds and homes for the destitute or infirm;

*(d) licensing of bicycles, trucks (other than machanically propelled trucks) canoes, wheel barrows and carts;

*(e) establishment, maintenance and regulation of markets, motor parks and public conveniences;

*(f) construction and maintenance of roads, streets, drains and other public highways, parks, open spaces, or such public facilities as may be prescribed from time to time by the House of Assembly of a State;

(g) naming of roads and streets and numbering of houses;

*(h) provision and maintenance of public conveniences and refuse disposal;

(i) registration of all births, deaths and marriages;

(j) assessment of priviately owned houses or tenements for the purpose of levying such rates as may be prescribed by the House of Assembly of a State; and

*(k) control and regulation of:-

(i) out-door advertising and boardings,

(ii) movement and keeping of pets of all descriptions,

(iii) shops and kiosks,

(iv) restaurants and other places for sale of food to the public, and

(v) laundries.

2. The functions of a local government council shall include

* Asterisk - (The authors)

participation of such council in the Government of a State as respects the following matters, namely:-

(a) the provision and maintenance of primary education;

(b) the development of agriculture and natural resources, other than the exploitation of minerals;

*(c) the provision and maintenance of health services; and

*(d) such other functions as may be conferred on a local government council by the House of Assembly of the State.

* Asterisk - (The authors)

APPENDIX 1.1.2

Reconstitution of Lagos State Market Place Development Board

Meanwhile, Japan's Kyodo News Agency reported that Vietnam, in a surprise diplomatic move, had invited Mr. Machel and his entourage to visit Hanoi for four days

He would also ... Chi Minh city, Kyodo quoted government sources in Hanoi as saying.

Mozambique has recently been enlarging its ties with other countries than the Soviet

Yong Nam, according ... official radio monitored ... Tokyo.

He met China's president ... Xiannian, Premier Zhao Z... and Communist Party ...

Market board, LGs to locate markets

LOCATION of new markets in Lagos State is now the joint responsibility of the newly reconstituted state Market Development Board and the local governments.

This is to prevent the uncoordinated establishment of markets in the state, according to the Commissioner for Local Government and Chieftaincy Affairs, Alhaj Lateef Olayinka, while inaugurating the ten-member board at Ikeja at the week-end.

The commissioner told the board members that they can also establish, develop or redevelop the wholesale markets as well as redevelop the retail markets.

Other duties of the board, he pointed out, were the maintenance and regulation of the wholesale markets.

To this end, Commissioner Olayinka announced that the board had been empowered to prescribe levy and collect stallage fees, in addition to collecting advance payments from the market allottees.

The board is also authorised to award contracts for the contruction, maintenance and repairs of markets.

It can borrow money by means of bank loans, among others, and insure its property against all forms of risk.

Alhaj Olayinka enjoined the members to promote peace among the market-women and traders.

He, also, urged the board to rid the state of street traders and illegal structures which provided shelter for pick-pockets, robbers and other undesirable elements.

The commissioner, then, reminded the board that it could "seize goods, wares or articles offered for sale in any place and dispose of them as laid down by the Street Trading Edict".

Replying, Mr. Olabode Ogunleye, chairman of the board, pledged that the members would dishcarge their duties efficiently and honestly.

Other members are Mr. Segun Ogundeyin, Mr. Olufunmilayo Ibrahim, Mr. K.O. Audu, Alhaj Y.O. Bashorun, Mr. A.A. Omofade, Mr. Olumoroti Jaiyesimi, Mr. J.A. Ajayi, Mr. J.O. Omolade and Mr. O.L. Odunaiya.

ALHAJ L.O. OLAYINKA
Commissioner for Local Goverment Lagos State

Daily Sketch, Tuesday, July 24, 1984.

APPENDIX 6.1.1

"KADUNA CITY MARKET PLACE STUDY"

FIELD SURVEY PART I: DEMAND FOR SPACES IN THE CITY CENTRAL MARKET PLACE

1.1 Activity Space Survey of the Market Place.

(SURVEY SHEET 2)

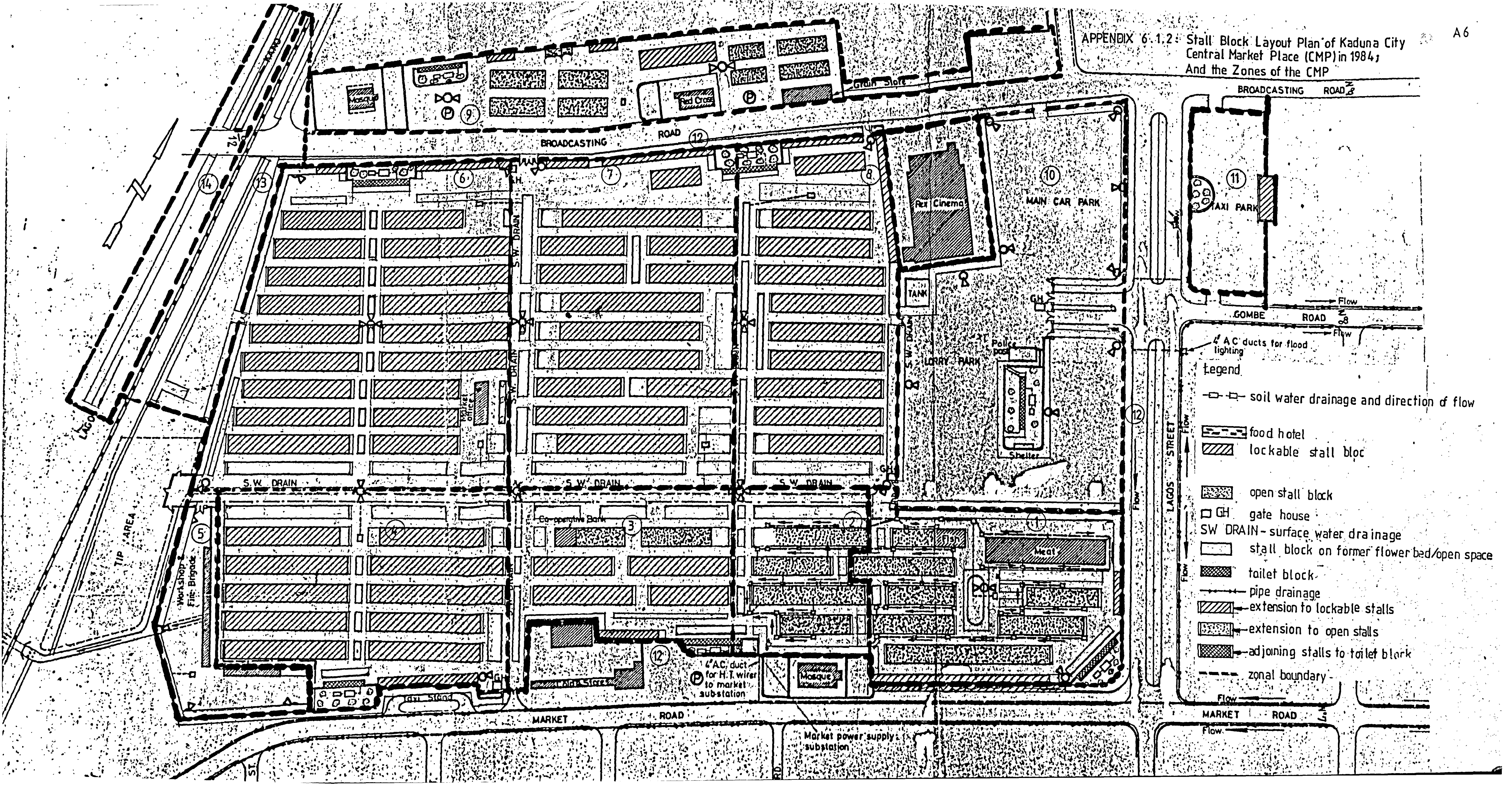
Name of Market Place ....

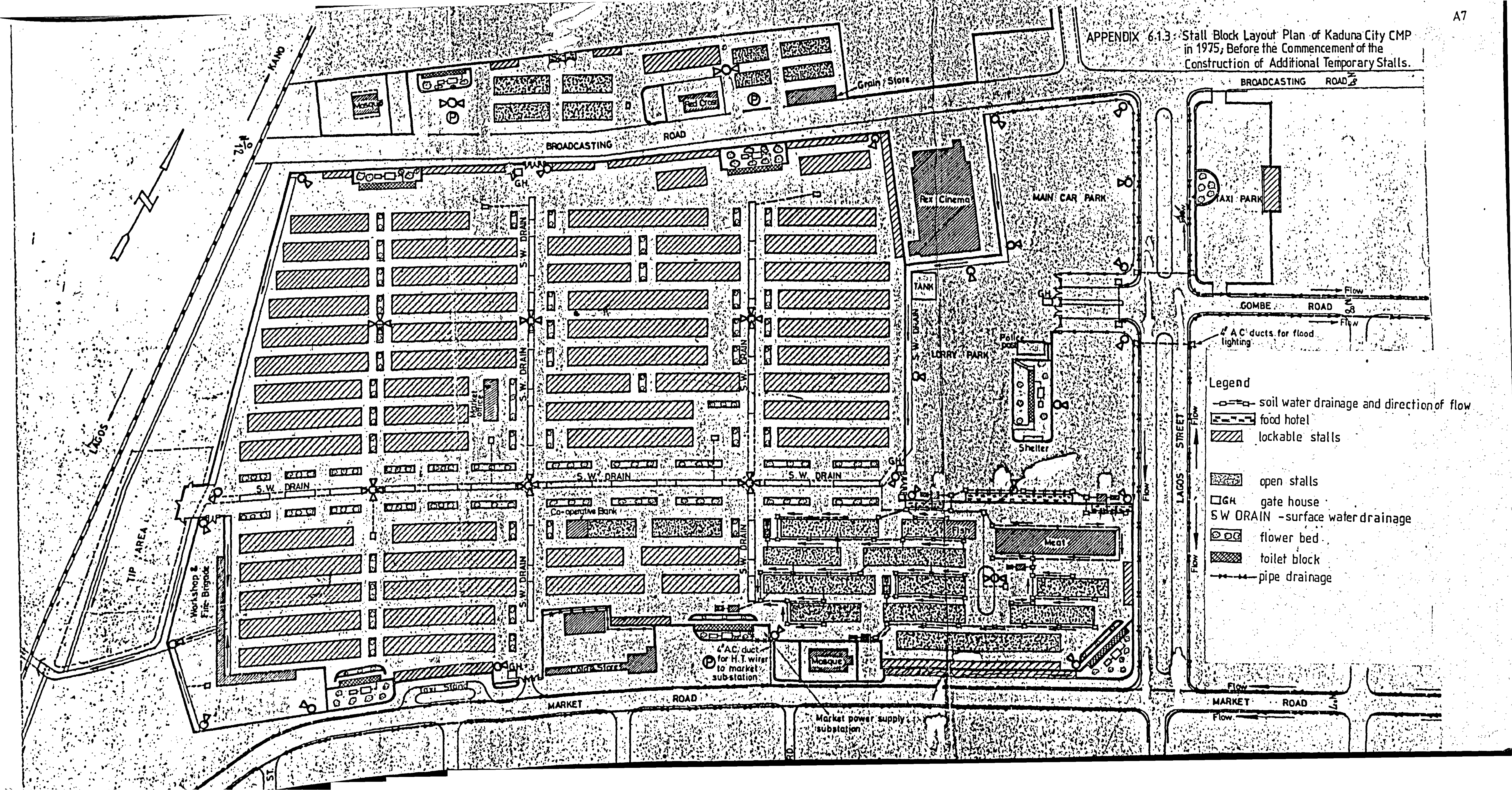
Zone of Market Place .... FEBRUARY, 1984.

Shopping block No.	Stall study No.	Floor-space of stall	Code(s) for commodities marketed (3 max)	Shopping block No.	Stall study No.	Floor-space of stall	Code(s) for commodities marketed (3 max)

Note: produce continuation sheets.

APPENDIX 6.1.2: Stall Block Layout Plan of Kaduna City Central Market Place (CMP) in 1984; And the Zones of the CMP





APPENDIX 6.1.3: Stall Block Layout Plan of Kaduna City CMP in 1975; Before the Commencement of the Construction of Additional Temporary Stalls.

APPENDIX 6.2.1

"KADUNA CITY MARKET PLACE STUDY"

FIELD SURVEY PART 1: DEMAND FOR ACTIVITY SPACES IN THE CENTRAL MARKET PLACE

1.3 Behaviour pattern of shopping trips distribution to the shopping establishments in the city by the city residents;

(Structured Interview Questionnaire to Households).

FEBRUARY, 1984

name of district	name of ward	name of street or quarter	built-up plot registration no.	status of respondent

CONTACT RECORD

Serial number....

date	time of call	outcome					
		interview completed	time completed	interview number	appointment to call back	no reply	refused

Signature of interviewer ....

Signature of supervisor ....

SECTION A.

I would like to ask some questions about your residential district and household in Kaduna.

1. a What is the name of this district you live in, that is, what do you call it?

WRITE IN NAME.................. CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE ASK b

SHOW CARD L.

b) I have on this card the names of the five administrative districts of Kaduna. In which of these do you live?

1. Doka ( )
2. Makera ( )
3. Tudun/ Wada ( )
4. Kawo ( )
5. Gabasawa ( )

b What is the name of this street or quarter you live in, that is, what do you call it?

WRITE IN NAME ....

WRITE IN RESPONDENTS IDENTIFICATION NO. .....

DATA RECORD

---

2. a Can you tell me the number of persons in your household in Kaduna? ....

Of this number, how many are

(b) adults...... (c) dependants (below 18 years old) .....

---

3. Does your household have a motor vehicle for its use?

1. Van ( ) 3. Motor cycle ( ) 5. None of the above ( )
2. Car ( ) 4. Bicycle ( )

4.a Is the head of your household, 1 employed ( )
2 self-employed ( )

b If the head of your household is employed, is it in what category?

WRITE IN NAME.............. OR CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOW CARD M AND CODE

SHOW CARD M.

I have on this card various categories of employment. In which of these is the head/mistress of your household

10. Chairman/Director/ Gen.Manager in Gov. Dept. ( )
11. Senior Gov. Officer ( )
12. Professional/ manager in a company ( )
13. Officer in the armed forces ( )
14. Technician ( )
15. Non-commissioned officer in the armed forces ( )
16. Skilled workman/ woman ( )
17. Unskilled workman/ woman ( )
18. Unspecified senior officer ( )
19. Unspecified junior staff ( )
99. Do not know ( )

c If the head of your household is self-employed; Is it as what?

WRITE IN NAME..........

OR CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOW CARD N AND CODE

SHOW CARD N.

I have on this card various classes of self-employment. To which type does the head/mistress of your household belong?

20. Managing Director, Limited Company ( )
21. Managing Director Non-Ltd. Company ( )
22. Professional/ Consultant ( )
23. Technician ( )
24. Trader ( )
25. Skilled tradesman/ woman ( )
26. Unskilled workman/ woman ( )
27. Farmer/Fisherman/ woman ( )
28. Retired person ( )
29. Unspecified ( )
99. Do not know ( )
00. No income ( )

5.a Is the mistress of your household:

1. employed ( )
2. self employed ( )
3. no. of housewives ( )

b If the mistress of your household is employed. Is it in what category?

WRITE IN NAME..........

CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOW CARD M ABOVE AND CODE

10	11	12	13	14	15	16	17	18	19	99
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

c If the mistress of your household is self-employed. Is it as what?

WRITE IN NAME ....

CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOW CARD N ABOVE AND CODE

20	21	22	23	24	25	26	27	28	29	99	00
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

---

6. Does your household own

1. a refrigerator ( )
2. a deep freezer ( )
3. a refrigerator and a deep freezer ( )
4. none of the above ( )

---

7. Who does most of the shopping for the household?

1. Head of the household ( )
2. Mistress of the household ( )
3. Another member of the household ( )

FROM THIS POINT ONWARD, THE PERSON WHO DOES MOST OF THE SHOPPING FOR THE HOUSEHOLD MUST PARTICIPATE IN THE INTERVIEW.

SECTION B.

I would like to ask some questions about how you do shopping for food commodities (provisions and traditional foodstuffs) listed on Show Card O.

8. (a) Can you name three shopping centres where you usually buy food commodities?

SHOW CARD O: LIST OF FOOD COMMODITIES

Code	Class name
01.	tubers
02.	grains
03.	flours
04.	cooking oil
05.	livestock
06.	fresh meat
07.	fresh fish
08.	dried meat and fish
09.	vegetables, fruits and nuts
10.	spices
11.	provisions (tinned foods)
12.	snacks and mineral drinks
13.	alcoholic drinks
14.	tobacco

WRITE IN THREE (i).......... CODE IN PRECODED LIST
NAMES MAXIMUM (ii).......... IF POSSIBLE, OTHERWISE
(iii).......... ASK (b) AND CODE

(b) <u>SHOW CARD P</u>.

I have on this card the names of the various shopping centres in Kaduna, in which of these do you usually buy your food items?

01. Kingsway, Leventis, UTC, Chellarams stores ( )
02. Central (Gari) Market Place ( )
03. Tudun Wada Market Place ( )
04. Railway Station Market Place ( )
05. Makera/Kurmin Gwari Market Place ( )
06. Barnawa Market Place ( )
07. Badarawa Market Place ( )
08. Panteka Market Place ( )
09. Kawo/Talata Market Place ( )
10. Ungwan Rimi Market Place ( )
11. Ahmadu Bello Way/Junction Road ( )
12. Lagos Street ( )
13. Ibadan Street ( )
14. Oghomosho/Katsina/Jos Road ( )
15. Ibrahim Taiwo Road (Tudun Wada) ( )
16. Tudun Wada Bye-Pass ( )
17. Constitution Road ( )
18. Outside Kaduna Capital Territory ( )
19. Kabala Gabas Market ( )
20. Ungwan Television Market Place ( )
21. Ungwan Shanu Market Place ( )
22. Corner Shops/Hawkers/Street Market Place ( )

9.a SHOW CARD Q. (MOTIVATION DUE TO LOCATIONAL POTENTIAL IN A SHOPPING CENTRE).

I have on this card some possible reasons which make (impel) people to shop at a particular shopping centre. Which two of these make you most to shop for food items in each of the three named shopping centres?

X1. Cheap transport cost by railway (train).

X2. Cheap transport cost by road (bus, taxi).

X3. Close to your residence; you can walk the distance.

X4. Close to your place of work/civic and cultural centres.

X5. Close to other shopping centres - for comparison.

X6. Combination of bulk and retail purchase of commodities.

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND WRITE IN THE CODES OF THE PRECODED LIST; ONE ON EACH LINE)

Shopping Centre (i) ....

....

Shopping Centre (ii) ....

....

Shopping Centre (iii) ....

....

9.b SHOW CARD R. (MOTIVATION DUE TO STRUCTURAL POTENTIAL IN A SHOPPING CENTRE)

I have on this card another set of some possible reasons which make (impel) people to shop at a particular shopping centre. Which two of these make you most to shop for food items in each of the three named shopping centres.

Y1. Attraction of the modern design of the stalls and shops.

Y2. Existence of good toilet facilities and other amenities.

Y3. Ample parking spaces for private cars and station spaces for buses and taxies.

Y4. Feeling of security for life and property.

Y5. Cleanliness and healthy conditions of the shopping centre and its surroundings.

Y6. Easy correlation of the locations of items you want to buy.

Y7. Healthy conditions of the food items you want to buy.

Y8. Combination of shopping for food, durable and services items.

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND WRITE IN THE CODES OF THE PRECODED LIST; ONE ON EACH LINE).

Shopping centre (i) ....
....

Shopping centre (ii) ....
....

Shopping centre (iii) ....
....

10.a How many times in a week do you usually buy food items in each of the three named shopping centres?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)

b In which of the three named shopping centres do you usually do the most major shopping for food items; not just buying one or two things.

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)

---

11. <u>SHOW CARD P</u>.

During the last seven days, i.e. one week, where did you buy your food items? Please look at show card P and name the shopping centre.

WRITE IN THREE NAMES MAXIMUM	(i).............	OR CODE IN PRECODED LIST CONTAINED IN SHOW CARD P.
	(ii).............	
	(iii).............	

P

12.a SHOW CARD Q. (MOTIVATION DUE TO LOCATIONAL POTENTIAL IN A SHOPPING CENTRE)

Look at Show Card Q and tell me two reasons which made (impelled) you to shop for food items in each of the three named shopping centres during the last seven days, i.e. one week.

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND WRITE IN THE CODES OF THE PRECODED LIST CONTAINED IN SHOW CARD Q; ONE ON EACH LINE)

Shopping Centre (i) ....
....

Shopping Centre (ii)....................
....

Shopping Centre (iii)....................
....

12.b SHOW CARD R. (MOTIVATION DUE TO STRUCTURAL POTENTIAL IN A SHOPPING CENTRE)

Look at Show Card R and tell me two reasons which made (impelled) you most to shop for food items in each of the three named shopping centres during the last seven days, i.e. one week.

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND WRITE IN THE CODES OF THE PRECODED LIST CONTAINED IN SHOW CARD R; ONE ON EACH LINE)

Shopping Centre (i) ....
....

Shopping Centre (ii) ....
....

Shopping Centre (iii)....................
....

13.a During the last seven days, i.e. one week, how many times did you buy food items in each of the three named shopping centres?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)

b During the last seven days, i.e. one week, in which of the three named shopping centres did you do your major shopping for food items, not just buying one or two things?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)

c <u>SHOW CARD S.</u>

On what days of the week did you shop at each of the three named shopping centres during the last seven days, i.e. one week?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

		Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)
1.	Monday	( )	( )	( )
2.	Tuesday	( )	( )	( )
3.	Wednesday	( )	( )	( )
4.	Thursday	( )	( )	( )
5.	Friday	( )	( )	( )
6.	Saturday	( )	( )	( )
7.	Sunday	( )	( )	( )
8.	No particular day	( )	( )	( )

d SHOW CARD T.

At what time of the day did you shop at each of the three named shopping centres during the last seven days, i.e. one week?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

		Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)
1.	Morning time (7 am - 12 noon)	( )	( )	( )
2.	Afternoon time (12-4 pm)	( )	( )	( )
3.	Evening time (4-6 pm)	( )	( )	( )
4.	No particular time of the day	( )	( )	( )

14. SHOW CARD V.

What was your mode of travel to each of the three named shopping centres where you bought food items during the last seven days i.e. one week?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

	Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)
1. walk	( )	( )	( )
2. bicycle	( )	( )	( )
3. motor cycle	( )	( )	( )
4. private car/van	( )	( )	( )
5. taxi	( )	( )	( )
6. minibus	( )	( )	( )
7. K.S.T.A. bus	( )	( )	( )
8. Train	( )	( )	( )

15.a SHOW CARD W.

How long (going time only) did the journey take by your mode of travel to each of the three shopping centres where you bought food items during the last seven days, i.e. one week?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

	Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)
1. 5 minutes	( )	( )	( )
2. 10 minutes	( )	( )	( )
3. 20 minutes	( )	( )	( )
4. 30 minutes	( )	( )	( )
5. 45 minutes	( )	( )	( )
6. 1 hour	( )	( )	( )
7. Over 1 hour	( )	( )	( )
9. Do not know	( )	( )	( )

Note: QIA-QIB, Record 2, Cols. 1-5.

15.b SHOW CARD X.

On the average, what was the total trip time (spent going, buying and returning) by your mode of travel to each of the three named shopping centres where you bought food items during the last seven days, i.e. one week?

(READ OUT THE THREE NAMED SHOPPING CENTRES ONE AFTER THE OTHER AND CODE)

		Shopping Centre (i)	Shopping Centre (ii)	Shopping Centre (iii)
1.	30-60 minutes	( )	( )	( )
2.	1-2 hours	( )	( )	( )
3.	2-3 hours	( )	( )	( )
4.	3-4 hours	( )	( )	( )
5.	4-5 hours	( )	( )	( )
6.	5-6 hours	( )	( )	( )
7.	Over 6 hours	( )	( )	( )
9.	Do not know	( )	( )	( )

---

16. SHOW CARD U.

In which weeks of the month do you buy the major food items? (CODE TWO MAXIMUM)

1.	First week of the month	( )
2.	Second week of the month	( )
3.	Third week of the month	( )
4.	Fourth week of the month	( )
9.	No particular week of the month	( )

SECTION C.

I would like to ask some questions about how you do your shopping for durable and service goods in a month.

17. Can you tell me how you usually shop for the durable and service goods listed in Show Card X in a month.

(READ OUT THE PRECODED DURABLE AND SERVICE GOODS ONE AFTER THE OTHER, ASK QUESTIONS (i - v) AND THEN CODE)

(i) When you want to buy (SPECIFY COMMODITY), can you tell me the first shopping centre you usually go to look for it.

(ii) LOCATIONAL POTENTIAL REASON 1.

(iii) LOCATIONAL POTENTIAL REASON 2.

(iv) STRUCTURAL POTENTIAL REASON 1.

(v) STRUCTURAL POTENTIAL REASON 2.

Col. (1) ENTER CODES LISTED IN SHOW CARD P.

Col. (2) ENTER CODES LISTED IN SHOW CARD Q.

Col. (3) ENTER CODES LISTED IN SHOW CARD Q.

Col. (4) ENTER CODES LISTED IN SHOW CARD R.

Col. (5) ENTER CODES LISTED IN SHOW CARD R.

	SHOW CARD X. Class of durable and services goods	(1) Choice of Shopping Centre	(2) Locational Potential Reason 1	(3) Locational Potential Reason 2	(4) Structural Potential Reason 1	(5) Structural Potential Reason 2
a	15. mens clothing					
b	16. womens clothing					
c	17. children's clothing					
d	18. shoes					
e	19. furniture					
f	20. electronics and electrical					
g	21. plastics, dishes and glasses					
h	22. leather goods					
i	23. utensils and tools					
j	24. prams and cycles					
k	25. cosmetics					
l	26. chemists and drugs					
m	27. toys and jewellery					
n	28. books and stationery					
o	29. building and construction materials					
p	30. auto spareparts					
q	31. bicycle spareparts					
r	32. restaurants (food hotels)					
s	33. hairdressing					
t	34. pools betting					
u	35. tailors and weavers workshop					
v	36. laundry services					
w	37. watch/shoe/bicycle repairs					
x	38. electronics and electrical workshop					

SECTION D.

I would like to ask some questions about your shopping at the Central Market Place.

18.a SHOW CARD Y1. (BLOCKAGE DUE TO LACK OF LOCATIONAL POTENTIALS IN THE CENTRAL MARKET PLACE)

I have on this card some possible reasons which could discourage people from shopping at the Central Market Place. Which two of these discourage you most from shopping at the Central Market Place? (READ OUT AND CODE)

X'1.	high transport cost by railway train	( )
X'2.	high transport cost by road (bus, minibus and taxi, motor cycle and private car/van)	( )
X'3.	far from your residence, you cannot walk the distance	( )
X'4.	far from your place of work, civic and cultural centres	( )
X'5.	is isolated from other shopping centres	( )
X'6.	cannot combine bulk and retail purchase of commodities	( )
X'7.	many other choices of shopping centres	( )

18.b SHOW CARD Y2. (BLOCKAGE DUE TO LACK OF STRUCTURAL POTENTIAL IN THE CENTRAL MARKET PLACE)

I have on this card another set of some possible reasons which make people not to shop at the Central Market Place. Which two of these make you most not to shop at the Central Market Place? (READ OUT AND CODE)

Y'1. rigidity of stalls inhibits expansion and change ( )

Y'2. lack of good toilet facilities and other amenities ( )

Y'3. lack of parking spaces for private cars and station spaces for buses and taxies ( )

Y'4. feeling of insecurity for life and property ( )

Y'5. the central market place and its surroundings are dirty and unhealthy ( )

Y'6. dispersed locations of the items you want to buy ( )

Y'7. food items are not properly preserved ( )

Y'8. cannot combine shopping for food, durable and services items ( )

---

19. How often do you go to the central market place to take intercity buses, minibuses, trucks and taxies?

1. for all your intercity journeys ( )
2. for about ½ of your intercity journeys ( )
3. for about ¼ of your intercity journeys ( )
4. do not go to the central market place for your intercity journeys ( )

---

20. SHOW CARDS O and X.

Look at show cards O and X. If the central market place is rebuilt into a three storey structure, name six classes of commodities which you want to see (READ OUT SHOW CARDS O and X).

a. On the ground floor

WRITE IN COMMODITY NAMES OR CODES

(i) ....

(ii) ....

(iii) ....

(iv) ....

(v) ....

(vi) ....

b. On the first floor

WRITE IN COMMODITY NAMES OR CODES

(i) ....

(ii) ....

(iii) ....

(iv) ....

(v) ....

(vi) ....

c. On the second floor

WRITE IN COMMODITY NAMES OR CODES

(i) ....

(ii) ....

(iii) ....

(iv) ....

(v) ....

(vi) ....

---

21. SHOW CARD U. In which weeks of the month do you buy items at the Central Market Place?

READ OUT AND ENTER CODES LISTED IN SHOW CARD

(a) 1st week of the month	0.no( )	1.yes( )
(b) 2nd week of the month	( )	( )
(c) 3rd week of the month	( )	( )
(d) 4th week of the month	( )	( )
(e) No particular week of the month	( )	( )

22. <u>SHOW CARD Y4.</u>

In which months of the year do you buy items at the central market place?

<u>READ OUT AND CODE</u>

	0. no	1. yes
(a) January	( )	( )
(b) February	( )	( )
(c) March	( )	( )
(d) April	( )	( )
(e) May	( )	( )
(f) June	( )	( )
(g) July	( )	( )
(h) August	( )	( )
(i) September	( )	( )
(j) October	( )	( )
(k) November	( )	( )
(l) December	( )	( )

---

23. <u>SHOW CARD X.</u>

When you go to the central market place to buy some of the non-food commodities listed in Show Card X, about how much time do you spend in the market place?

01.	30 minutes	( )	09.	4½ hours	( )
02.	1 hour	( )	10.	5 hours	( )
03.	1½ hours	( )	11.	5½ hours	( )
04.	2 hours	( )	12.	6 hours	( )
05.	2½ hours	( )	13.	6½ hours	( )
06.	3 hours	( )	14.	7 hours	( )
07.	3½ hours	( )	15.	7½ hours	( )
08.	4 hours	( )	16.	8 hours	( )
			17.	Do not know	( )

24.a Do you think that the manner in which the traders display the food items in the Central Market Place is helpful in preserving them?

1. Yes ( ) 2. No ( )

b Any comments? PROBE AND RECORD FULLY

c Instead of haggling about prices of food items with the traders would you like the traders to put exact price labels on the food items displayed for sale?

1. Yes ( ) 2. No ( )

d Any comments? PROBE AND RECORD FULLY

e Do you think that the manner in which the traders display food items for sale in the Central Market Place is helpful in facilitating existing bargaining system?

1.	very helpful	( )	3.	fairly helpful	( )
2.	helpful	( )	4.	not helpful	( )

f Any other comments on the manner in which the traders display the food items meant for sale?

SECTION E.

I would like to ask some general questions.

25. Could you tell me which of these ages comes closest to yours?

READ OUT SHOW CARD Z AND THEN CODE

01.	21 years	( )	07.	50 years	( )
02.	25 years	( )	08.	55 years	( )
03.	30 years	( )	09.	60 years	( )
04.	35 years	( )	10.	65 years	( )
05.	40 years	( )	11.	70 years	( )
06.	45 years	( )	12.	Over 70 yrs.	( )

---

26. Could you tell me where you work?

WRITE IN NAME ....
....

---

27. Could you tell me what type of work you do in your place of work?

WRITE IN NAME ....
....

---

28. Can you tell me the name by which you are known in this compound, i.e. what do people who live in this compound call you?

....

---

29. Apart from shopping and taking inter-city buses and taxies, what other social activities do you take in the Central Market Place?

....

CLOSE THE INTERVIEW

Thank you very much for your co-operation and the time you have spared to respond to the questions. If we have reasons to come back for more information, we hope you shall co-operate with us once more. Thank you again!

APPENDIX 6.2.2 BUILT-UP PLOTS AND HOUSEHOLD LISTING SHEET

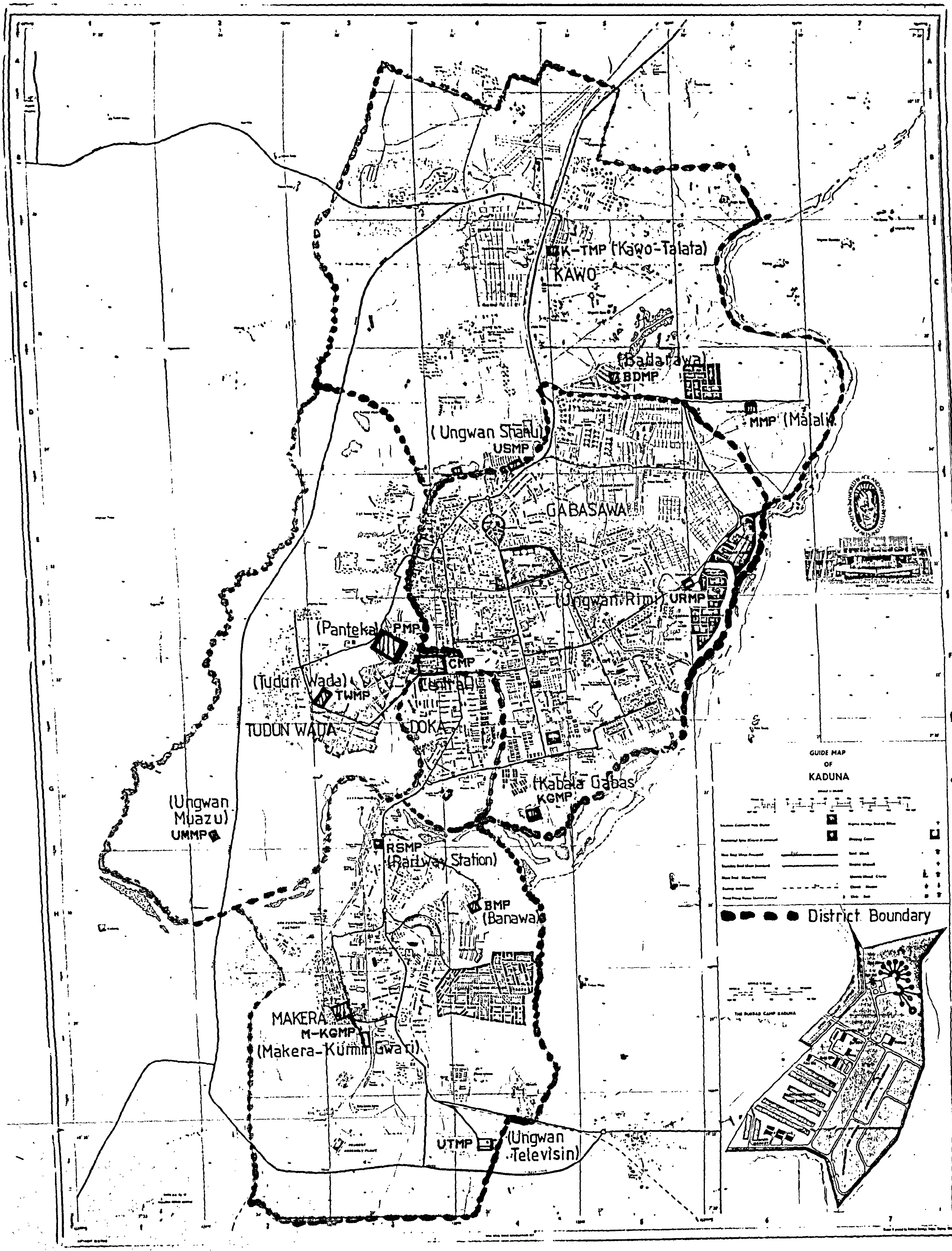
FIELD SURVEY PART I: DEMAND FOR ACTIVITY SPACES IN THE URBAN MARKET PLACES

1.3 Behaviour Pattern of Shopping Trips Distribution to the Shopping Establishments in the City by the City Residents.

BUILT-UP PLOT STUDY NUMBER..... TOTAL NUMBER OF HOUSEHOLDS RESIDING IN THE BUILT-UP PLOT ...

Household Number	Household characteristics						
	Head of household Show Card M/N...		Mistress of household Show Card M/N		Size of household		Vehicle ownership
	Employment type	Category of employment	Employment type	Category of employment	Number of adults	Number of dependants	

APPENDIX 6.2.3: Map of Kaduna City Showing the Administrative Districts and the Market Places



APPENDIX 6.2.4

KADUNA LOCAL GOVERNMENT 1963 CENSUS POPULATION
AND PROJECTION FROM 1978-85 BY DISTRICTS

DISTRICTS	1963 POPULATION CENSUS	1978 - 1985 PROJECTED POPULATION							
		1978	1979	1980	1981	1982	1983	1984	1985
DOKA	44,311	122,255	130,813	139,970	149,768	160,252	171,470	183,472	196,315
GABASAWA	15,361	42,381	45,348	48,523	51,919	55,553	59,442	63,603	68,055
KAWO	34,529	95,267	101,936	109,071	116,706	124,876	133,616	142,970	152,978
MAKERA	20,214	55,771	59,675	63,852	68,322	73,104	78,222	83,697	89,556
TUDUN WADA	35,495	97,932	104,787	112,122	119,971	128,369	137,354	146,970	157,258
TOTAL	149,910	413,606	442,559	473,538	506,686	542,154	580,104	628,712	664,162

NOTE: Projection based on 1963 Census using 7% (constant) annual growth rate.

SOURCE: Kaduna State 1963 Census Population and Projections from 1978-1985 by Districts and Local Government Council Areas (1983, p. 4).
(Ministry of Economic Development, Statistics Division, Kaduna State, Nigeria).

APPENDIX 6.2.5: DISTRIBUTION OF PERSONS PER HOUSEHOLD BY STATE, AGE-GROUP AND SEX

URBAN: 1979

AGE-GROUP & SEX / STATES	0 - 4		5 - 14		15 - 29		30 - 44		45 - 59		60+		TOTAL		Grand Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	M/F
Anambra	0.39	0.57	1.06	1.13	0.66	0.81	0.45	0.36	0.24	0.06	0.02	0.03	2.82	2.96	5.78
Bauchi	0.49	0.50	0.66	0.85	0.51	0.76	0.53	0.57	0.26	0.11	0.05	0.04	2.50	2.83	5.33
Bendel	0.39	0.41	0.63	0.63	0.77	0.75	0.39	0.20	0.09	0.07	0.07	0.06	2.34	2.12	4.46
Benue	0.38	0.42	0.89	0.76	0.67	0.74	0.42	0.36	0.09	0.08	0.04	0.03	2.49	2.39	4.88
Borno	0.24	0.33	0.60	0.38	0.40	0.56	0.39	0.35	0.19	0.10	0.08	0.05	1.90	1.77	3.67
Cross River	0.29	0.41	0.60	0.47	0.73	0.68	0.39	0.25	0.11	0.11	0.05	0.04	2.17	1.96	4.13
Gongola	0.24	0.23	0.51	0.42	0.49	0.54	0.47	0.47	0.24	0.10	0.10	0.03	2.05	1.79	3.84
Imo	0.39	0.49	0.98	0.63	0.78	0.92	0.66	0.44	0.07	0.02	0.07	0.00	2.95	2.50	5.45
Kaduna	0.45	0.40	0.76	0.58	0.66	0.86	0.48	0.36	0.23	0.06	0.06	0.02	2.64	2.28	4.92
Kano	0.42	0.69	0.75	0.61	0.62	0.80	0.46	0.52	0.19	0.19	0.16	0.16	2.60	2.97	5.57
Kwara	0.35	0.30	0.76	0.58	0.52	0.69	0.36	0.51	0.18	0.03	0.14	0.08	2.31	2.19	4.50
Lagos	0.26	0.31	0.81	0.57	0.47	0.59	0.44	0.45	0.19	0.09	0.06	0.03	2.23	2.04	4.27
Niger	0.29	0.33	0.74	0.56	0.49	0.81	0.51	0.42	0.23	0.06	0.03	0.00	2.29	2.18	4.47
Ogun	0.15	0.25	0.70	0.71	0.45	0.43	0.24	0.53	0.34	0.17	0.17	0.09	2.05	2.18	4.23
Ondo	0.27	0.24	0.69	0.62	0.46	0.47	0.31	0.46	0.24	0.23	0.15	0.11	2.12	2.13	4.25
Oyo	0.33	0.31	0.73	0.51	0.68	0.66	0.38	0.45	0.21	0.16	0.21	0.13	2.54	2.22	4.76
Plateau	0.42	0.43	0.67	0.53	0.64	0.65	0.39	0.24	0.08	0.02	0.02	0.02	2.22	1.89	4.11
Rivers	0.42	0.26	0.78	0.63	0.62	0.85	0.32	0.35	0.28	0.10	0.03	0.12	2.45	2.31	4.76
Sokoto	0.38	0.30	0.53	0.44	0.42	0.76	0.41	0.40	0.22	0.07	0.10	0.03	2.06	2.00	4.06
Total	0.33	0.37	0.74	0.60	0.60	0.68	0.40	0.42	0.20	0.12	0.11	0.08	2.38	2.27	4.65

Source: Household Sourvey Unit, Federal Office of Statistics, Lagos.
In Social Statistics in Nigeria (1980), page 11.

APPENDIX 6.2.6 The Sale of 1983 Electoral Register

FEDECO to sell voters' list to political parties

From ADEBISI ADEKUNLE, Sokoto

FEDERAL Electoral Commission (FEDECO) is to sell copies of the voters's list to all registered political parties to display in their offices.

The FEDECO Administrative Secretary in Sokoto State, Alhaji Mohammed Tukur Adamu told the New Nigerian yesterday that each unit of 1,000 names would be sold for 10 Naira. He said this was to enable party supporters to cross-check their names on the voters' list.

The secretary said that all payments for the voters' list were to be made at the FEDECO headquarters in Lagos and that sales began from yesterday.

He said that no association other than political parties or individuals would be allowed to purchase the voters list.

NEW NIGERIAN Nº 5398 NEWSPAPER
SATURDAY, 23 JULY, 1983

APPENDIX 6.3.1

"KADUNA CITY MARKET PLACE STUDY"

FIELD SURVEY PART 2: LOCATIONAL AND STRUCTURAL POTENTIALS IN THE URBAN MARKET PLACE

(Section A: Interview of Market place Administrators.

Section B: Physical Survey of the city market places and their vicinities).

FEBRUARY, 1984.

01	02		03
Name of market place	Name of district	Name of responding administrator	Status of responding administr-ator

Signature of responding administrator .... Date ....

Notes on completion of Section A:

Some questions can be answered simply by ticking the appropriate box.

If additional space is required for the written answers, please use the space provided at the end of the form.

Any information obtained from the survey will be used for academic purposes only.

Thank you for your valuable assistance.

Q.

01 NAME OF MARKET PLACE

02	Central Market Place	(CMP)
03	Tudun Wada Market Place	(TWMP)
04	Railway Station Market Place	(RSMP)
05	Makera/Kurmin Gwari Market Place	(M-KGMP)
06	Barnawa Market Place	(BMP)
07	Badarawa Market Place	(BDMP)
08	Panteka Market Place	(PMP)
09	Kawo/Talata Market Place	(K-TMP)
10	Ungwan Rimi Market Place	(URMP)
20	Karbala Gabas Market Place	(KGMP)
21	Ungwan Television Market Place	(UTMP)
22	Ungwan Shanu Market Place	(USMP)

DATA RECORD

02 NAME OF DISTRICT

D. Doka
M. Makera
T. Tudun Wada
K. Kawo
G. Gabasawa

03 STATUS OF RESPONDING ADMINISTRATOR

1 Market Master/Market Scribe
2 Local Government Official
3 City Development Board Official
4 Market Development Board Official

SECTION A

This section, A, could be completed by the respondent or administered on him by the field surveyor.

1. What are the reasons for the establishment of this market place?

....

....

....

....

2(a) Is this market place Daily; ( ) Periodic ( ) or Daily-Periodic ( )

(b) If it is periodic or daily-periodic, what is the market cycle?

1. on Monday ( )		5. on Friday ( )	
2. on Tuesday ( )		6. on Saturday ( )	
3. on Wednesday ( )		7. on Sunday ( )	(i)
4. on Thursday ( )		0. not applicable ( )	(ii)

(c) For Ibo speaking area

1. every Eke ( )		5. every other Eke ( )	
2. every Orie ( )		6. every other Orie ( )	
3. every Afor ( )		7. every other Afor ( )	
4. every Nkwo ( )		8. every other Nkwo ( )	(i)
		0. not applicable ( )	(ii)

3(a) In what year was this market place established..... (0000 - 1984)

(b) What is the year of the last reconstruction of this market place......... (0000 - 1984)

(c) What is the number of reconstructions since the establishment of this market place........ (0 - 8)
9. do not know

---

4. Could you list the problems you encountered during the allocation of the stalls after the last reconstruction

....

....

5(a) After the last reconstruction how many stalls were available for allocation? ....

0000 - 8888
9999 data not available.

(b) How many years did it take to exhaust the allocation of the available number of stalls? ....

(1 - 8)

9 do not know.

---

6. How many years after the last reconstruction did you commence the construction of additional stalls? ....

(1 - 8)

9 data not available.

---

7. Who financies the construction of

(In each case code a maximum of three financiers)

(a) the permanent stalls
(b) the temporary stalls

	(a) permanent stalls	(b) temporary stalls
1. State government		
2. Market Place Development Board		
3. Local government council		
4. City Development Board		
5. Federal Government		
6. Some Finance Organisations		
7. Middlemen Contractors		
8. Stall Allottee		
9. The trader occupying the stall		

---

8. Since the last reconstruction, what changes have taken place in the Market Place in the original zoning of commodities?

....

....

....

....

---

9. Since 1974 how many times has this market place been affected by the following disasters?

Type of Disaster	Year[1] of occurrence	No.[2] of stalls involved	Estimated cost of damage	Other remarks	
(a) Fire	....	....	....	....	
	....	....	....	....	1
	....	....	....	....	2
	....	....	....	....	
(b) Flood	....	....	....	....	
	....	....	....	....	1
	....	....	....	....	2
	....	....	....	....	
(c) Thunderstorm	..	....	....	....	
	....	....	....	....	1
	....	....	....	....	2
	....	....	....	....	
(d) Burglary	.....	....	....	....	
	.....	....	....	....	1
	.....	....	....	....	2
	.....	....	....	....	

Notes: (1) 00 - 88 (numbers
(2) 0000 - 8888 (numbers)
9999 - data not available

10. Could you list the administrative problems of this market place.

....

....

....

....

....

---

11. How many applications for stalls in this market place are now awaiting consideration for sale of the following commodities?

Code	Commodity	Number of applications		
01.	tubers		A1. traditional foodstuffs	A. food commodities
02.	grains			
03.	flours			
04.	cooking oil			
05.	livestock			
06.	fresh meat			
07.	fresh fish			
08.	dried meat and fish			
09.	vegetables, fruits and nuts			
10.	spices			
11.	provisions (tinned foods)		A2. factory processed foodstuffs	
12.	snacks and mineral drinks			
13.	alcoholic drinks			
14.	tobacco			
15.	men's clothing		B1. durable goods	B. non-food commodities
16.	women's clothing			
17.	children's clothing			
18.	shoes			
19.	furniture			
20.	electronics and electrical			
21.	plastics, dishes and glasses			
22.	leather goods			
23.	cooking utensils and tools			
24.	prams and cycles			
25.	cosmetics			
26.	chemists and drugs			
27.	toys and jewelleries			
28.	books and stationery			
29.	building and construction materials			
30.	auto spareparts			
31.	bicycle spareparts			

Code	Commodity	Number of applications	
32.	restaurants		Services goods
33.	hairdressing		
34.	pools betting		
35.	tailors and weavers workshop		
36.	laundry services		
37.	watch/shoe/bicycle repairs		
38.	electronics and electrical workshop		
39.	woodcraft workshop		
40.	metalcraft workshop		
41.	battery charging and vulcanization		
42.	herbalist ingredients		
43.	empty bottles and containers		
44.	flour mills		

Notes:

000 - 888 (numbers)

999 - data not available.

12. Could you list the various complaints you have received about this market place from the market traders:

....

....

....

....

....

---

13. Could you list the administrative problems you suspect would face a two- or three-storey market place structure.

....

....

....

....

....

---

14. (a) What time of the day does this market place open?

(0000 - 2400 hours)

(b) What time of the day does this market place close?

(0000 - 2400 hours)

SECTION B

This section, B, comprises physical survey of the market place and its vicinity by the researcher.

---

15. What is the quality of the railway connections to this market place?

5.	Railway with a station	( )	5
4.	Railway without a station	( )	4
3.	Railway siding only	( )	3
2.	Railway not nearby but in town	( )	2
1.	No Railway in the town	( )	1
0.	No Railway in the country	( )	0

---

16. What is the quality of road connections to this market place?

(a) No. of inner ring roads connected directly to the market place ....

(b) No. of outer ring roads connected directly to the market place ....

(c) No. of 1st distributor roads connected directly to the market place ....

(d) No. of 2nd distributor roads connected directly to the market place ....

(e) No. of 3rd distributor roads connected directly to the market place ....

(f) No. of 4th distributor roads connected directly to the market place ....

(g) No. of 5th distributor roads connected directly to the market place ....

Note: (0 - 9) numbers; see definitions in page A59

---

17. (a) How many K.S.T.A. omnibus routes pass through the market place? ....

(b) How many minibus routes pass through the market place? ....

Note: (0 - 9) numbers

---

18. Could you list the shopping thoroughfares adjoining the market place

....

....

....

Note: (0 - 9) numbers

19. Could you fill in the following chart.

Locational Potential	Within ¼ km. radius of the market place 1	Within ½ km. radius of the market place minus (1) entry 2	Within 1 km. radius of the market place minus (1-2) entries 3	Within 2 km. radius of the market place minus (1-3) entries 4
(a) Residential population				
(b) Federal Govt. Secretariate				
(c) State Govt. Secretariate				
(d) Local Govt. Secretariate				
(e) District Headquarters				
(f) Superstores locations				
(g) Warehouses location				
(h) Industrial/Workshop location				
(i) Agricultural/fishing location				

Notes: 19(a) Enter actual population in wholenumber thousands

19(b-i) Enter 0 for No,
and 1 for Yes.

20. What is the quality of separation of access for shoppers, commodities and facilities.

4. Access for shoppers, commodities and facilities separate ( )
3. Access for shoppers separate, commodities and facilities mixed up ( )
2. Access for facilities separate, shoppers and commodities mixed up ( )
1. Access for commodities separate, shoppers and facilities mixed up ( )
0. Access for shoppers, commodities and facilities mixed up ( )

---

21. Are the zones and sub-zones of the market place demarcated by design hedges and landmarks?

4. very well demarcated ( )
3. well demarcated ( )
2. fairly demarcated ( )
1. poorly demarcated ( )
0. not demarcated at all ( )

---

22. What is the existing hierarchy of shopping corridors in the market place?

3. shopping-concourse, -avenue and -lanes ( )
2. shopping-avenues and -lanes only ( )
1. shopping-lanes only ( )
0. none of the above ( )

---

23. Record available toilet facilities.

Sanitary ware	1 No. in usable condition	2 No. in unusable condition
a. WCs (water closets)		
b. urinals		
c. pit latrines		

Notes: (00 - 88) number of sanitary wares.
(99) data not available.

24. Record available parking or station spaces for the following classes of vehicles:

a. private car/van .... m^2

b. motor cycles .... m^2

c. minibus .... m^2

d. taxi .... m^2

e. motor truck .... m^2

f. hand carts .... m^2

g. K.S.T.A. bus .... m^2

Note: (0000 - 9999 m^2)

---

25. What is the quality of refuse disposal in the market place?

a.
3. use of refuse trucks bins ( )
2. use of refuse bucket-bins ( )
1. use of incinerator ( )
0. none of the above ( )

b.
2. regular market place sweepers ( )
1. no regular market place sweepers ( )
0. no market place sweepers at all ( )

---

26. What is the quality of surface water drainage in the market place?

3. underground sewers ( )
2. covered drains ( )
1. open channel drains ( )
0. no designed drainage system ( )

---

27. What is the quality of ground surface in the market place? (environmental quality).

	0.No	1.Yes	9.Not applicable
a. shoppers access roads paved			
b. shopping-concourse paved			
c. shopping-avenue paved			
d. shopping-lanes paved			
e. floor surface of stall paved			
f. open spaces maintained			

28. What is the material of property fence surrounding the market place?

3. solid wall ( )
2. expanded metal ( )
1. barbed wire ( )
0. none of the above ( )

29. What is the quality of police protection in the market place?

3. police station ( )
2. police post ( )
1. no police office ( )
0. no police presence at all ( )

30. What is the quality of security lighting in the market place?

2. flood lighting ( )
1. street lighting ( )
0. no security lighting ( )

31. What is the quality of fire protection in the market place?

a. 2. fire station ( )
   1. fire post ( )
   0. no firemen present ( )

b. 1. fire hydrants exist ( )
   0. fire hydrants do not exist ( )

---

32. What is the quality of market place wardens?

   2. wardens in uniform ( )
   1. wardens not in uniform ( )
   0. no wardens at all ( )

---

33. What is the quality of market place administration office?

   3. permanent building ( )
   2. temporary building ( )
   1. market stall used as office ( )
   0. no market place office at all ( )

---

34. What is the level of availability of the following utilities?

Utility	0. none	1. yes
a.1 Electric power supply in the stalls		
a.2 Electric power supply in the market place		
b.1 Air-conditioning in the stalls		
b.2 Air-conditioning in the market place		
c.1 Cold water supply in the stalls		
c.2 Cold water supply in the market place		
d.1 Hot water supply in the stalls		
d.2 Hot water supply in the market place		
e.1 Bulk dry storage in the stalls		
e.2 Bulk dry storage in the market place		
f.1 Bulk cold storage in the stalls		
f.2 Bulk cold storage in the market place		
g.1 Drainage in the stalls		
g.2 Drainage in the market place		
h.1 Privacy in the stalls		
h.2 Privacy in the market place		
i.1 Show window in the stalls		
i.2 Show window in the market place		

35. How much space is available for future expansion of this market place?

	Without any demolition (a)	With reasonable demolition (b)
2. plenty of space		
1. little space		
0. no space at all		

APPENDIX 6.3.2

Calculation Scheme of Locational and Structural Potentials Scores.

Variable Name and Code	Sub-Variable Code	Name of Sub-variable	Question No. of Sub-Variable in the Questionnaire	Interval Level of Measurement	Unit value of Sub-Variable	Crude Score of Sub-Variable	Crude Score of Variable	Standardized Score (Z Score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Railway Transport Linkage X_1	X1.1	Railway with station	Q15A	5						
	X1.2	Railway without station	Q15B	4						
	X1.3	Railway siding	Q15C	3						
Road Transport Linkage X_2	X2.1	Number of omnibus routes	Q17A	9						
	X2.2	Number of minibus routes	Q17B	8						
	X2.3	Number of inner ring roads	Q16A	7						
	X2.4	Number of outer ring roads	Q16B	6						
	X2.5	Number of first distributor roads	Q16C	5						
	X2.6	Number of second distributor roads	Q16D	4						
	X2.7	Number of third distributor roads	Q16E	3						
	X2.8	Number of fourth distributor roads	Q16F	2						
	X2.9	Number of fifth distributor roads	Q16G	1						
Immediate surrounding residential population X_3	X3.1	Residential population within ¼ Km. radius	Q19A1	4*						
	X3.2	Residential population within ½ Km. radius	Q19A2	3*						
	X3.3	Residential population within 1 Km. radius	Q19A3	2*						
	X3.4	Residential population within 2 Km. radius	Q19A4	1*						

* per 1000 population

Variable Name and Code	Sub-Variable Code	Name of Sub-variable	Question No. of Sub-Variable in the Questionnaire	Interval Level of Measurement	Unit Value of Sub-Variable	Crude Score of Sub-Variable	Crude Score of Variable	Standardized Score (Z Score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Immediate surrounding places of work and socio-cultural activities (including location near industrial sites) X_4	X4.1	Federal Government Secretariate within $\frac{1}{4}$ Km. radius	Q19B1	5						
	X4.2	Federal Government Secretariate within $\frac{1}{2}$ Km. radius	Q19B2	4						
	X4.3	Federal Government Secretariate within 1 Km. radius	Q19B3	3						
	X4.4	Federal Government Secretariate within 2 Km. radius	Q19B4	2						
	X4.5	State Government Secretariate within $\frac{1}{4}$ Km. radius	Q19C1	7						
	X4.6	State Government Secretariate within $\frac{1}{2}$ Km. radius	Q19C2	6						
	X4.7	State Government Secretariate within 1 Km. radius	Q19C3	5						
	X4.8	State Government Secretariate within 2 Km. radius	Q19C4	4						
	X4.9	Local Government Secretariate within $\frac{1}{4}$ Km. radius	Q19D1	5						
	X4.10	Local Government Secretariate within $\frac{1}{2}$ Km. radius	Q19D2	4						
	X4.11	Local Government Secretariate within 1 Km. radius	Q19D3	3						
	X4.12	Local Government Secretariate within 2 Km. radius	Q19D4	2						
	X4.13	District Headquarters within $\frac{1}{4}$ Km. radius	Q19E1	4						
	X4.14	District Headquarters within $\frac{1}{2}$ Km. radius	Q19E2	3						
	X4.15	District Headquarters within 1 Km. radius	Q19E3	2						
	X4.16	District Headquarters within 2 Km. radius	Q19E4	1						
Immediate surrounding other shopping centres X_5	X5.1	Number of adjoining shopping streets	Q18	5						
	X5.2	Number of superstores within $\frac{1}{4}$ Km. radius	Q19F1	4						
	X5.3	Number of superstores within $\frac{1}{2}$ Km. radius	Q19F2	3						
	X5.4	Number of superstores within 1 Km. radius	Q19F3	2						
	X5.5	Number of superstores within 2 Km. radius	Q19F4	1						

Variable Name and Code	Sub-Variable Code	Name of Sub-Variable	Question No. of Sub-Variable in the Questionnaire	Interval level of Measurement	Unit score of Sub-Variable	Crude score of Sub-Variable	Crude score of Variable	Standardized score (Z score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Immediate surrounding whole-sale shops and warehouses (including location near agricultural sites) X_6	X6.1	Number of warehouses within ¼ Km. radius	Q19G1	4						
	X6.2	Number of warehouses within ½ Km. radius	Q19G1	3						
	X6.3	Number of warehouses within 1 Km. radius	Q19G1	2						
	X6.4	Number of warehouses within 2 Km. radius	Q19G2	1						
	X6.5	Number of industrial premises within ¼ Km. radius	Q19H2	4						
	X6.6	Number of industrial premises within ½ Km. radius	Q19H2	3						
	X6.7	Number of industrial premises within 1 Km. radius	Q19H3	2						
	X6.8	Number of industrial premises within 2 Km. radius	Q19H3	1						
	X6.9	Hectarage of agricultural farms " ¼ Km. radius	Q19I3	4						
	X6.10	Hectarage of agricultural farms " ½ Km. radius	Q19I1	3						
	X6.11	Hectarage of agricultural farms " 1 Km. radius	Q19I4	2						
	X6.12	Hectarage of agricultural farms " 2 Km. radius	Q19I4	1						
Building Design Factors Y_1	Y1.1	Percentage of separation of accesses	Q20A	10						
	Y1.2	Permanency of stall structures	Q20B	10						
Facilities and Amenities Y_2	Y2.1	Number of water closets in usable condition	Q23A1	6						
	Y2.2	Number of water closets in unusable condition	Q23A2	5						
	Y2.3	Number of urinals in usable condition	Q23B1	4						
	Y2.4	Number of urinals in unusable condition	Q23B2	3						
	Y2.5	Number of pit latrines in usable condition	Q23C1	2						
	Y2.6	Number of pit latrines in unusable condition	Q23C2	1						

Variable Name and Code	Sub-Variable Code	Name of Sub-Variable	Question No. of Sub-Variable in the Questionnaire	Interval Level of Measurement	Unit Score of Sub-Variable	Crude Score of Sub-Variable	Crude Score of Variable	Standardized Score (Z Score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Y_3 Parking and Stationing Spaces for Vehicles	Y3.1	Parking floor-space available to private car/van	Q24A	1**						
	Y3.2	Parking floor-space available to motor cycle	Q24B	1**						
	Y3.3	Stationing floor-space available to minibus	Q24C	1**						
	Y3.4	Stationing floor-space available to taxi cab	Q24D	1**						
	Y3.5	Stationing floor-space available to motor truck	Q24E	1**						
	Y3.6	Stationing floor-space available to hand cart	Q24F	1**						
	Y3.7	Stationing floor-space available to omnibus	Q24G	1**						
Y_4 Security of Life and Property	Y4.1	Solidity of property fence	Q28	5						
	Y4.2	Size of police presence	Q29	5						
	Y4.3	Effectiveness of security lighting	Q30	5						
	Y4.4	Size of fire fighters	Q31A	5						
	Y4.5	Percentage of fire hydrants	Q31B	5						
	Y4.6	Size of market warden presence	Q32	5						
	Y4.7	Solidity of administrative building	Q33	5						
Y_5 Environmental Qualities	Y5.1	Solidity of the floor of the stalls	Q27E	6						
	Y5.2	Effectiveness of refuse disposal	Q25A	5						
	Y5.3	Effectiveness of refuse collection	Q25B	5						
	Y5.4	Effectiveness of surface water drainage	Q26	5						
	Y5.5	Solidity of shoppers access ways	Q27A	5						
	Y5.6	Solidity of shopping concourse	Q27B	4						
	Y5.7	Solidity of shopping avenues	Q27C	3						
	Y5.8	Solidity of shopping lanes	Q27D	2						
	Y5.9	Cleanliness of open spaces	Q27F	1						

** per 100 square metres

Variable Name and Code	Sub-Variable Code	Name of Sub-Variable	Question No. of Sub-Variable in the Questionnaire	Interval Level of Measurement	Unit Score of Sub-Variable	Crude Score of Sub-Variable	Crude Score of Variable	Standardized Score (Z Score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Disposition of Commodity Zones Y_6	Y6.1	Distinctiveness of the zones and sub-zones	Q21	10						
	Y6.2	Size of hierarchy of shopping	Q22	10						
Preservation of Food Commodities Y_7	Y7.1	Availability of electric power supply in the stalls	Q34A1	4						
	Y7.2	Availability of electric power supply in the market place	Q34A2	2						
	Y7.3	Availability of air-conditioning in the stalls	Q34B1	4						
	Y7.4	Availability of air-conditioning in the market place	Q34B2	2						
	Y7.5	Availability of cold water supply in the stalls	Q34C1	4						
	Y7.6	Availability of cold water supply in the market place	Q34C2	2						
	Y7.7	Availability of hot water supply in the stalls	Q34D1	4						
	Y7.8	Availability of hot water supply in the market place	Q34D2	2						
	Y7.9	Availability of bulk dry storage in the stalls	Q34E1	4						
	Y7.10	Availability of bulk dry storage in the market place	Q34E2	2						
	Y7.11	Availability of bulk cold storage in the stalls	Q34F1	4						
	Y7.12	Availability of bulk cold storage in the market place	Q34F2	2						
	Y7.13	Availability of drainage in meat, fish and vegetable stl	Q34G1	4						
	Y7.14	Availability of drainage in the market place	Q34G2	2						
	Y7.15	Availability of privacy in the stalls	Q34H1	4						
	Y7.16	Availability of bad weather protection in market place	Q34H2	2						
	Y7.17	Availability of display show windows in the stalls	Q34I1	4						
	Y7.18	Availability of display show windows in the market place	Q34I2	2						

Variable Name and Code	Sub-Variable Code	Name of Sub-Variable	Floor-Space Classification Questionnaire Item 6.2.4	Interval Level of Measurement	Unit Score of Sub-Variable	Crude Score of Sub-Variable	Crude Score of Variable	Standardized Score (Z Score) of Variable	Weight of Variable	Variable Score
1	2		3	4	5	6	7	8	9	10
Y_8 Food and Non-Food Floor-Spaces (measure of physical size of market place)	Z_a	Scale of stallage food floor-space	Food Floor-Space	1***						
	Z_b	Scale of stallage non-food floor-space	Non-Food Floor-Space	1***						
	***	Per 1000 m^2 of stallage floor-space								

Definition of Distributor Roads

1. FIRST DISTRIBUTOR ROADS: Roads serving the country as a whole or a region of the country, and linking up the main centres of population or the various regions.

2. SECOND DISTRIBUTOR ROADS: Roads carrying traffic having its origin outside the urban and its destination inside the urban or vice versa.

3. THIRD DISTRIBUTOR ROADS: Roads carrying traffic having its origin in one area of the urban and its destination in another.

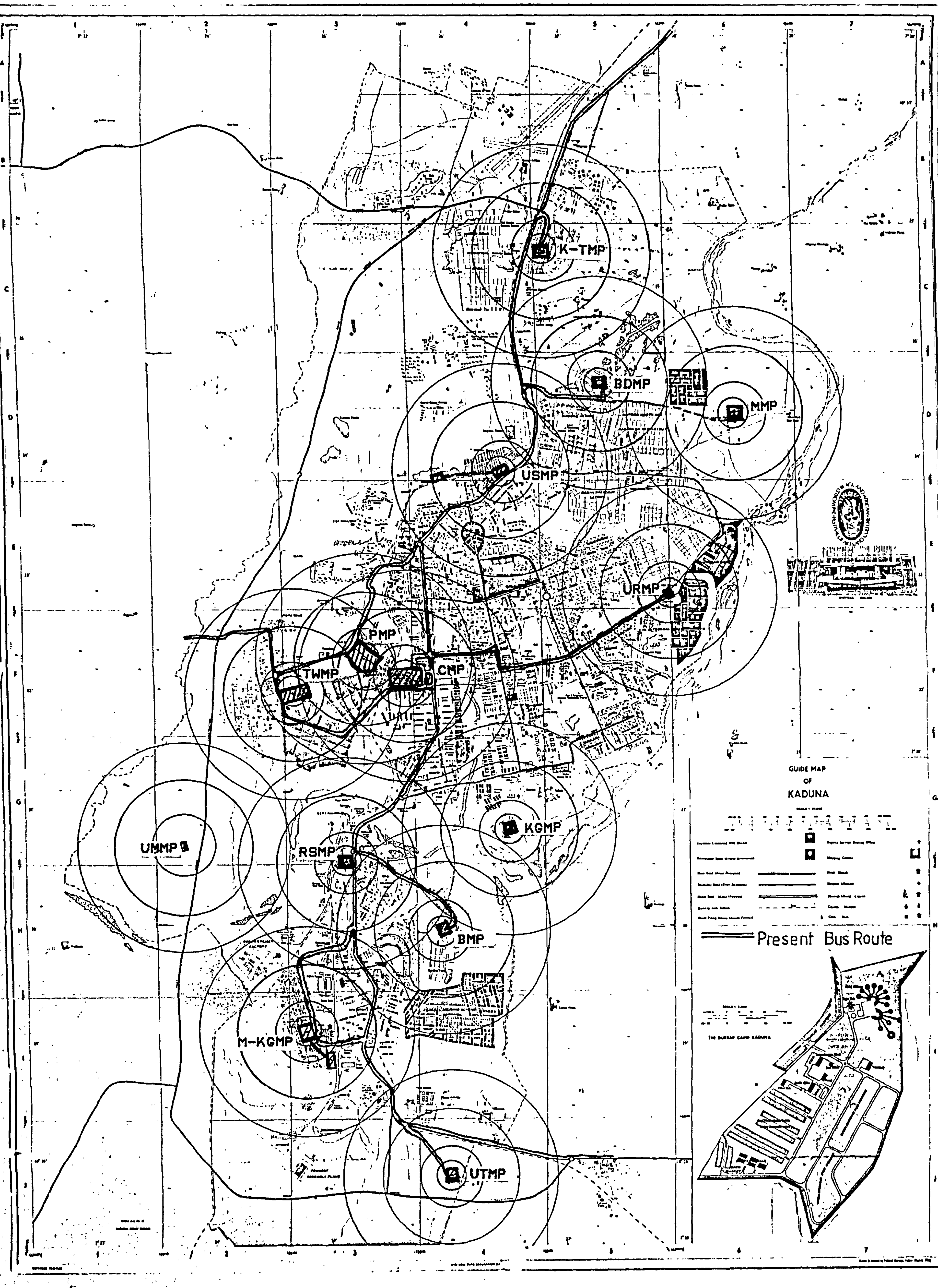
4. FOURTH DISTRIBUTOR ROADS: All other roads in the urban, except development roads called the fifth distributor roads.

5. FIFTH DISTRIBUTOR ROADS: (Development Roads): Roads, the primary function of which is to provide frontage for the development of a land use.

6. THE INNER RING ROADS: Roads, the primary function of which would both be that of an inner-most diversion route, for traffic which does not need to enter the central area; and the principal circulating route for vehicles seeking the most convenient point of access to the central area. Any connected system of roads which efficiently performs the functions of inner ring roads may be deemed for that purpose.

7. THE OUTER RING ROAD (By-Pass Roads): Roads, the primary function of which would be both that of an outermost diversion, for traffic which does not need to enter the city; and the principal circulating route for vehicles seeking the most convenient point of access into the city. Any connected system of roads which efficiently performs the functions of outer ring road may be deemed for that purpose.

APPENDIX 6.3.3 INTERVAL LEVELS OF MEASUREMENT OF SCORES OF THE LOCATIONAL POTENTIALS; AS INDICATED BY THE CONCENTRIC CIRCLES OF 1/4, 1/2, 1 & 2 KM RADII RESPECTIVELY.



APPENDIX 6.3.1 NUMBER OF SQUARES OF BUILT-UP AREA IN THE CONCENTRIC INTERVAL CIRCLES SURROUNDING THE MARKET PLACES

NAME OF DISTRICT / SIZE OF SQUARE SCALE 1:25000 / POPULATION PER SQUARE	No. of Squares of Built-up Area of District Within ¼ km. Radius of Market Place					No. of Squares of Built-up Area of District Within ½ km. Radius of Market Place					No. of Squares of Built-up Area of District Within 1 km. Radius of Market Place					No. of Squares of Built-up Area of District Within 2 km. Radius of Market Place				
	Doka	Makera	T/Wada	Kawo	Gaba Sawa	Doka	Makera	T/Wada	Kawo	Gaba Sawa	Doka	Makera	T/Wada	Kawo	Gaba Sawa	Doka	Makera	T/Wada	Kawo	Gaba Sawa
	0.5cm x 0.5cm	2cm x 2cm	1.5cm x 1.5cm	1.5cm x 1.5cm	3cm x 3cm	0.5cm x 0.5cm	2cm x 2cm	1.5cm x 1.5cm	1.5cm x 1.5cm	3cm x 3cm	0.5cm x 0.5cm	2cm x 2cm	1.5cm x 1.5cm	1.5cm x 1.5cm	3cm x 3cm	0.5cm x 0.5cm	2cm x 2cm	1.5cm x 1.5cm	1.5cm x 1.5cm	3cm x 3cm
	1339	1131	1564	1388	1298	1339	1131	1564	1388	1298	1339	1131	1564	1338	1298	1339	1131	1564	1388	1298
CMP	5					18		2			58		4		2	130		16		20
TWMP			2					6					21			12		67		
RSMP		1					4					16				13	32	3		
M/KGMP		1					8					22					54			
BMP		1					4					12					44			
BDMP				2					4					11	1				30	10
PMP			2					4			12		16			87		37		8
K/TMP				2					4					15					41	
URMP					1					2					4					26
KGMP					1					2	2				6	44	4			12
UTMP		1					4					10					24			
USMP				1	1				3	2				8	5				25	19
MMP				2					4					12					19	4
UMMP			2					3					8					21	4	

APPENDIX 6.3.5 RESIDENTIAL POPULATION IN THE CONCENTRIC INTERVAL CIRCLES SURROUNDING THE MARKET PLACES.

MARKET PLACES	Pop. Within ¼ km Radius						Pop. Within ½ km. Radius Minus Pop. Within ¼ km. Radius					
	D	M	T	K	G	Total	D	M	T	K	G	Total
CMP	6695					6695	17407		3128			20535
TWMP			3128			3128			6256			6256
RSMP		1131				1131		3393				3393
M/KGMP		1131				1131		7917				7917
BMP		1131				1131		3393				3393
BDMP				2776		2776				2776		2776
PMP			3128			3128			3128			3128
K/TMP				2776		2776				2776		2776
URMP					1298	1298					1298	1298
KGMP					1298	1298					1298	1298
UTMP		1131				1131		3393				3393
USMP				1388	1298	2686				2776	1298	4074
MMP				2776		2776				2776		2776
UMMP			3128			3128			1564			1564

MARKET PLACES	Pop. Within 1 km. Radius Minus Pop. Within ½ km. Radius						Pop. Within 2 km. Radius Minus Pop. Within 1 km. Radius					
	D	M	T	K	G	Total	D	M	T	K	G	Total
CMP	53560		3128		2596	59284	96408		18758		23364	138540
TWMP			23460			23460	16068		71944			88012
RSMP		13572				13572	17407	18096	4692			40195
M/KGMP		15834				15834	--	36192				32192
BMP		9048				9048		36192				36192
BDMP				9716	1298	11014				26372	11682	38054
PMP	16068		18768			34836	100425		32844		10384	143653
K/TMP				15268		15268				36088		36088
URMP					2596	2596					28556	28556
KGMP	2678				5192	7870	56238	4524			7788	68550
UTMP		6786				6786		15834				15834
USMP				6940	3894	10834				23596	18172	41768
MMP				11104		11104				9716	5192	14908
UMMP			7820			7820			20332	5552		25884

APPENDIX 6.4.1

"KADUNA CITY MARKET PLACE STUDY"

FIELD SURVEY PART 1: DEMAND FOR ACTIVITY SPACES IN THE CITY CENTRAL MARKET PLACE

1.4 Road Vehicle Entry and Departure Census at the City Central Market Place (SURVEY SHEET 1)

FEBRUARY, 1984.

Census Post.......... Date........... Time ....

PRIVATE CAR/VAN, MOTOR CYCLE, MINIBUS, TAXI, MOTOR TRUCK

OMNIBUS, HAND CART

PRIVATE CAR/VAN, MOTOR CYCLE, MINIBUS, TAXI, MOTOR TRUCK

IN		IN		IN	OUT	OUT		OUT	
P	C	P	C	C	C	P	C	P	C

Note: produce continuation sheets.

APPENDIX 6.4.2

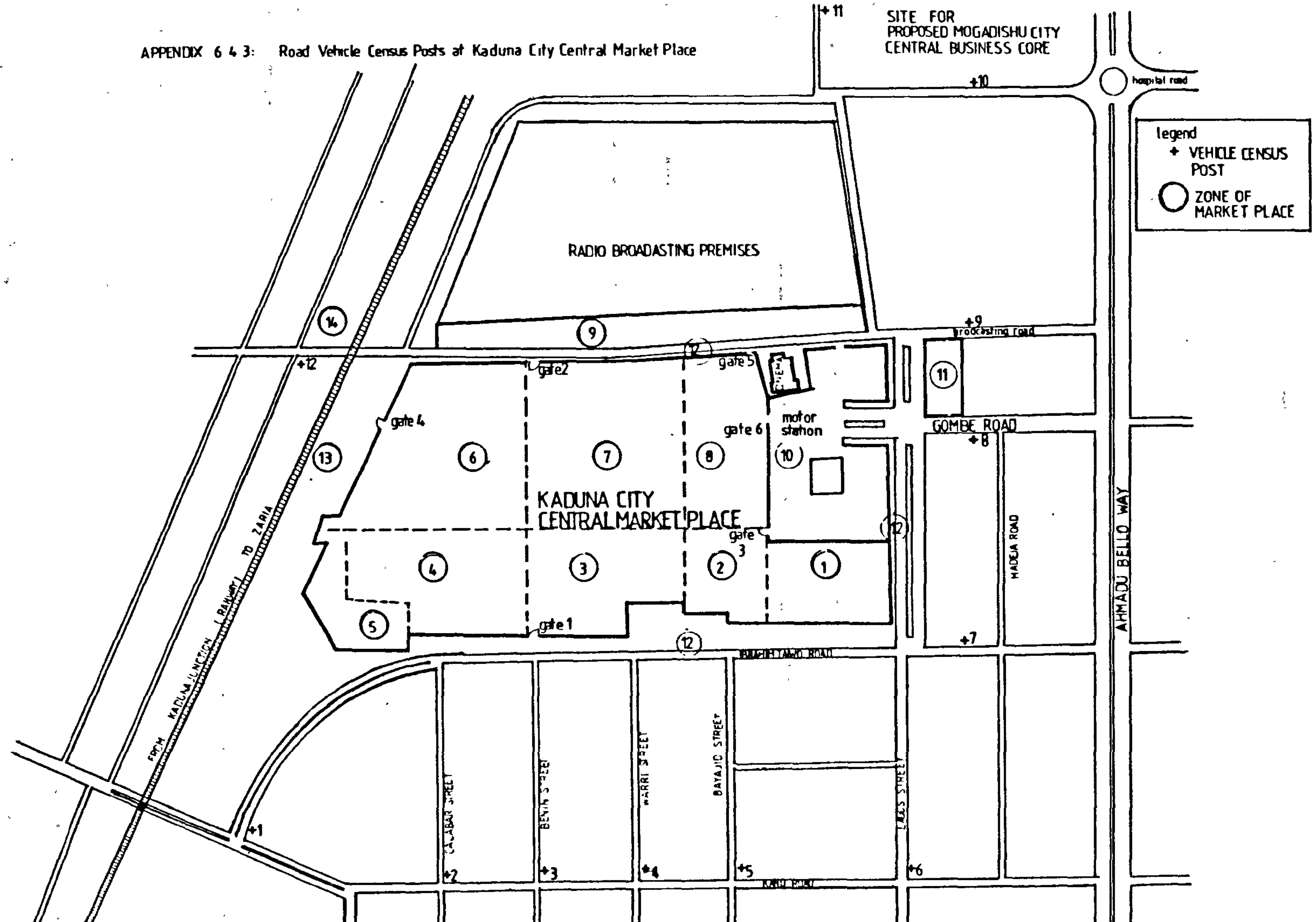
FIELD SURVEY PART 1: DEMAND FOR SPACES IN THE URBAN MARKET PLACES

1.4 Vehicle Entry and Departure Census of the City Central Market Place.

(SURVEY WORKING SHEET)

CENSUS POST	CLASS OF VEHICLE	7-8am		8-9am		9-10am		10-11am		11-12 noon		12-1pm		1-2pm		2-3pm		3-4pm		4-5pm		5-6pm	
		IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
2	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXI CAB																						
	MOTOR TRUCK																						
	HAND CART																						
3	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
4	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
5	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
6	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
7	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
8	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
9	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
10	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
11	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						
12	PRIVATE CAR/VAN																						
	MOTOR CYCLE																						
	MINIBUS/ TAXICAB																						
	MOTOR TRUCK																						
	HAND CART																						

APPENDIX 6 4 3: Road Vehicle Census Posts at Kaduna City Central Market Place



APPENDIX 6.5.1

"KADUNA CITY MARKET PLACE STUDY"

FIELD SURVEY PART 1: DEMAND FOR SPACES IN THE CITY CENTRAL MARKET PLACE

1.2 Structured Interview of Traders at the City Central Market Place.

FEBRUARY, 1984.

01	02	03	04	05	06	07
1-4	6-8	9-10	11	12	13	14-15
Field Survey numbers			Structure of stall	Floor-space size of stall	Sex of respondent	Commodity marketed
Stall No.	Shopping block No.	Market Zone No.				

CONTACT RECORD

Serial number ....

date time of call	Outcome					
	interview completed	time completed	interview number	appointment to call back	no reply	refused

Signature of Interviewer ....

Signature of Supervisor ....

Q

01 TRADERS IDENTIFICATION NUMBER (1001-9999)
(stall serial number)
DATA RECORD (1-2)

02 SHOPPING BLOCK NUMBER (A01 - Z99)

03 ZONE OF THE CENTRAL MARKET PLACE (01-99)

04 CATEGORY OF STRUCTURE OF STALL

1. permanent original open stall
2. permanent original lock-up stall
3. temporary extension to original open stall
4. temporary extension to original lock-up stall
5. temporary shopping block in odd spaces
6. squatting

05 SIZE OF FLOOR-SPACE OF STALL

1. floor-space of stall - 4.50 m^2
2. floor-space of stall - 6.00 m^2
3. floor-space of stall - 9.00 m^2
4. floor-space of stall - 18.00 m^2
5. floor-space of squatting 1.50 m^2
6. floor-space of squatting 3.00 m^2

06 SEX OF TRADER

1. male
2. female

07 MAJOR COMMODITY MARKETED IN THE STALL (01-47)

(see Appendix 6.5.2, page A84 for the list of commodities).

SECTION A.

I would like to ask some questions about your shop/stall.

1. Can you tell me whether the location of your shop/stall in this zone of the central market place was;

   1. your choice ( )
   2. not your choice ( )

---

2. (i) Is your shop/stall allocated to you direct by the market authority ( )

   (ii) or you rented it from an allottee, i.e. there is a middle-man ( )

---

3. What form of rent do you pay for your shop/stall?

WRITE IN NAME .... or CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOWCARD A AND THEN CODE

SHOW CARD A

I have on this card the various forms of rent. Which of these applies to you?

1. free of charge ( )	5. monthly rent ( )
2. lease for some years( )	6. quarterly rent ( )
3. daily rent ( )	7. half yearly ( )
4. weekly rent ( )	8. yearly rent ( )
	9. squatting, i.e. without permission ( )

---

4. SHOW CARD B

a. I have on this card various titles to a shop/stall. Which of these do you prefer?

1. allottee-occupier ( )	5. monthly rent ( )
2. lease for some years( )	6. quarterly rent ( )
3. daily rent ( )	7. half yearly rent ( )
4. weekly rent ( )	8. yearly rent ( )
	9. squatting, i.e. without permission ( )

b. PROBE FULLY AND RECORD, INCLUDING, WHY DO YOU PREFER THAT? AND WHAT ELSE?

SHOW CARD C

5. (a) What about the size of your shop/stall; Do you think it is .... READ OUT AND THEN CODE

0.	it is okay	( )	5.	fairly small	( )
1.	too large	( )	6.	small	( )
2.	very large	( )	7.	very small	( )
3.	large	( )	8.	too small	( )
4.	fairly large	( )	9.	do not know	( )

PROBE FULLY, INCLUDING "Why do you say that?" AND "What else?".

SHOW CARD D

(b) IF THE ANSWER TO QUESTION 5(a) IS NOT OKAY, THEN ASK QUESTION 5(b).

What size of your present shop/stall do you want in order to store and display your commodities in more suitable manner?

READ OUT AND CODE

0. okay	( )	1. ¼	( )	2. 1/3	( )
3. ½	( )	4. 1¼ times	( )	5. 1½ times	( )
6. 2 times	( )	7. 3 times	( )	8. 4 times	( )
9. 5 times or more	( )				

(c) If you want a bigger size, are you prepared to pay a rent higher than your present one?

1. Yes ( ) 2. No ( )

6. What about the design of your shop/stall. Do you think it is .... READ OUT

1.	very flexible	( )	4.	not flexible	( )
2.	flexible	( )	5.	not at all flexible	( )
3.	fairly flexible	( )	9.	Do not know	( )

7.a What year did you first occupy this shop/stall? ......

b Where was your shop/stall previously located?.......

c If at the Central Market Place, in which zone was that ....

d What was the previous use of this shop/stall, do you know? ....

8.a Do you wish to change your location in the Central Market Place?

1. Yes ( )
2. No ( )

b PROBE FULLY, INCLUDING "Why do you say that? AND "What else?"

c <u>If yes, SHOW CARD E</u>

I have on this card a sketch map showing the various zones of the Central Market Place. Which zone would you like to move to next? (SHOW THE TRADER HIS/HER LOCATION AND THE MAIN GATES TO THE CENTRAL MARKET PLACE ON THE MAP).

01.	Zone D	( )	08.	Zone B	( )	13.	Zone M_1	( )
02.	Zone C	( )	09.	Zone J	( )	14.	Zone M_2	( )
03.	Zone F	( )	10.	Zones A, K_1 & K_2	( )	00.	No Change	( )
04.	Zone H	( )	11.	Zone L	( )	SS.	Squatter	( )
05.	Zone WY	( )	12.	Zones WA, WB & WC	( )	99.	Do not know	( )
06.	Zone G	( )						
07.	Zone E	( )						

---

9. Which shopping thoroughfare or market places outside the Central Market Place would you like to move to in future?

WRITE IN NAME............ OR CODE IN PRECODED LIST IF POSSIBLE, OTHERWISE READ OUT SHOW CARD F AND THEN CODE E

SHOW CARD F.

I have on this card the names of the shopping streets and market places within Kaduna Capital Territory; which of these would you like to move to in future?

01.	Kingsway, Leventis, UTC, Chellarams Stores	( )
02.	Central (Gari) Market Place	( )
03.	Tudun Wada Market Place	( )
04.	Railway Station Market Place	( )
05.	Makera/Kurmin Gwari Market Place	( )
06.	Barnawa Market Place	( )
07.	Badarawa Market Place	( )
08.	Panteka Market Place	( )
09.	Kawo/Talata Market Place	( )
10.	Ungwan Rimi Market Place	( )
12.	Ahmadu Bello Way/Junction Road	( )
13.	Lagos Street	( )
14.	Ibadan Street	( )
15.	Oghomosho/Katsina/Jos Road	( )
16.	Ibrahim Taiwo Road (Tudun Wada)	( )
17.	Tudun Wada Bye-Pass	( )
18.	Constitution Road	( )
19.	Outside Kaduna Capital Territory	( )
20.	Kabala Gabas Market	( )
21.	Ungwan Television Market Place	( )
22.	Ungwan Shanu Market Place	( )
23.	Corner Shops/Street Market Place	( )

10. (a) Do you mind if you are located on the first floor of a three storey Central Market Place structure?

1. No ( ) 2. Yes ( ) 3. Not sure ( )

(b) PROBE FULLY, INCLUDING "Why do you say that?", "What else?"

---

11. (a) Do you mind if you are located on the second floor of a three storey Central Market Place structure?

1. No ( ) 2. Yes ( ) 3. Not sure ( )

(b) PROBE FULLY AND RECORD, INCLUDING "Why do you say that", and "What else?"

SECTION B

I would like to ask some questions about your trading occupation.

12. Can you name the places from where you obtain your commodities? WRITE IN NAMES OF THREE PLACES IN ORDER OF IMPORTANCE

(a).................
(b).................
(c).................

---

13. By what means of transport do your commodities arrive at the entrance gate of the Central Market Place?

WRITE IN NAMES (a) .... OR CODE IN PRECODED LIST IF POSSIBLE OTHERWISE READ OUT SHOW CARD G AND THEN CODE
(b) ....

SHOW CARD G

I have on this card the various means of transport by which commodities can arrive at the entrance gate of the Central Market Place; by which of these do your commodities arrive?

1. railway	( )	6. head loader	( )
2. motor truck	( )	7. wheel barrow	( )
3. motor van	( )	8. hand cart	( )
4. motor cycle	( )	9. hand luggage by yourself	( )
5. bicycle	( )		
		0. None of the above	( )

---

14. SHOW CARD G

a. By what means of transport do you usually move your commodities when they arrive at the entrance gate of the Central Market Place to your shop/stall?

WRITE IN NAMES (i) .... CODE IN PRECODES LISTED IN SHOW CARD 'G' ABOVE, IF POSSIBLE G

(ii) ....

(iii) ....

b. What is your motivation for the use of each of the three named means of transportation of commodities within the Central Market Place?

(i) ....

(ii) ....

(iii) ....

---

15. What time do you normally move your commodities into your shop/stall?

(a) Time(s) of the day (i) ....
(ii)..................

(b) Day(s)of the week (i) ....
(ii) ....

---

16. SHOW CARD H

By which two of these means of transport do your customers carry away the items they have bought from your shop/stall to the outside of the exit gate of the Central Market?

1.	motor truck	( )	6.	wheel barrow	( )
2.	motor van	( )	7.	hand cart	( )
3.	motor cycle	( )	8.	hand luggage by self	( )
4.	bicycle	( )	9.	Do not know	( )
5.	head loader (dan doko)	( )	0.	None of the above	( )

17. Can you describe the usual arrangement by which the suppliers or producers of your commodities deliver goods to you in the Central Market Place?

---

18. (a) What facilities do you consider necessary to enhance the efficiency or profit from your trading occupation?

WRITE IN NAMES, FIVE MAX (i) .... OR CODE IN PRECODED LIST IF POSSIBLE OTHERWISE READ OUT SHOW CARD I, AND THEN CODE

(ii) ....

(iii) ....

(iv) ....

(v) ....

SHOW CARD I

I have on this card names of facilities which you could require to enhance the efficiency or profit from your trading occupation. Name them in order of importance to you. (WRITE IN MAXIMUM OF FIVE FACILITIES).

CODED FACILITIES

1. Electric light	( )	6. Cold storage	( )
2. Air-conditioning	( )	7. Drainage	( )
3. Cold water supply	( )	8. Privacy	( )
4. Hot water supply	( )	9. Show window	( )
5. Dry storage	( )		

(b) SHOW CARD J

I have on this card possible present levels of adequacy of the facilities you consider necessary to enhance the efficiency or profit from your trading occupation. Which of these apply to your named facilities? (READ OUT THE NAMED FACILITIES ONE AFTER THE OTHER AND CODE)

LEVELS OF ADEQUACY

1. very adequate
2. adequate
3. fairly adequate
4. not adequate
5. not at all adequate
6. do not exist
7. surplus
9. Do not know

---

19. (a) Compare the quantity of commodities in your shop/stall now and that of last year at this time. Do you think the present quantity is -

0. same ( ) 1. bigger ( ) 2. less ( )

(b) Is it bigger/less by -

1. 5%	( )	2. 10%	( )	3. 25%	( )
4. 50%	( )	5. 100%	( )	6. 200%	( )
7. 300%	( )	8. 400%	( )	9. Over 400%	( )
0. 0%	( )				

---

20. (a) Compare the quantity of commodities in your shop/stall now and that of 2 years ago (1981). Do you think the present quantity is --

0. same ( ) 1. bigger ( ) 2. less ( )

(b) Is it bigger/less by -

1. 5%	( )	2. 10%	( )	3. 25%	( )
4. 50%	( )	5. 100%	( )	6. 200%	( )
7. 300%	( )	8. 400%	( )	9. Over 400%	( )
0. 0%	( )				

---

21. THE SURVEYOR, MAKE A CLOSE OBSERVATION OF THE SHOP/STALL AND CODE YOUR PERCEIVED LEVEL OF CONGESTION OF THE SHOP/STALL

1. very congested ( )
2. congested ( )
3. fairly congested ( )
4. almost empty ( )
5. not at all congested ( )
9. not sure ( )

---

22. When did you last suffer any of the following hazards?

(a) fire disaster ....
(b) flood disaster ....
(c) burglary ....
(d) rain storm ....

---

23. What are the peak periods of your sales?
ASK THE CODED QUESTIONS ONE AFTER THE OTHER AND THEN CODE

(a) What time of the day?

1. morning 7am-12 noon ( ) 2. Afternoon 12-4pm ( )
3. evening 4-6pm ( ) 9. not definite ( )

(b) What days of the week?

1. Monday ( ) 2. Tuesday ( ) 3. Wednesday ( )
4. Thursday ( ) 5. Friday ( ) 6. Saturday ( )
7. Sunday ( ) 9. not definite ( )

(c) What weeks of the month?

1. First week ( ) 2. Second week ( )
3. Third week ( ) 4. Fourth week ( )
9. Not definite ( )

---

d. <u>What quarter of the year</u>?

1. first quarter (Jan-March) ( )
2. second quarter (April-June) ( )
3. third quarter (July-September) ( )
4. fourth quarter (October-December) ( )
9. not definite ( )

---

24. How many shops/stalls do you have <u>in</u> this Central Market Place? ....

b. Any reason? .... PROBE AND RECORD FULLY

c. Do you have assistants who sell commodities <u>in the open spaces</u> inside the Central Market Place?

1. yes ( )
2. no ( )

d. If yes, how many? ....

---

25. (a) How many shops/stalls do you have <u>outside</u> the Central Market Place?

1. Shops .... 2. Stalls ....
3. Any other form of business ....

(b) Any reason? ...... PROBE AND RECORD FULLY

(c) Do you have assistants who sell trade commodities <u>in the open spaces outside</u> the Central Market Place?

1. yes ( )
2. no ( )

(d) If yes, how many? ....

---

26. THE INTERVIEWER: RECORD WHETHER THE COMMODITIES DISPLAY IS ---

a. 1. Table top display ( ) 4. Show case display ( )
2. Behind counter display ( ) 5. Stock pile display ( )
3. Self service display ( ) 6. None of the above ( )

b. Instead of haggling about prices with each customer, would you like to put exact price labels on the commodities you have displayed for sale?

1. Yes ( ) 2. No ( )

c. Any reason? .... PROBE AND RECORD FULLY

d. Do you think that the manner in which you have displayed your commodities is helpful in facilitating existing bargaining system?

1. very helpful ( ) 3. fairly helpful ( )
2. helpful ( ) 4. not helpful ( )

e. Any other comments?

---

f. Do you think that the manner in which you have displayed your commodities is helpful in facilitating their preservation?

1. very helpful ( ) 3. fairly helpful ( )
2. helpful ( ) 4. not helpful ( )

g. Any other comments?

SECTION C

I would like to ask some general questions.

27.a Do you belong to any contributory savings-loan scheme (contribution arrangement) in order to raise trading capital from time to time?

1. yes ( )
2. no ( )

b If yes, can you describe the form of contributory savings-loan scheme?

c If not, why not?

28.a How many assistants have you here in the shop/stall regularly? ....

b How many of them are --

1. paid employees ( )
2. apprentices (not members of your family) ( )
3. your brothers/sisters ( )
4. your wife/children ( )

---

29. What languages can you speak? Please name them in your order of fluency. (RECORD THE FIRST THREE LANGUAGES)

(a) ....

(b) ....

(c) ....

---

30. <u>SHOW CARD K</u>

What is your usual mode of travel to the Central Market Place?

WRITE IN NAME ....

OR READ OUT SHOW CARD ...... AND CODE

1. walk	( )	5. minibus	( )
2. bicycle	( )	6. K.S.T.A. bus	( )
3. motor cycle	( )	7. Train	( )
4. private car/ van	( )	8. Taxi cab	( )

---

31. What other social and cultural activities do you take part in the Central Market Centre?

---

32. For how long have you been trading in the Central Market Place? .... number of years.

a. Since that time what changes have you observed in the structure of the Central Market Place? Give dates where possible ----- READ OUT THE CODED CHANGES ONE AFTER THE OTHER, CODE AND RECORD THE PARTICULAR CHANGES THAT HAVE TAKEN PLACE.

b. Changes in the location of traders engaged in your commodities.

c. Changes in the number of traders engaged in your commodities.

d. Changes in the structural size of your shop/stall.

e. Changes in the parking arrangement for traders vehicles.

f. Changes in the methods of advertisement you have adopted in order to beat your competitors.

g. Changes in the methods of advertisement of commodities.

h. Changes in the access to your shop/stall when you are bringing in new commodities.

i. Changes in the parking arrangements for customers cars.

j. Any other change?

---

33. What changes would you like to see, which you think can improve the condition of the Central Market Place?

---

34. For how long have you engaged in your present trading occupation? .... - number of years.

   a. Since that time what changes have you observed in your trading occupation. Give dates where possible -------- READ OUT THE CODED CHANGES ONE AFTER THE OTHER, CODE AND RECORD THE PARTICULAR CHANGES THAT HAVE TAKEN PLACE.

   b. Changes in the form and quality of supplied commodities.

   c. Changes in the sources of supply of commodities.

   d. Changes in the means of transportation of supplied commodities.

   e. Changes in the measures of sale of commodities.

   f. Changes in the method of display of commodities.

   g. Changes in the storage and preservation of commodities.

   h. Changes in the behaviour and attitude of consumer.

   i. Changes in the behaviour and attitude of distributor/suppliers.

   j. Changes in the attitude of government authorities and officials.

   k. Any other changes? ....

---

35. What changes would you like to see, which you think can improve the performance of your trading occupation?

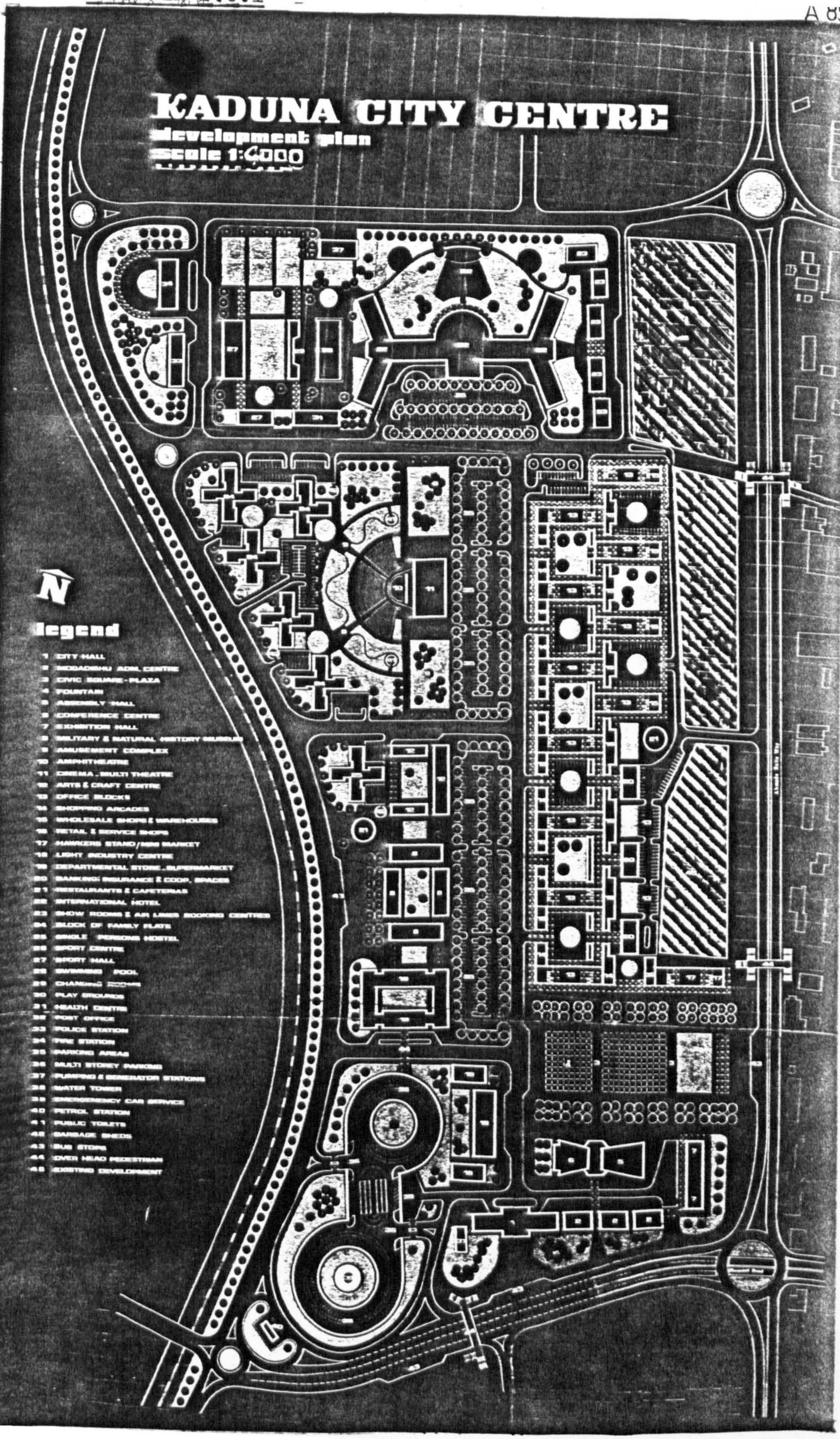
CLOSE THE INTERVIEW

Thank you very much for your cooperation and the time you have spared to respond to the questions. If we have reasons to come back for more information, we hope you shall cooperate with us. Thank you again!

APPENDIX 6.5.2

LIST OF COMMODITIES

			Code	Class name
Commodities	Food commodities	Traditional foodstuffs	01.	tubers
			02.	grains
			03.	flours
			04.	cooking oil
			05.	livestock
			06.	fresh meat
			07.	fresh fish
			08.	dried meat and fish
			09.	vegetables, fruits and nuts
			10.	spices
		Factory processed foodstuffs	11.	provisions (tinned foods)
			12.	snacks and mineral drinks
			13.	alcoholic drinks
			14.	tobacco
	Non-food commodities	Durable goods	15.	men's clothing
			16.	women's clothing
			17.	children's clothing
			18.	shoes
			19.	furniture
			20.	electronics and electrical
			21.	plastics, dishes, glasses
			22.	leather goods
			23.	cooking utensils and tools
			24.	prams and cycles
			25.	cosmetics
			26.	chemists and drugs
			27.	toys and jewelleries
			28.	books and stationery
			29.	building and construction materials
			30.	auto spareparts
			31.	bicycle spareparts
		Services goods	32.	restaurants
			33.	hairdressing
			34.	pools betting
			35.	tailors and weavers workshops
			36.	laundry services
			37.	watch/shoe/bicycle repairs
			38.	electronics/electrical workshop
			39.	wood craft workshop
			40.	metal craft workshop
			41.	battery charging/vulcanization
			42.	herbalists ingredients
			43.	empty bottles and containers
			44.	flour mills
		miscellaneous	45.	unascertained commodity
			46.	vacant stall
			47.	new stall


KADUNA CITY CENTRE
development plan
scale 1:4000
N
legend
1 CITY HALL
2 MOGADISHU ADM. CENTRE
3 CIVIC SQUARE-PLAZA
4 FOUNTAIN
5 ASSEMBLY HALL
6 CONFERENCE CENTRE
7 EXHIBITION HALL
8 MILITARY & NATURAL HISTORY MUSEUM
9 AMUSEMENT COMPLEX
10 AMPHITHEATRE
11 CINEMA, MULTI THEATRE
12 ARTS & CRAFT CENTRE
13 OFFICE BLOCKS
14 SHOPPING ARCADES
15 WHOLESALE SHOPS & WAREHOUSES
16 RETAIL & SERVICE SHOPS
17 HAWKERS STAND/MINI MARKET
18 LIGHT INDUSTRY CENTRE
19 DEPARTMENTAL STORE, SUPERMARKET
20 BANKING, INSURANCE & COOP. SPACES
21 RESTAURANTS & CAFETERIAS
22 INTERNATIONAL HOTEL
23 SHOW ROOMS & AIR LINES BOOKING CENTRES
24 BLOCK OF FAMILY FLATS
25 SINGLE PERSONS HOSTEL
26 SPORT CENTRE
27 SPORT HALL
28 SWIMMING POOL
29 CHANGING ROOMS
30 PLAY GROUNDS
31 HEALTH CENTRE
32 POST OFFICE
33 POLICE STATION
34 FIRE STATION
35 PARKING AREAS
36 MULTI STOREY PARKING
37 PUMPING & GENERATOR STATIONS
38 WATER TOWER
39 EMERGENCY CAR SERVICE
40 PETROL STATION
41 PUBLIC TOILETS
42 GARBAGE SHEDS
43 BUS STOPS
44 OVER HEAD PEDESTRIAN
45 EXISTING DEVELOPMENT

APPENDIX 7.1A

MARKET PLACE FLOOR-SPACE-USE CLASSIFICATION
PRIMARY SURVEY CODING FRAME

V.

01 MARKET PLACE

Code	Name	
11.	City Central Market Place	(CMP)
21.	Railway Station Market Place	(RSMP)
22.	Panteka Market Place	(PMP)
31.	Makera-Kurmin Gwari Market Place	(M-KGMP)
32.	Tudum Wada Market Place	(TWMP)
33.	Kawo-Talata Market Place	(K-TMP)
34.	Ungwan-Rimi Market Place	(URMP)
41.	Barnawa Market Place	(BMP)
42.	Ungwan Television Market Place	(UTMP)
43.	Badarawa Market Place	(BDMP)
44.	Ungwān-Shanu Market Place	(USMP)
45.	Kabala Gabas Market Place	(KGMP)

02 ZONE OF MARKET PLACE

03 SHOPPING BLOCK NUMBER

04 STALL STUDY NUMBER

05 STALL STRUCTURE

1. permanent 2. temporary 3. squatting

06 FLOOR-SPACE OF STALL

1. 04.5 m^2 2. 06.0 m^2
3. 09.0 m^2 4. 18.0 m^2
5. 01.5 m^2 6. 03.0 m^2

07 FIRST COMMODITY MARKETED IN THE STALL (01-47)

08 SECOND COMMODITY MARKETED IN THE STALL (01-47)

09 THIRD COMMODITY MARKETED IN THE STALL (01-47)

(See Appendix .6.5.2. 6.5.2 page A84. for the list of commodities).

Notes: V. = Variable.

APPENDIX 7.1B

MARKET PLACE FLOOR-SPACE-USE CLASSIFICATION
FINAL SURVEY CODING FRAME

V.

1 MARKET PLACE
(for code and name, see Appendix 7.1A page A 84 ; V.01)

2 ZONE OF MARKET PLACE

3 COMMODITY MARKETED IN THE STALL (01-47)
(see Appendix 6.5.2 page A 84 for list of commodities).

4 NUMBER OF STALL UNITS OF 2.00 m^2 FLOOR-SPACE
(one third of stall of floor space 6.00 m^2)

5 NUMBER OF STALL UNITS OF 2.25 m^2 FLOOR-SPACE
(one half of stall of floor space 4.50 m^2)

6 NUMBER OF STALL UNITS OF 3.00 m^2 FLOOR-SPACE
(one half of stall of floor space 6.00 m^2)
(one third of stall of floor space 9.00 m^2)

7 NUMBER OF STALL UNITS OF 4.50 m^2 FLOOR-SPACE
(one half of stall of floor space 9.00 m^2)

7A (stall of floor space 4.50 m^2)

8 NUMBER OF STALL UNITS OF 6.00 m^2 FLOOR-SPACE
(stall of floor space 6.00 m^2)

9 NUMBER OF STALL UNITS OF 9.00 m^2 FLOOR-SPACE
(stall of floor space 9.00 m^2)

10 NUMBER OF STALL UNITS OF 18.00 m^2 FLOOR-SPACE
(stall of floor space 18.00 m^2)

11 NUMBER OF SQUATTING UNITS OF 1.50 m^2 FLOOR-SPACE
(single squatting space)

12 NUMBER OF SQUATTING UNITS OF 3.00 m^2 FLOOR-SPACE
(double squatting space)

13 NUMBER OF SQUATTING UNITS OF 6.00 m^2 FLOOR-SPACE
(triple squatting space)

APPENDIX 7.2(a): Stallage Floor-Space and Equivalent Number of Stalls in Zone 1 of the CMP.

	Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres	No.of Stalls
1	TUBERS	18.0000	7.0000		
2	GRAINS	54.0000	18.0000		
3	FLOURS	1046.2500	146.1667		
4	COOKOIL	245.2500	54.1667		
6	FMEAT	303.0000	71.0000		
7	FFISH	240.7500	30.1667		
8	DMEAT DFISH	755.2500	147.1667	3672.00	722.67
9	VEGFRU	790.5000	196.0000		
10	SPICES	85.5000	14.0000		
11	PROVIS	27.0000	5.6667		
12	SMDRINK	60.0000	23.3333		
14	TOBACCO	6.0000	4.0000		
15	MCLOTH	1.5000	1.0000		
17	CCLOTH	1.5000	1.0000		
22	LEATHG	15.0000	10.0000	127.50	46.67
27	TJEWEL	64.5000	22.0000		
35	TAILOR	4.5000	.6667		
45	UNASCERT	81.0000	12.0000		
	TOTAL	3799.5000	763.3333	3799.5	763.33

APPENDIX 7.2(b): Stallage Floor-Space and Equivalent Number of Stalls in Zone 2 of the CMP.

	Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres	No. of Stalls
2	GRAINS	435.0000	64.6667		
3	FLOURS	157.5000	44.0000		
4	COOKOIL	111.0000	22.5000		
7	FFISH	57.0000	9.5000		
8	DMEAT DFISH	102.7500	22.5000		
9	VEGFRU	282.0000	77.8333	1725.50	382.34
10	SPICES	414.0000	67.6667		
11	PROVIS	129.0000	60.0000		
12	SMDRINK	15.0000	10.0000		
15	MCLOTH	13.5000	6.6667		
16	WCLOTH	30.0000	9.6667		
17	CCLOTH	22.5000	3.6667		
18	SHOES	162.0000	39.0000	671.50	203.00
21	FDGLAS	10.5000	1.6667		
22	LEATHG	130.5000	44.0000		
25	CMETIC	168.0000	49.3333		
27	TJEWEL	91.5000	42.0000		
32	RTRANT	10.5000	1.6667		
35	TAILOR	10.5000	1.6667		
45	UNASCERT	45.0000	7.3333		
	TOTAL	2397.7500	585.3333	2397.75	585.33

APPENDIX 7.2(c): Stallage Floor-Space and Equivalent Number of Stalls in Zone 3 of the CMP.

	Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres	No.of Stalls
1	TUBERS	30.0000	5.0000		
2	GRAINS	12.0000	2.0000		
3	FLOURS	42.0000	7.0000		
4	COOKOIL	4.5000	.6667		
9	VEGFRU	426.0000	59.8333	870.00	131.83
10	SPICES	262.5000	42.6667		
11	PROVIS	73.5000	12.1667		
15	MCLOTH	166.5000	25.1667		
16	WCLOTH	217.5000	35.8333		
17	CCLOTH	105.0000	16.0000		
18	SHOES	726.0000	97.6667		
20	ELECTR	12.0000	2.0000		
21	PDGLAS	100.5000	12.6667		
22	LEATHG	354.0000	48.1667	2557.50	364.83
23	UTOOLS	85.5000	13.6667		
24	PCYCLE	6.0000	1.0000		
25	CMETIC	232.5000	37.1667		
26	CDRUG	9.0000	1.0000		
27	TJEWEL	292.5000	42.5000		
28	BKNERY	60.0000	8.0000		
37	WCSBR	117.0000	15.5000		
38	ELECRP	54.0000	6.0000		
45	UNASCERT	39.0000	5.0000		
	TOTAL	3427.5000	496.6667	3427.5	496.67

APPENDIX 7.2(d): Stallage Floor-Space and Equivalent Number of Stalls in Zone 4 of the CMP

	Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres / No. of Stalls
2	GRAINS	30.0000	10.0000	
3	FLOURS	76.5000	14.6667	
6	FMEAT	12.0000	4.0000	
7	FFISH	42.0000	28.0000	
8	DMEAT DFISH	43.5000	29.0000	
9	VEGFRU	187.5000	51.5000	
10	SPICES	138.0000	17.6667	3470.25 / 581.00
11	PROVIS	2339.2500	321.0000	
12	SMDRINK	327.0000	58.6667	
13	ALCHO	15.0000	2.0000	
14	TOBACCO	181.5000	34.5000	
15	MCLOTH	6.0000	1.0000	
16	WCLOTH	10.5000	1.6667	
17	CCLOTH	51.0000	7.0000	
18	SHOES	33.0000	5.3333	
20	ELECTR	24.0000	3.0000	
21	PDGLAS	79.5000	26.6667	
22	LEATHG	100.5000	33.0000	
23	UTOOLS	61.5000	9.6667	
24	PCYCLE	18.0000	2.0000	1908.75 / 299.83
25	CMETIC	423.7500	63.5000	
26	CDRUG	258.0000	31.6667	
27	TJEWEL	61.5000	10.6667	
28	BKNERY	345.0000	45.5000	
30	ASPATS	9.0000	1.0000	
33	HAIRDR	261.0000	34.5000	
35	TAILOR	52.5000	7.6667	
38	ELECRP	36.0000	6.0000	
45	UNASCERT	156.0000	20.0000	
	TOTAL	5379.0000	880.8333	5379.00 / 880.00

APPENDIX 7.2(e): Stallage Floor-Space and Equivalent Number of Stalls in Zone 5 of the CMP.

Commodity Class	Floor-Space	Equivalent No.of Stalls
FMEAT	630.0000	70.0000
TOTAL	630.0000	70.0000

1

APPENDIX 7.2(f): Stallage Floor-Space and Equivalent Number of Stalls in Zone 6 of the CMP.

	Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres / No.of Stalls
1	TUBERS	6.0000	1.6667	
2	GRAINS	15.0000	7.6667	
3	FLOURS	47.2500	5.8333	
6	FMEAT	6.0000	4.0000	
7	FFISH	4.5000	3.0000	
8	DMEAT DFISH	16.5000	11.0000	
9	VEGFRU	919.5000	154.3333	3103.50 / 498.00
10	SPICES	252.0000	30.3333	
11	PROVIS	1408.5000	208.0000	
12	SMDRINK	279.7500	46.1667	
13	ALCHO	24.0000	3.0000	
14	TOBACCO	12.0000	8.0000	
15	MCLOTH	222.0000	27.8333	
16	WCLOTH	75.7500	11.0000	
17	CCLOTH	401.2500	48.6667	
18	SHOES	524.2500	65.5000	
19	FNITURE	519.0000	60.0000	
20	ELECTR	9.0000	1.0000	
21	PDGLAS	1629.0000	215.0000	
22	LEATHG	112.5000	29.6667	
23	UTOOLS	198.0000	25.5000	
24	PCYCLE	15.0000	2.0000	6379.5 / 821.33
25	CMETIC	456.0000	60.8333	
26	CDRUG	342.0000	41.0000	
27	TJEWEL	127.5000	22.0000	
28	BKNERY	168.0000	23.0000	
29	BUCOMT	159.0000	22.0000	
31	BSPATS	273.0000	32.6667	
35	TAILOR	916.5000	104.5000	
37	WCSBR	9.0000	1.0000	
38	ELECRP	110.2500	13.1667	
45	UNASCERT	225.0000	30.0000	
	TOTAL	9483.0000	1319.3333	9483.00 / 1319.33

APPENDIX 7.2(g): Stallage Floor-Space and Equivalent Number of Stalls in Zone 7 of the CMP.

Commodity		Floor-Space	Equivalent No.of Stalls	Sq.Metres / No.of Stalls
1	TUBERS	6.0000	4.0000	
2	GRAINS	25.5000	17.0000	
3	FLOURS	4.5000	.6667	
6	FMEAT	15.0000	10.0000	376.50 / 138.66
8	DMEAT DFISH	19.5000	13.0000	
9	VEGFRU	21.0000	14.0000	
10	SPICES	70.5000	23.6667	
11	PROVIS	78.0000	27.1667	
12	SMDRINK	78.0000	21.3333	
15	MCLOTH	1011.7500	145.0000	
16	WCLOTH	2466.0000	321.6667	
17	CCLOTH	897.0000	137.6667	
18	SHOES	430.5000	66.8333	
19	FNITURE	12.0000	2.0000	
20	ELECTR	9.0000	1.5000	
21	PDGLAS	1053.0000	143.5000	
22	LEATHG	110.2500	32.5000	
23	UTOOLS	352.5000	59.3333	
24	PCYCLE	54.0000	6.3333	
25	CMETIC	227.2500	30.6667	7347.50 / 1065.00
27	TJEWEL	276.0000	59.0000	
28	BKNERY	6.0000	1.0000	
34	PBETT	15.0000	2.5000	
35	TAILOR	330.0000	41.1667	
37	WCSBR	39.0000	6.5000	
45	UNASCERT	117.0000	15.6667	
	TOTAL	7724.2500	1203.6667	7724.25 / 1203.67

APPENDIX 7.2(h): Stallage Floor-Space and Equivalent Number of Stalls in Zone 8 of the CMP.

Commodity Class		Floor-Space	Equivalent No.of Stalls	Sq.Metres No.of Stalls
1	TUBERS	18.0000	3.0000	402.75 98.83
8	DMEAT DFISH	3.0000	2.0000	
9	VEGFRU	21.0000	8.0000	
10	SPICES	24.0000	4.0000	
11	PROVIS	130.5000	36.5000	
12	SMDRINK	101.2500	30.1667	
15	MCLOTH	921.0000	143.1667	6340.5 979.83
16	WCLOTH	1243.5000	183.0000	
17	CCLOTH	717.7500	118.6667	
18	SHOES	518.2500	92.0000	
19	FNITURE	54.0000	7.0000	
20	ELECTR	48.0000	21.5000	
21	PDGLAS	1287.0000	159.6667	
22	LEATHG	174.0000	39.6667	
23	UTOOLS	474.0000	62.8333	
25	CMETIC	309.0000	61.6667	
26	CDRUG	3.0000	.5000	
27	TJEWEL	99.0000	22.5000	
28	BKNERY	66.0000	11.0000	
35	TAILOR	240.0000	28.0000	
37	WCSBR	60.0000	10.0000	
38	ELECRP	21.0000	3.5000	
45	UNASCERT	210.0000	30.3333	
	TOTAL	6743.2500	1078.6667	1743.25 1078.67

APPENDIX 7.2(i): Stallage Floor-Space and Equivalent Number of Stalls in Zone 9 of the CMP.

Commodity		Floor-Space	Equivalent No.of Stalls	Sq.Metre No.Stalls
1	TUBERS	665.2500	196.1667	1759.50 435.67
2	GRAINS	32.2500	9.5000	
3	FLOURS	13.5000	2.0000	
4	COOKOIL	520.5000	100.3333	
5	LVSTOCK	378.0000	53.0000	
6	FMEAT	6.0000	4.0000	
9	VEGFRU	72.0000	27.3333	
10	SPICES	15.0000	10.0000	
11	PROVIS	19.5000	13.0000	
12	SMDRINK	33.0000	17.3333	
14	TOBACCO	4.5000	3.0000	
16	WCLOTH	18.0000	12.0000	425.00 127.00
17	CCLOTH	22.5000	15.0000	
18	SHOES	15.0000	10.0000	
19	FNITURE	26.2500	5.5000	
20	ELECTR	21.0000	7.0000	
22	LEATHG	30.0000	20.0000	
25	CMETIC	27.0000	9.0000	
27	TJEWEL	27.0000	18.0000	
32	RTRANT	211.5000	23.6667	
35	TAILOR	4.5000	.6667	
37	WCSBR	22.5000	6.6667	
	TOTAL	2184.7500	563.1667	2184.75 563.67

APPENDIX 7.2(j): Stallage Floor-Space and Equivalent Number of Stalls in Zone 10 of the CMP

Commodity		Floor-Space	Equivalent No. of Stalls
1	TUBERS	10.5000	7.0000
2	GRAINS	79.5000	21.5000
3	FLOURS	18.0000	3.0000
5	LVSTOCK	6.0000	1.0000
6	FMEAT	10.5000	7.0000
8	DMEAT DFISH	19.5000	13.0000
9	VEGFRU	87.0000	29.5000
10	SPICES	52.5000	21.5000
11	PROVIS	51.0000	16.0000
12	SMDRINK	166.5000	39.0000
15	MCLOTH	249.0000	91.3333
16	WCLOTH	303.0000	95.3333
17	CCLOTH	214.5000	84.5000
18	SHOES	102.0000	17.0000
19	FNITURE	6.0000	1.0000
20	ELECTR	27.0000	4.5000
22	LEATHG	42.0000	25.0000
25	CMETIC	42.0000	7.0000
26	CDRUG	6.0000	1.0000
27	TJEWEL	51.0000	31.0000
32	RTRANT	246.0000	36.5000
35	TAILOR	42.0000	7.0000
37	WCSBR	18.0000	3.0000
38	ELECRP	30.0000	5.0000
	TOTAL	1879.5000	567.6667

Sq.Metres
No. of Stalls
501.00
158.50
1378.50
409.175
1879.5
567.67

APPENDIX 7.2(k): Stallage Floor-Space and Equivalent Number of Stalls in Zone 11 of the CMP.

Commodity		Floor-Space	Equivalent No. of Stalls
11	PROVIS	30.0000	5.0000
12	SMDRINK	42.0000	7.0000
25	CMETIC	12.0000	2.0000
30	ASPATS	9.0000	1.5000
32	RTRANT	81.0000	13.5000
37	WCSBR	3.0000	.5000
38	ELECRP	24.0000	4.0000
41	BCHARG VULC	48.0000	8.0000
45	UNASCERT	90.0000	15.0000
	TOTAL	339.0000	56.5000

Sq.Metres
No. of Stalls
117.0
19.50
222.00
37.00
339.00
56.50

APPENDIX 7.2(1): Stallage Floor-Space and Equivalent Number of Stalls in Zone 12 of the CMP

Commodity		Floor-Space	Equivalent No.of Stalls	Sq.Metres No. of Stalls
2	GRAINS	51.0000	8.5000	958.50 158.17
3	FLOURS	9.0000	1.5000	
4	COOKOIL	18.0000	3.0000	
7	FFISH	6.0000	1.0000	
9	VEGFRU	144.0000	23.3333	
10	SPICES	22.5000	3.3333	
11	PROVIS	393.0000	65.0000	
12	SMDRINK	216.0000	36.0000	
14	TOBACCO	30.0000	5.0000	
15	MCLOTH	1038.7500	170.1667	4028.25 652.17
16	WCLOTH	266.2500	43.0000	
17	CCLOTH	279.7500	45.0000	
18	SHOES	804.0000	129.3333	
19	FNITURE	6.0000	1.0000	
20	ELECTR	374.2500	62.5000	
21	PDGLAS	102.0000	15.6667	
22	LEATHG	264.0000	44.0000	
23	UTOOLS	60.0000	10.0000	
24	PCYCLE	3.0000	.5000	
25	CMETIC	6.0000	1.0000	
26	CDRUG	6.0000	1.0000	
27	TJEWEL	189.0000	31.5000	
28	BKNERY	60.0000	10.0000	
29	BUCOMT	135.0000	20.5000	
31	BSPATS	15.0000	2.0000	
35	TAILOR	99.0000	12.0000	
37	WCSBR	90.0000	15.0000	
38	ELECRP	155.2500	25.5000	
41	BCHARG VULC	6.0000	1.0000	
45	UNASCERT	138.0000	23.0000	
	TOTAL	4986.7500	810.3333	4986.75 810.33

APPENDIX 7.2(m): Stallage Floor-Space and Equivalent Number of Stalls in Zone 13 of the CMP.

Commodity	Floor-Space	Equivalent No. of Stalls	Sq.Metres / No. of Stalls
2 GRAINS	21.0000	8.0000	1146.00 / 256.00
4 COOKOIL	27.0000	4.5000	
5 LVSTOCK	22.5000	9.0000	
6 FMEAT	352.5000	61.0000	
9 VEGFRU	432.0000	106.5000	
10 SPICES	237.0000	48.0000	
11 PROVIS	12.0000	2.0000	
12 SMDRINK	36.0000	15.0000	
18 SHOES	3.0000	.5000	114.00 / 18.00
22 LEATHG	12.0000	2.0000	
32 RTRANT	54.0000	9.0000	
35 TAILOR	21.0000	3.5000	
37 WCSBR	18.0000	3.0000	
45 UNASCERT	12.0000	2.0000	
TOTAL	1260.0000	274.0000	1260. / 274.

APPENDIX 7.2(n): Stallage Floor-Space and Equivalent Number of Stalls in Zone 14 of the CMP.

Commodity	Floor-Space	Equivalent No.of Stalls	Sq.Metres / No.of Stalls
1 TUBERS	6.0000	1.0000	243.00 / 40.50
2 GRAINS	12.0000	2.0000	
3 FLOURS	75.0000	12.5000	
4 COOKOIL	6.0000	1.0000	
5 LVSTOCK	6.0000	1.0000	
6 FMEAT	12.0000	2.0000	
8 DMEAT DFISH	42.0000	7.0000	
9 VEGFRU	60.0000	10.0000	
11 PROVIS	15.0000	2.5000	
12 SMDRINK	9.0000	1.5000	
16 WCLOTH	12.0000	2.0000	618.00 / 103.5
19 FNITURE	207.0000	34.5000	
22 LEATHG	42.0000	7.0000	
23 UTOOLS	6.0000	1.0000	
24 PCYCLE	6.0000	1.0000	
29 BUCOMT	30.0000	5.0000	
32 RTRANT	183.0000	30.5000	
35 TAILOR	42.0000	7.0000	
37 WCSBR	18.0000	3.0000	
38 ELECRP	30.0000	5.0000	
41 BCHARG VULC	42.0000	7.0000	
TOTAL	861.0000	143.5000	861.00 / 143.5

APPENDIX 7.3

CENTRAL MARKET PLACE ROAD VEHICLE ENTRY AND DEPARTURE CENSUS SURVEY CODING FRAME

V.

1 DAY OF THE WEEK (1 - 7)

1. Tuesday (28.2.84)
2. Wednesday (29.2.84)
3. Thursday (1.3.84)
4. Friday (2.3.84)
5. Saturday (3.3.84)
6. Sunday (4.3.84)
7. Monday (5.3.84)

2 CENSUS POST (01-12)

01. Kano Road/Ibrahim Taiwo Road junction
02. Kano Road/Calabar Street junction
03. Kano Road/Benin Street junction
04. Kano Road/Warri Street junction
05. Kano Road/Bayajida Street junction
06. Kano Road/Lagos Street junction
07. Ibrahim Taiwo Road/Hadeja Road junction
08. Gombe Road/Hadeja Road junction
09. Broadcasting Road/Lagos Street junction
10. Hospital Road Extension/Lagos Street Extension junction
11. Mogadishu Barrack Road
12. Panteka Market Road/Lagos-Kano Railway junction

3 VEHICLE CLASS (1-5)

1. private car/van
2. motor cycle
3. minibus/taxi cab
4. motor truck
5. omnibus
6. hand cart

DATA RECORD

4 NUMBER OF OVERNIGHT VEHICLES
5 NUMBER OF VEHICLES IN BETWEEN 7-8am.
6 NUMBER OF VEHICLES OUT BETWEEN 7-8am.
7 NUMBER OF VEHICLES IN BETWEEN 8-9am.
8 NUMBER OF VEHICLES OUT BETWEEN 8-9am.

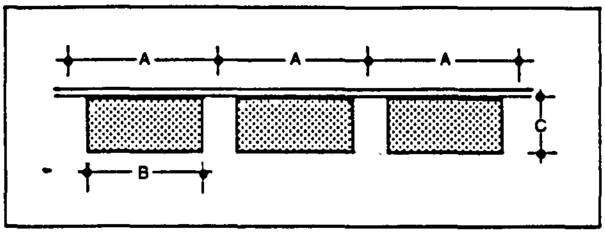
CENTRAL MARKET PLACE VEHICLE ENTRY AND DEPARTURE CENSUS
SURVEY CODING FRAME CONTD.

V.

9 NUMBER OF VEHICLES IN BETWEEN 9-10am.
10 NUMBER OF VEHICLES OUT BETWEEN 9-10am.
11 NUMBER OF VEHICLES IN BETWEEN 10-11am.
12 NUMBER OF VEHICLES OUT BETWEEN 10-11am.
13 NUMBER OF VEHICLES IN BETWEEN 11-12pm.
14 NUMBER OF VEHICLES OUT BETWEEN 11-12pm.
15 NUMBER OF VEHICLES IN BETWEEN 12-1pm.
16 NUMBER OF VEHICLES OUT BETWEEN 12-1pm.
17 NUMBER OF VEHICLES IN BETWEEN 1-2pm.
18 NUMBER OF VEHICLES OUT BETWEEN 1-2pm.
19 NUMBER OF VEHICLES IN BETWEEN 2-3pm.
20 NUMBER OF VEHICLES OUT BETWEEN 2-3pm.
21 NUMBER OF VEHICLES IN BETWEEN 3-4pm.
22 NUMBER OF VEHICLES OUT BETWEEN 3-4pm.
23 NUMBER OF VEHICLES IN BETWEEN 4-5pm.
24 NUMBER OF VEHICLES OUT BETWEEN 4-5pm.
25 NUMBER OF VEHICLES IN BETWEEN 5-6pm.
26 NUMBER OF VEHICLES OUT BETWEEN 5-6pm.

Man & his buildings

PARKING



1 Parallel parking

	A	B	C
in bldg	5800	4600	2200–2300
in open	6100–6700	5500	2400

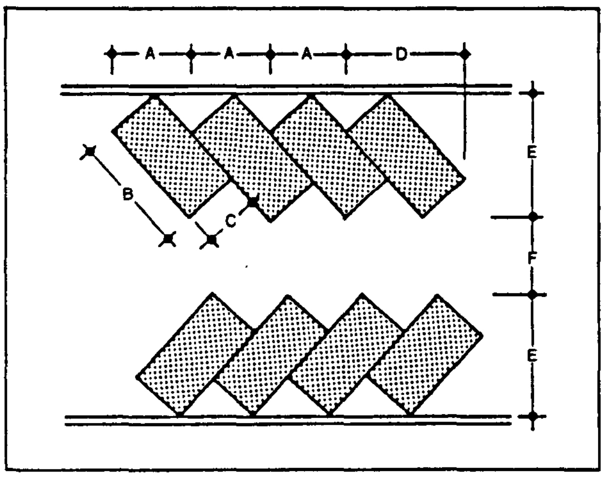
Basis or layout of vehicle parking spaces in parking bay ranges from 1800 × 4600 to 2400 × 6000. Larger bay dimensions usually adopted for open air parking, or where high proportion of larger cars and vans likely use. While 90° parking more economical in space requirement (20–22 m^2/car) 45° parking (23–26 m^2/car) more convenient →(1)–(3).

Vehicle lengths →p20 24 251

Vehicle parking spaces for disabled persons should be wider. For semi-ambulant persons bay widths should be increased to 2700 or better 2800; for wheelchair users 3000–3100 →p85 166(3).

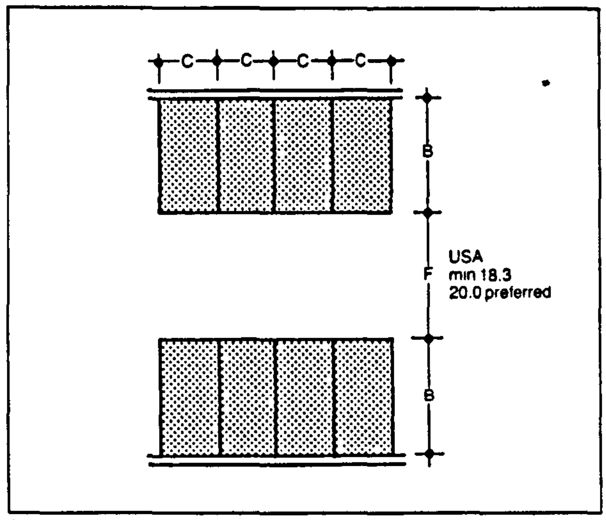
USA parking spaces vary; depending on zoning ordinances →p250

NB diagrams on this page apply to traffic circulation on the left



2 45° parking

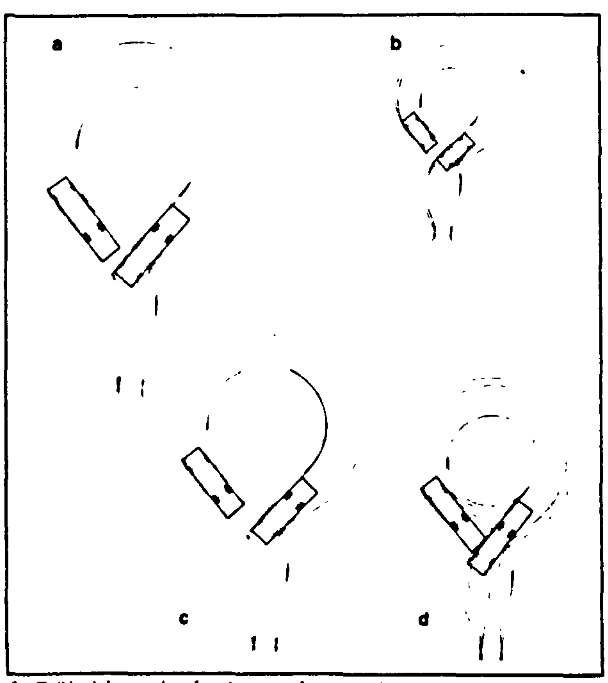
	A	B	C	D	E	F
in bldg	3000	4600	2300	3260	5000	2800
in open	3390	5500	2400	3890	5500	2800–3000



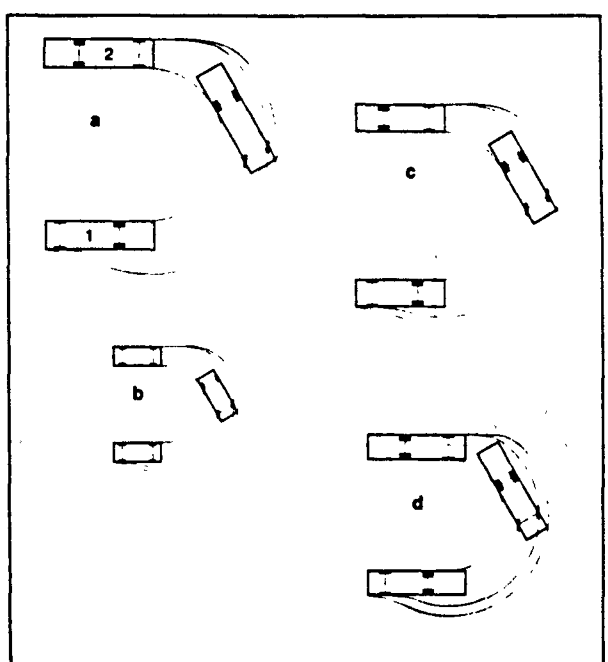
3 90° parking

	A	B	C	D	E	F
in bldg		4600	2300			6000
in open		5500	2400			6100–6700

VEHICLE TURNING SPACES



4 Full lock forward. **a** furniture van **b** car **c** refuse vehicle **d** fire appliance



5 Full lock reverse: **a** furniture van **b** car **c** refuse vehicle **d** fire appliance

Source: Neufert Architect's Data second (international) English editio (1980) p. 22

APPENDIX 7.5A Motor Vehicles and Licences Issued By Type of Vehicles, 1976

Type of Vehicle	New Registration	Licenses Issued	
		Yearly	Quarterly
Private Vehicle			
1973	1,747	4,181	4,758
1974	2,390	4,667	6,000
1975	5,444	7,029	3,859
1976	1,200	4,502	2,921
1977	-	-	-
1978	11,484	49,392	18,226
Commercial Vehicles			
1973	1,475	1,767	3,929
1974	637	1,126	4,098
1975	1,802	3,253	2,783
1976	590	3,685	2,607
1977	-	-	-
1978	18,457	70,456	24,679
Motor-Cycles			
1973	4,352	7,377	2,889
1974	5,345	10,593	4,476
1975	9,400	1,387	3,419
1976	2,413	4,783	2,818
1977	-	-	-
1978	11,845	32,467	13,226
Taxis and Omnibuses			
1973	151	60	668
1974	461	276	1,953
1975	664	217	1,267
1976	316	467	992
1977	-	-	-
1978	829	3,597	5,158
Omnibuses only			
1973	58	70	144
1974	200	120	692
1975	448	289	854
1976	192	304	448
1977	-	-	-
1978	1,499	6,508	2,599

Source: Vehicle Inspection Division, Kaduna.

APPENDIX 7.5B MOTOR VEHICLE REGISTRATION STATISTICS DATA OF KADUNA STATE OF NIGERIA FOR THE PERIOD OF 1977 TO 1982 RESPECTIVELY

Type of Vehicle	1977	1978	1979	1980	1981	1982
Motor cycle	26,548	11,845	14,403	8,262	26,775	34,265
Private vehicle	13,095	11,484	6,248	4,082	30,292	33,819
Commercial vehicle	8,814	18,457	2,057	2,538	25,637	33,670
Taxis	704	829	395	391	8,589	3,874
Buses	460	1,499	402	941	13,448	9,691
TOTAL	49, 621	44,114	23,505	16,214	104,741	115,319

Source: Vehicle Inspectorate Division, Kaduna.

APPENDIX A.7.2.1

Hierarchical Relationships Between Shoppers' Trips and Number of Stalls
($T_a - R_a$, $T_b - R_b$)

The statistics in Table 7.31(a) for (T_a-R_a), page 357, whilst confirming the expected strong relationship between number of food-stalls and food-trips, is significant as shown by the significance statistics of 0.0000. Again the CMP has far greater values on both variables than all the others. The values being far removed from the others, the majority of cases appear bunched together near the base of the scatter-plot in order to permit the atypical CMP to be accommodated on the same plot. As shown by the standardized scatterplot in Figure A.7.2.1a page A104, the CMP is not an outlier, even though it has such atypically high values. It appears from Figure A.7.2.1 that there is a positive association between number of food-stalls and food-trips, i.e. as the number of food stalls increases, so does the food-trips. The association has shown correlation coefficient 'r' of 0.95 and 'r^2' of 0.92. As shown by the scatterplot, the relationship between number of food-stalls and food-trips is linear, since the observed points cluster more or less around a straight line of slope 0.5906 and intercept on the Y axis = -112.

As indicated in the statistics in Table 7.31(b) for (T_b - R_b) , page 358 , the expected strong relationship between number of non-food-stalls and non-food-trips appears confirmed with a significance statistic of 0.00000. Again the CMP has far greater values on both variables than all the others. The values are far removed from the others, and the majority cases appear bunched together in order to

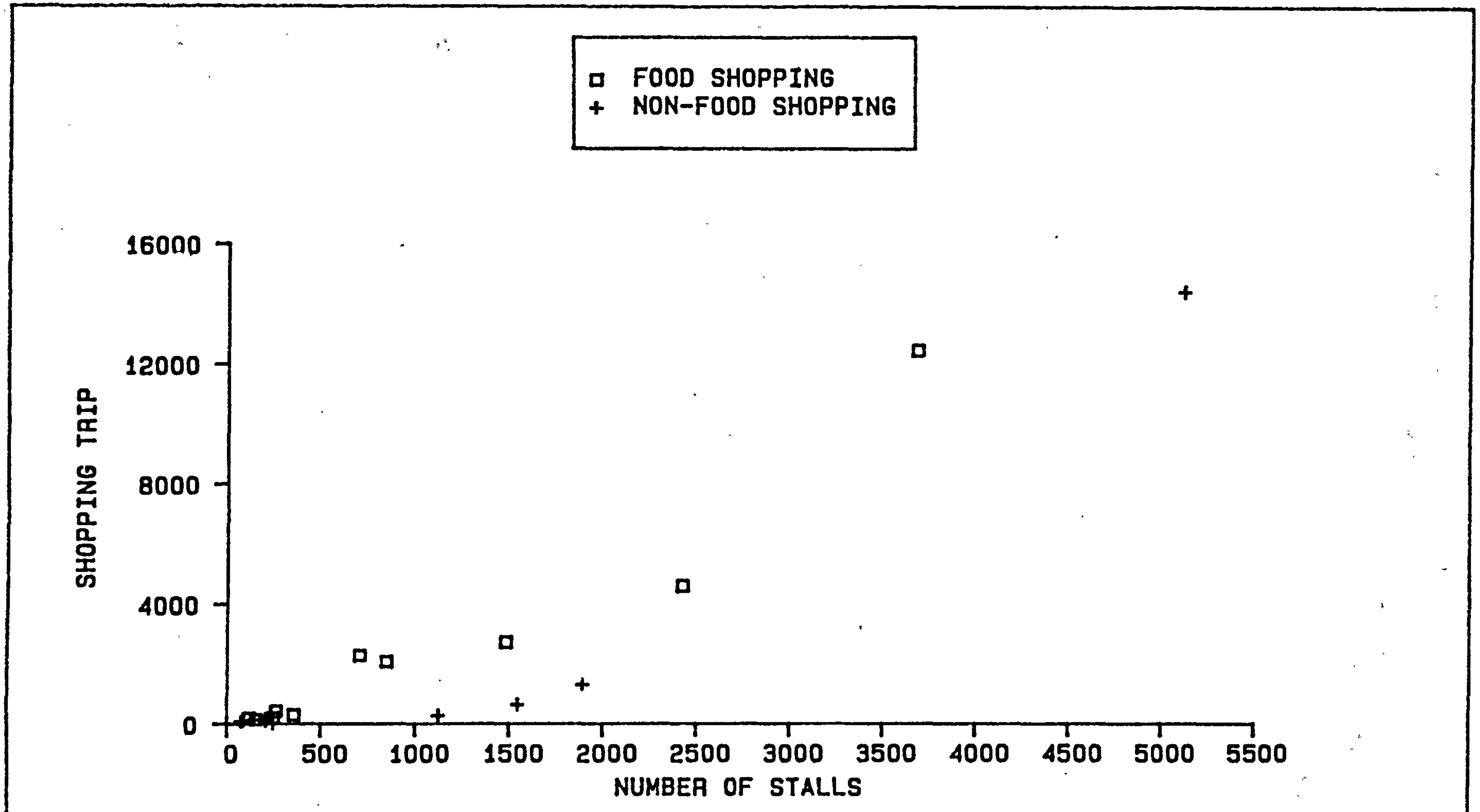


Figure A.7.2.1: HIERARCHICAL RELATIONSHIPS BETWEEN SHOPPING TRIP AND NUMBER OF STALLS

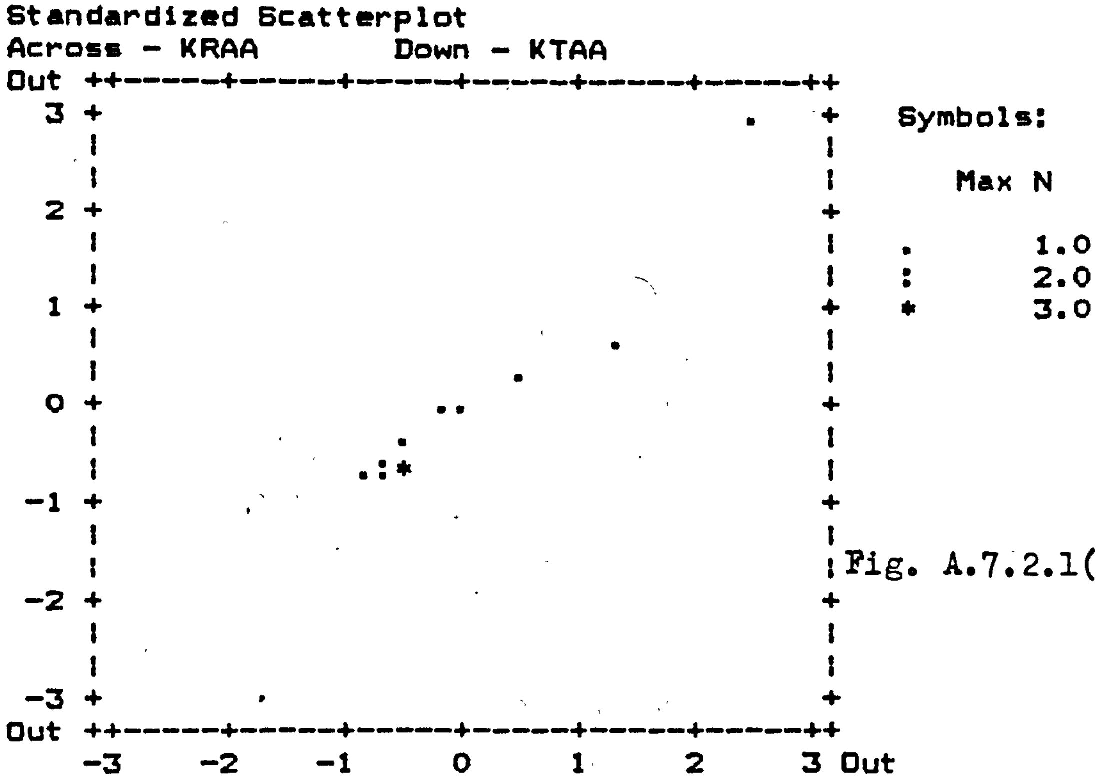


Fig. A.7.2.1(a)

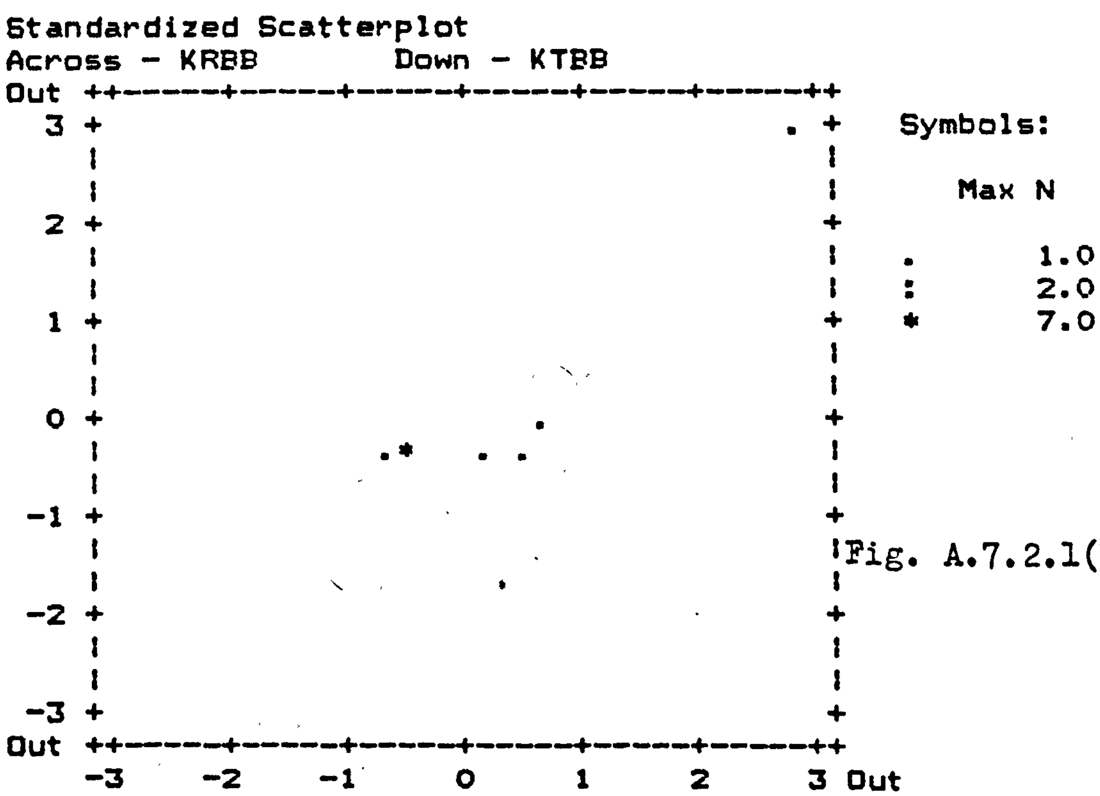


Fig. A.7.2.1(b)

Legend:

KTAA - THE SHOPPERS FOODTRIPS
KTBB - THE SHOPPERS NON-FOOD-TRIPS
KRAA - THE NUMBER OF FOOD STALLS
KRBB - THE NUMBER OF NON- FOOD STALLS

permit the atypical CMP to appear on the same plot. Although the CMP has such atypically high values, it is confirmed not to be an outlier, as shown in the standardized scatterplot in Figure A.7.2.1b page A104. Each of the 2s in the scatterplot represent two market places having similar values on both variables. Again, the data on Tables 7.2 and 7.9, pages 291 and 304, respectively, do not show any market places having exactly similar values. As seen in Figure A.7.2.1 there appears to be a positive relationship between number of non-food-stalls and non-food-trips. That is, non-food-trips increase for increasing number of non-food stalls. The relationship shows a coefficient of correlation 'r' of 0.92 and 'r^2' of 0.86. The scatterplot in Figure A.7.2.1 is both significant and strong and predictable with a slope of .4993 and intercept on the Y axis of -162.

APPENDIX A.7.2.2

Hierarchical Relationships Between Stallage Floor-Spaces and Number of Stalls: ($Z_a - R_a$, $Z_b - R_b$)

The statistics in the Table 7.31(a) for (Z_a-R_a), page 357, indicates the expected strong relationship between food floor-space and the number of food stalls. It is noteworthy that the scatterplot shows one case, the CMP, to have far greater values on both variables than all the others. Although this case has such atypically high values, it is not an outlier, as shown by the standardized scatterplot in Figure A.7.2.2a page A108. This asserts that it belongs to the same family of data despite its estranged values on both variables. The figure 2 in the scatterplot represents two market places, each having roughly similar values on both variables. But the data on Tables 7.1 and 7.2 pages 291 and 291 show no market places having similar values. From Figure A.7.2.2, there appears to be a positive association between food floor-space and the number of stalls. That is, as the amount of food-floor-space increases, so does the number of stalls directly, with correlation coefficient 'r' of 0.98 and 'r^2' of 0.96. This association is termed linear since the observed points cluster more or less around a straight line of slope = 4.589 and intercept 317. This is a true relationship because there is no food floor-space when there are no stalls. The relationship is significant as shown by the significance statistics of 0.0000.

The statistics in Table 7.31(b) for (Z_b - R_b), page 358 , indicates the expected strong relationship between non-food floor-space and the number of non-food stalls. The peculiar thing observed in the scatterplot is one case, the railway station market place, which has great value on the non-food floor-space variable and little corresponding value of number of non-food stalls. This abnormality is due to the timber sheds and saw-mills where one stall (shed) covers several square metres floor-space. Interestingly, the scatterplot shows the CMP to have far greater values on both variables than all the others. Although it has atypically high values, it is not an outlier, as shown by the standardized scatterplot in Figure A.7.2.2b page A108. In order to accommodate the CMP on the same plot, the majoritv of cases have been bunched together. For example, the figures 2 in the scatterplot represent two market places which appear to have similar values on both variables. But Tables 7.1 and 7.2 , pages 291 and 291

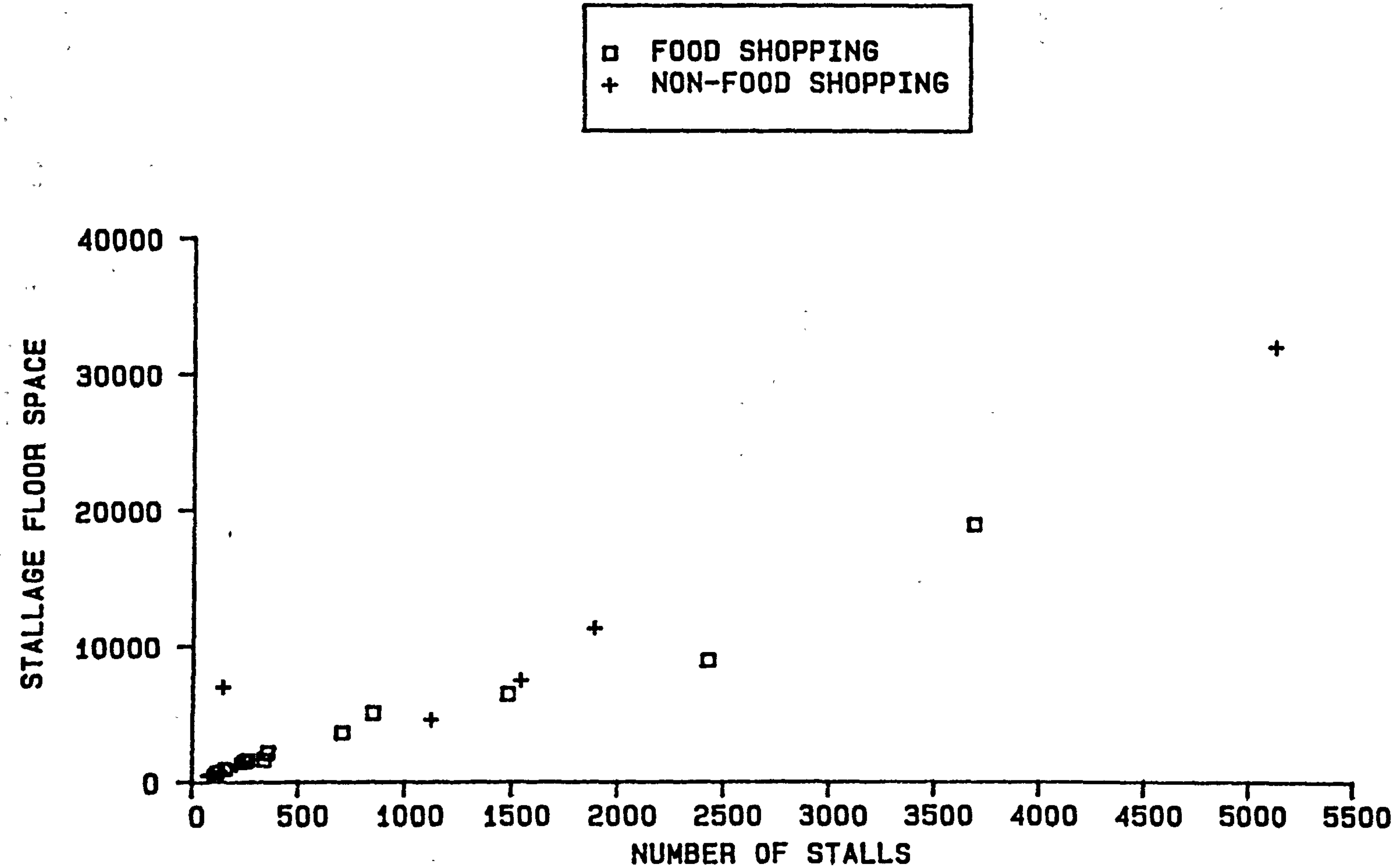


Fig.A.7.2.2: HIERARCHICAL RELATIONSHIPS BETWEEN STALLAGE FLOOR SPACE AND NUMBER OF STALLS

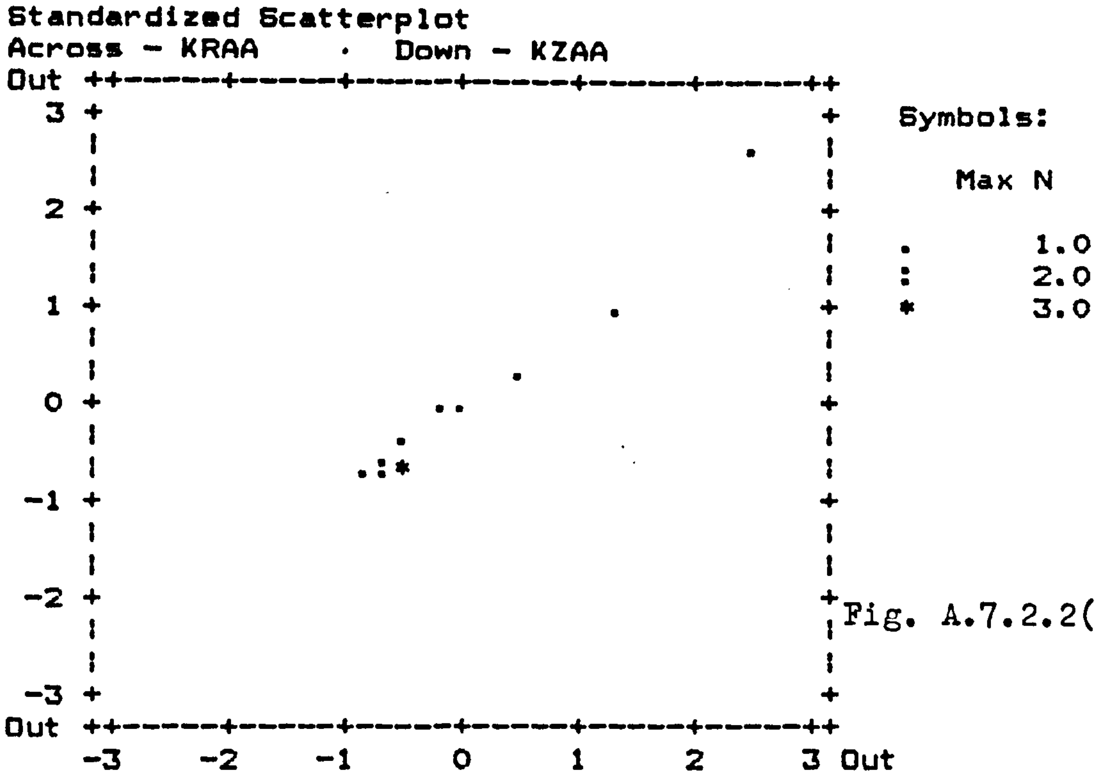


Fig. A.7.2.2(a)

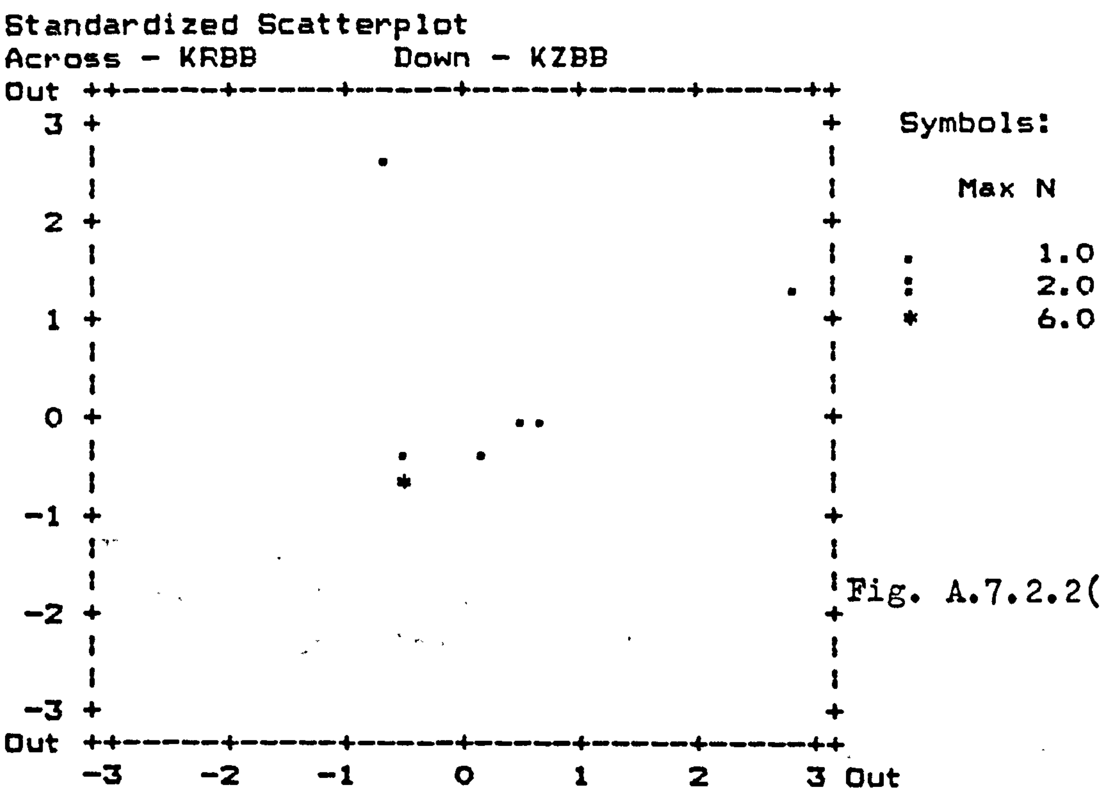


Fig. A.7.2.2(b)

Legend:

KZAA - THE STALLAGE FOOD FLOOR-SPACE
KZBB - THE STALLAGE NON-FOOD FLOOR-SPACE
KRAA - THE NUMBER OF FOOD STALLS
KRBB - THE NUMBER OF NON- FOOD STALLS

indicate that no market places have exactly similar values on the variables. As seen in Figure A.7.2.2, there appears to be a positive linear relationship between non-food floor-space and number of non-food stalls. The linear association has correlation coefficient 'r' of 0.39 and 'r^2' of 0.15. But for the abnormality of the railway station market, the linear relationship is much stronger than as shown by the above correlation coefficient. he observed relationship has slope of 4.115 with intercept of 6145 on floor-space axis;

APPENDIX A.7.2.3

Hierarchical Relationships Between Stallage Floor-Spaces and Number of Traders: $(Z_a - Q_a, Z_b - Q_b)$

The statistics in Table 7.31(a) for $(Z_a - Q_a)$ page 357 indicates a strong relationship between number of food traders and food floor-spaces and this is as expected. But again the CMP has far greater values on both variables than all the others. The CMP is significantly atypical but it is not an outlier, as confirmed by the standardized scatterplot in Figure A.7.2.3a page A112. The scatterplot in Figure A.7.2.3 implies a positive strong linear relationship between food floor-space and number of stalls. That is, as the floor-space increases, the number of food-traders also increase directly, with correlation coefficient 'r' of 0.99 and 'r^2' of 0.98. This association is termed linear since observed points cluster more or less around a straight line of slope 0.4288 and intercept of 317 on floor-space axis.

The overall association is significant, as indicated by the significance statistics of 0.0000.

As indicated in Table 7.31(b) page 358, the statistics for (Z_b-Q_b) implies a strong relationship between non-food floor-space and the number of non-food traders. The interesting thing is shown in the scatterplot where one case, the CMP, has far greater values on both variables than the others. Another case, the railway station, has far greater value on the non-food floor-space, but with correspondingly little value on non-food traders. Since the two atypical cases have values far removed from others, the majority cases appear bunched together in order to permit the atypical cases to appear on the same plot. Although these cases are atypical, they are not outliers, as shown in the standardized scatterplot in Figure A.7.2.3b page A112. As a consequence of the inclusion of the atypical cases in the scatterplot, the figures 6 and 2 on the scatterplot represent six and two market places, respectively, having similar values on either axis. The actual values are not exactly the same. As could be seen in Tables 7.1 and 7.3, pages 291 and 293, no market places have identical values on the non-food floor-space of number of traders variables.

As indicated in Figure A.7.2.3 there appears to be a positive linear relationship between non-food floor-space and number of traders. The coefficient of correlation 'r' of the association is given as 0.41 and 'r^2' is given as 0.17. The relationship is said to be linear. Having allowed for the abnormal value

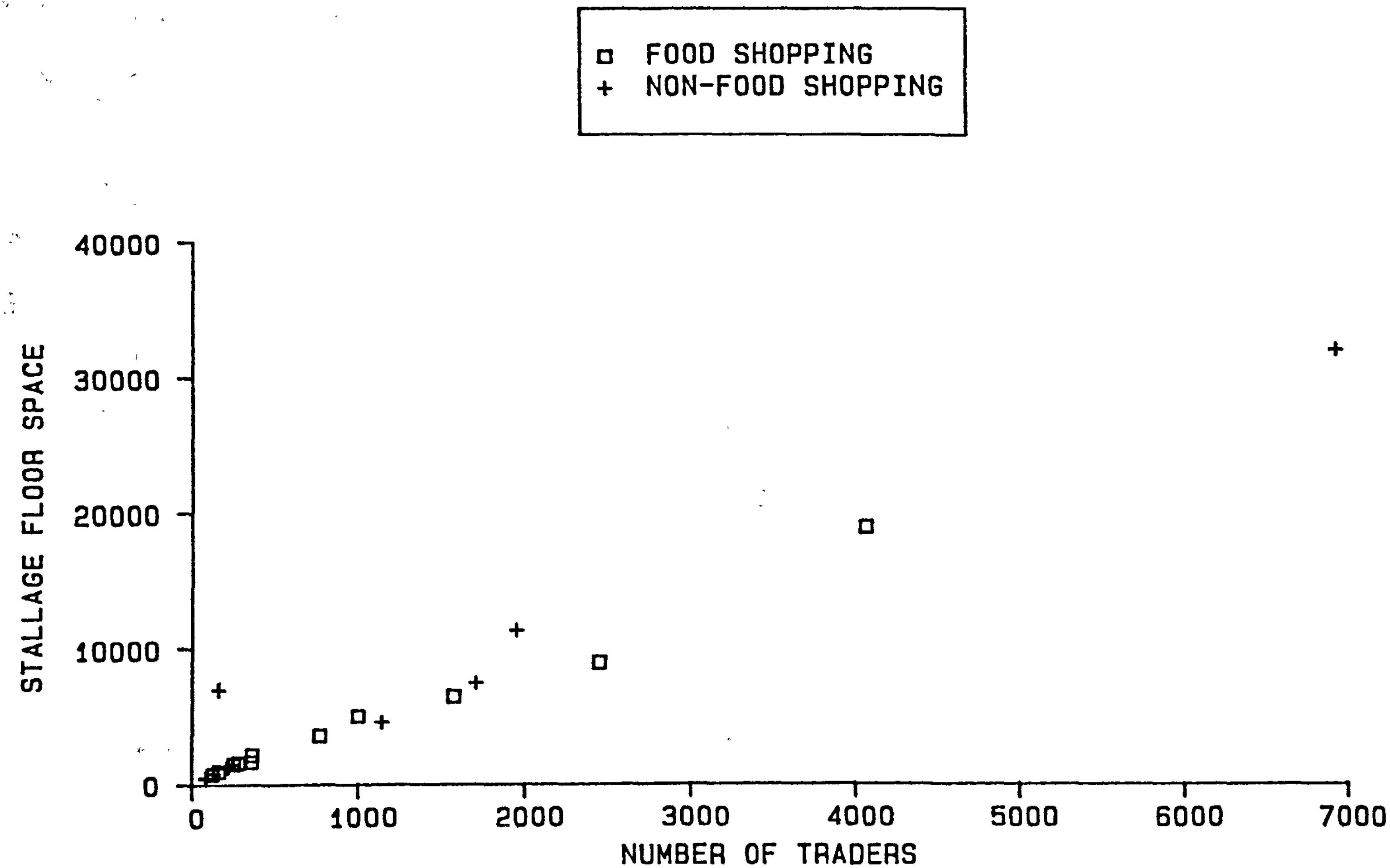


Fig.A.7.2.3: HIERARCHICAL RELATIONSHIPS BETWEEN STALLAGE FLOOR SPACE AND NO OF TRADERS

Standardized Scatterplot
Across - KQAA Down - KZAA

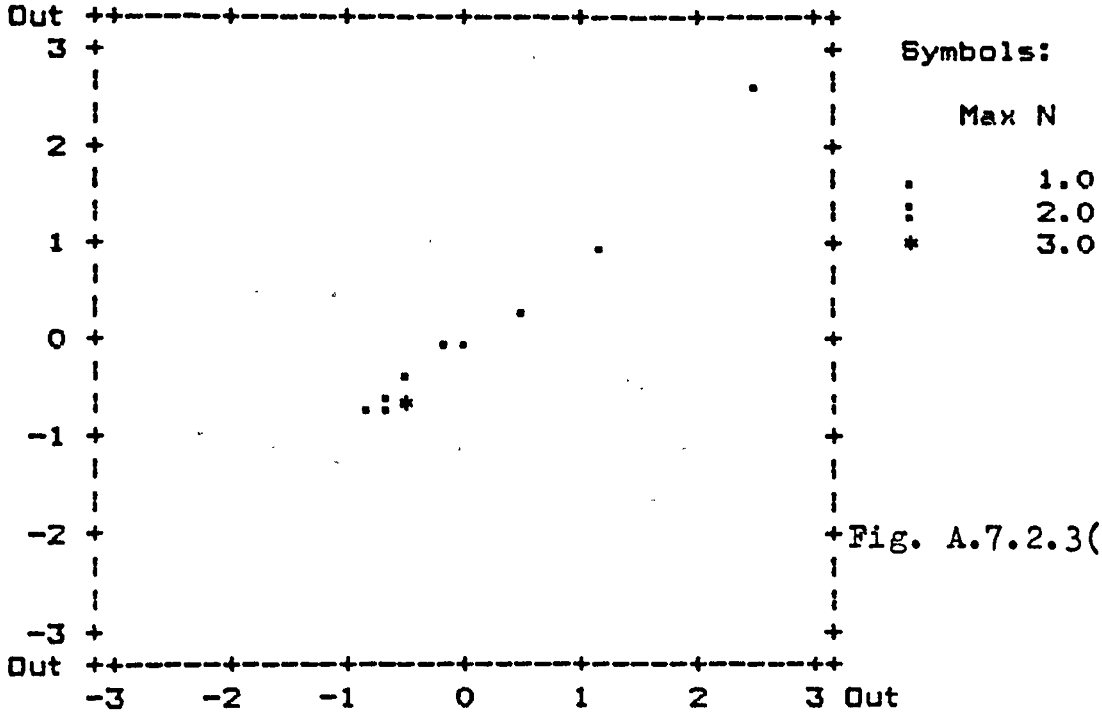


Fig. A.7.2.3(a)

Standardized Scatterplot
Across - KQBB Down - KZBB

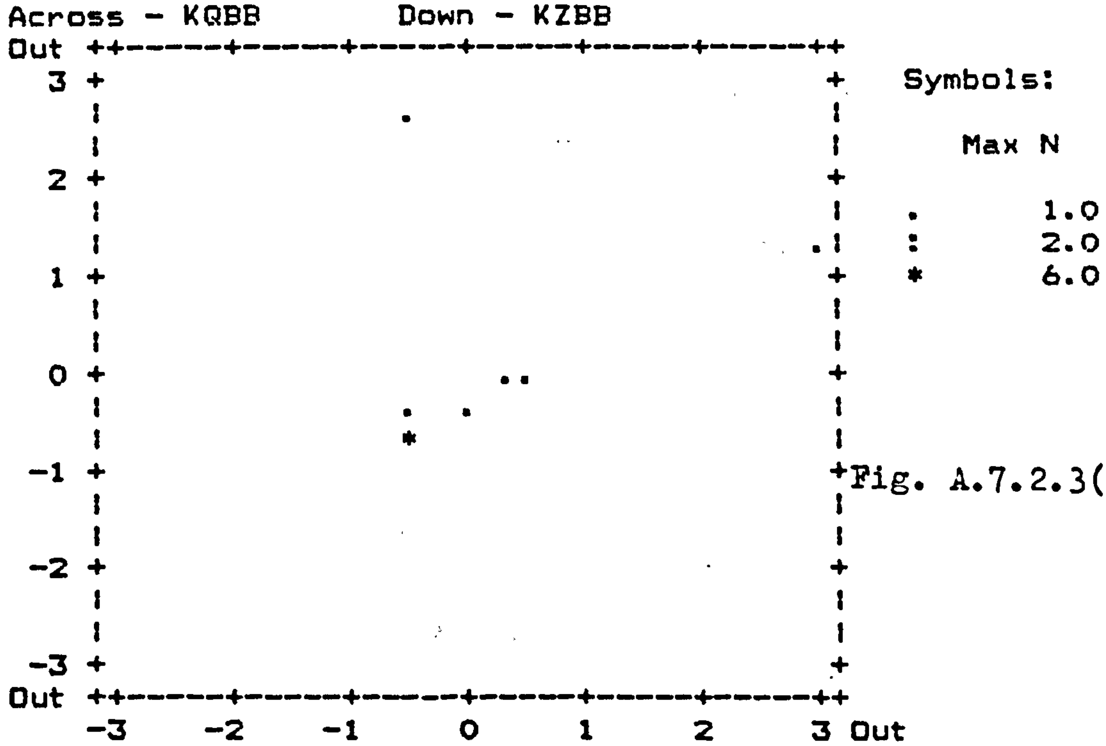


Fig. A.7.2.3(b)

Legend:
KZAA - THE STALLAGE FOOD FLOOR-SPACE
KZBB - THE STALLAGE NON-FOOD FLOOR-SPACE
KQAA - THE NUMBER OF FOOD TRADERS
KQBB - THE NUMBER OF NON-FOOD TRADERS

of the railway station market place, the observed points cluster more or less around a straight line whose slope is 3.265 and intercept on floor-space axis is 6348. The significance statistics of the overall relationship is 0.0901.

APPENDIX A.7.2.4

Hierarchical Relationships Between Number of Traders and Number of Stalls: ($Q_a - R_a$, $Q_b - R_b$)

The statistics in Table 7.31(a) for (Q_a-R_a) page 357, indicates a strong relationship between number of food traders and number of food stalls. This was expected, but again the CMP has far greater values on both variables than all the others. Since its values are far removed from the others, the majority of cases appear bunched together in order to permit the atypical CMP to appear on the same plot. As shown by the standardized scatterplot in Figure A.7.2.4a page A115, the CMP is not an outlier, even though it has such atypically high values. Therefore, in spite of its estranged high values, it still belongs to the same family of data. From Figure A.7.2.4, p. A114, there appears to be a positive relationship between number of food traders and number of food stalls; i.e. as the number of food traders increases, so does the number of food stalls. The coefficient of correlation of these variables 'r' is 0.99 and 'r^2' is 0.99. This relationship is termed linear, since the observed points cluster more or less around a straight line of slope = 1.078 and intercept - 6 on traders axes. The relationship is also significant as shown by the significance statistics of 0.0000.

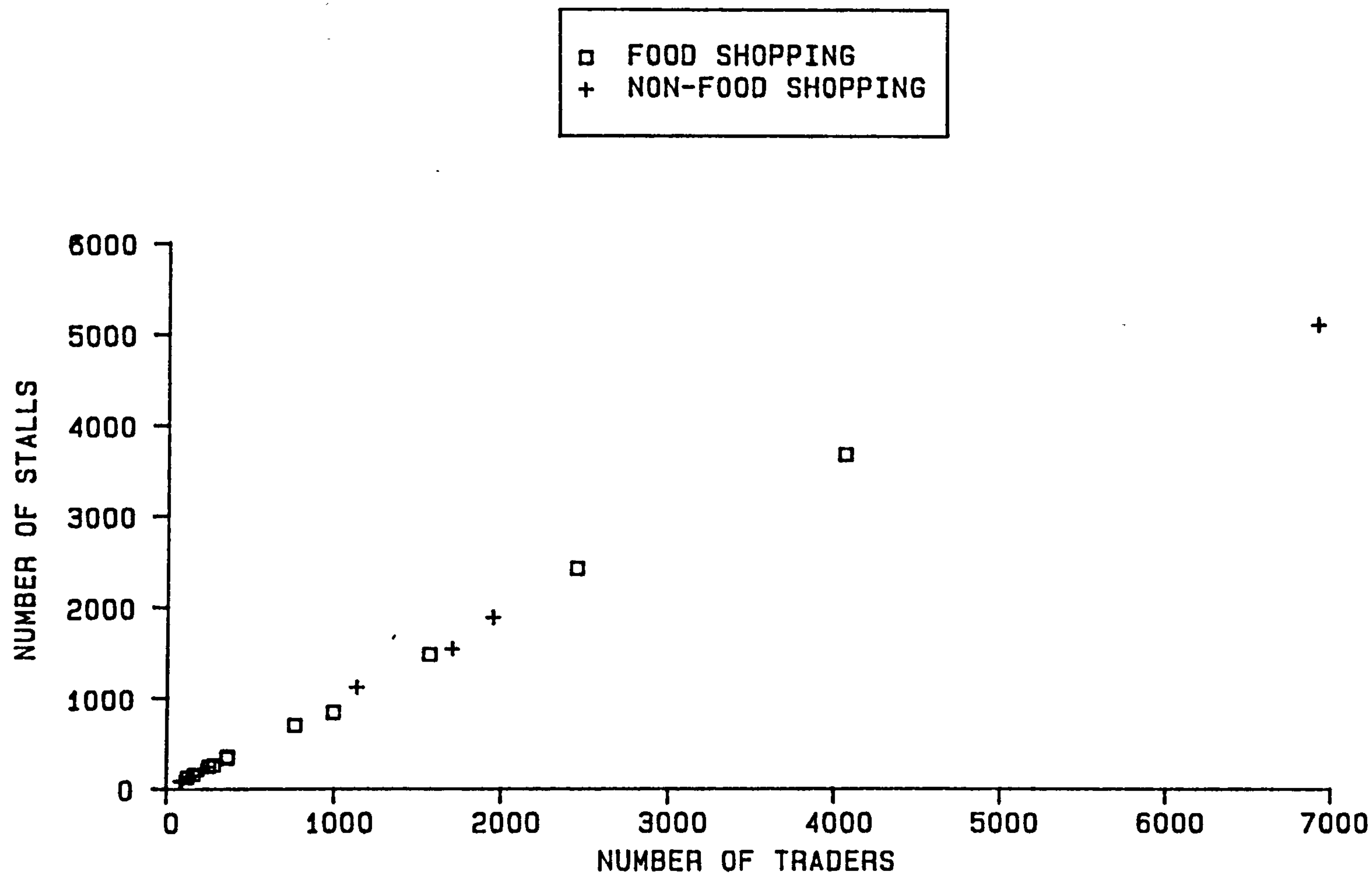


Fig. A.7.2.4: HIERARCHICAL RELATIONSHIPS BETWEEN NO OF STALLS AND NO OF TRADERS

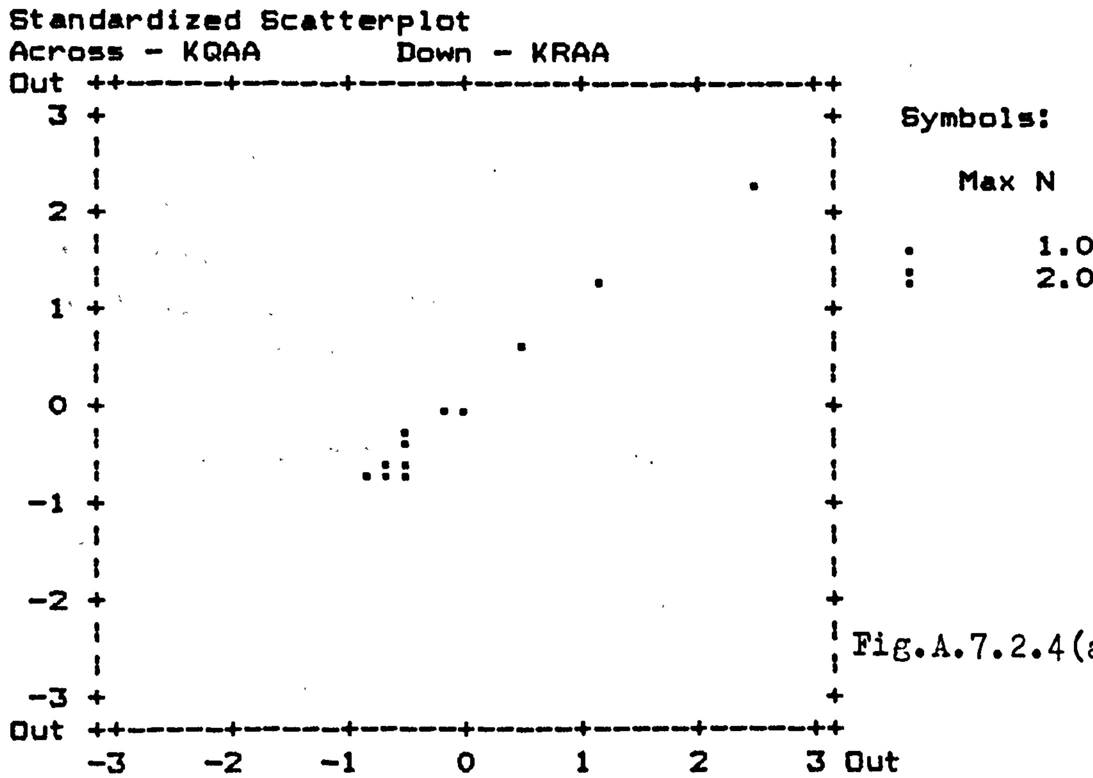


Fig.A.7.2.4(a)

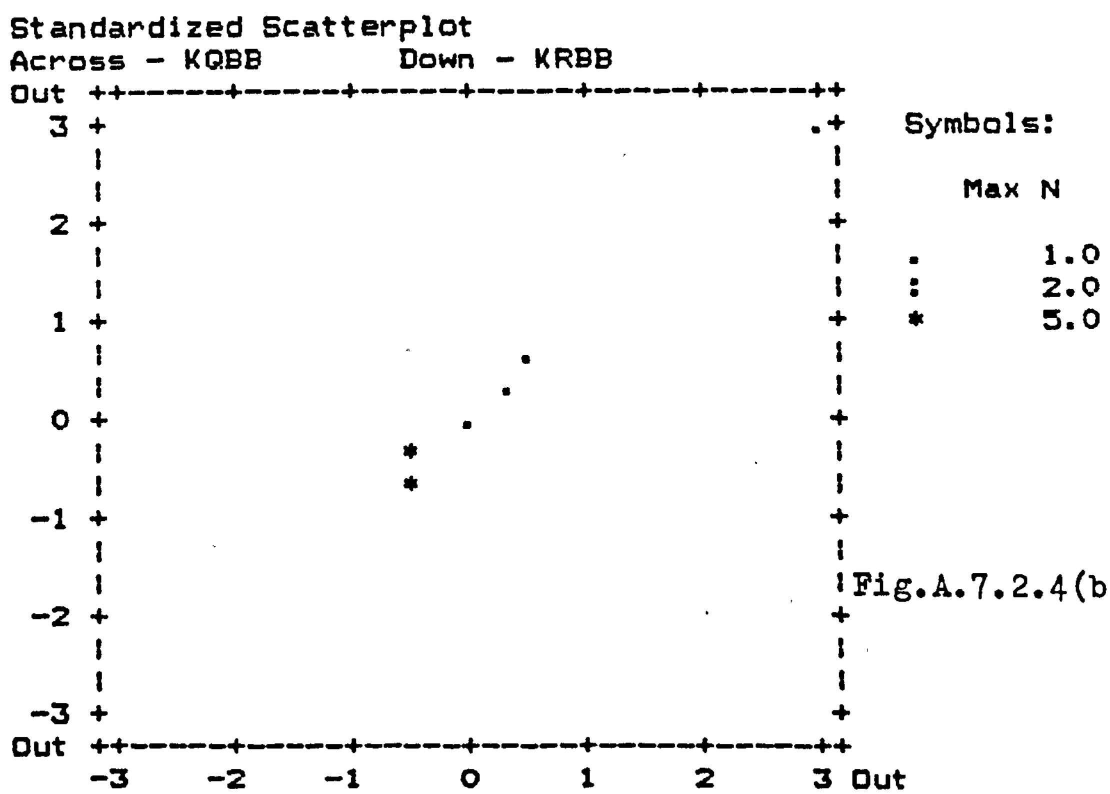


Fig.A.7.2.4(b)

Legend:

KRAA - THE NUMBER OF FOOD STALLS
KRBB - THE NUMBER OF NON- FOOD STALLS
KQAA - THE NUMBER OF FOOD TRADERS
KQBB - THE NUMBER OF NON-FOOD TRADERS

The statistics in Table 7.31(b) for (Q_b-R_b) , page 358, indicates the expected strong relationship between number of non-food traders and number of non-food stalls. Again the interesting thing is shown by the scatterplot where the CMP has far greater values on both variables than all the others. Since its values are very far removed from the rest, the majority of cases appear bunched together in order to permit the atypical CMP to appear on the same plot. Although the CMP has such atypically very high values, it is not an outlier as confirmed by the standardized scatterplot, in Figure A.7.2.4b, page A115. The consequences of accommodating the CMP on the same plot are the 5s and 2s in the scatterplot. Each of the 2s represent two market places having the same values on either variable. The truth is that these market places have close values on either variable, but not exactly the same values as verified in Tables 7.3 and 7.2 , pages 293 and 291 , that no two market places have identical values on a variable. Figure A.7.2.4 indicates a positive relationship between the number of non-food traders and the number of non-food stalls. This implies that as the number of non-food traders increases, so does the number of non-food stalls. The correlation coefficient of the relationship, 'r', is 0.99 and 'r^2' is 0.99. The relationship is termed linear, as the observed points cluster more or less around a straight line of slope = 1 and of intercept of - 116 on trader's axis. The significance statistics of 0.0000 confirms that the overall relationship is significant.

APPENDIX A.7.2.5

Hierarchical Relationships Between Shoppers Trips and Number of Traders: $(T_a - Q_a, T_b - Q_b)$

The statistics in Table 7.31(a) for $(T_a - Q_a)$ page 357, indicated the predicted strong relationship between number of food traders and shoppers food-trips. It is noteworthy that the scatterplot shows the CMP to have far greater values on both variables than all the others. Although the CMP has such atypically very high values, it is not an outlier as confirmed by the standardized scatterplot in Figure A.7.2.5a page A119 This asserts that it belongs to the same family of data in spite of its estranged high values on both variables. Since the values of the CMP are far removed from the others, the majority of cases appear bunched together in order to permit the atypical CMP to appear on the same plot. From Figure A.7.2.5 there appears to be a positive relationship between the number of food traders and shoppers' food-trips. That is, as the number of food traders increases, so does the shoppers food-trips directly. The relationship has shown correlation coefficient 'r' of 0.97 and 'r^2' of 0.94. The relationship also indicates linearity as the observed points cluster more or less around a straight line of slope .5534 and of intercept of - 113 on the shoppers' axis. The overall relationships is significant as confirmed by the significance statistics of 0.0000.

The statistics in Table 7.31(b) for $(T_b - Q_b)$, page 358, indicates the predicted strong relationship between number of non-food traders and shoppers non-food-trips. The peculiar thing shown in the scatterplot is that the CMP has far greater values on both variables than all the others. The interesting thing is that, though

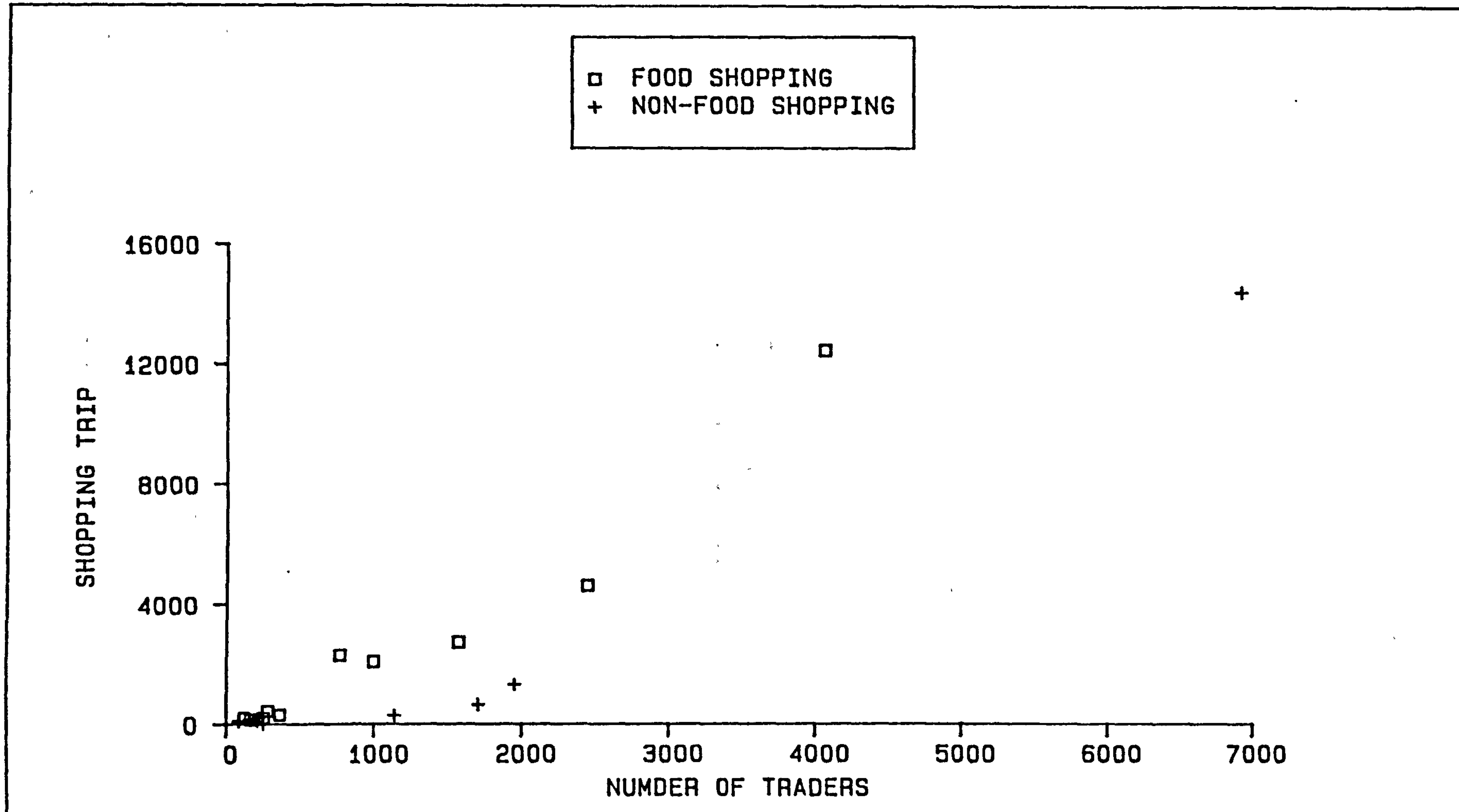


Fig. A.7.2.5: HIERARCHICAL RELATIONSHIPS BETWEEN SHOPPING TRIP AND NO OF TRADERS

Standardized Scatterplot
Across - KQAA Down - KTAA

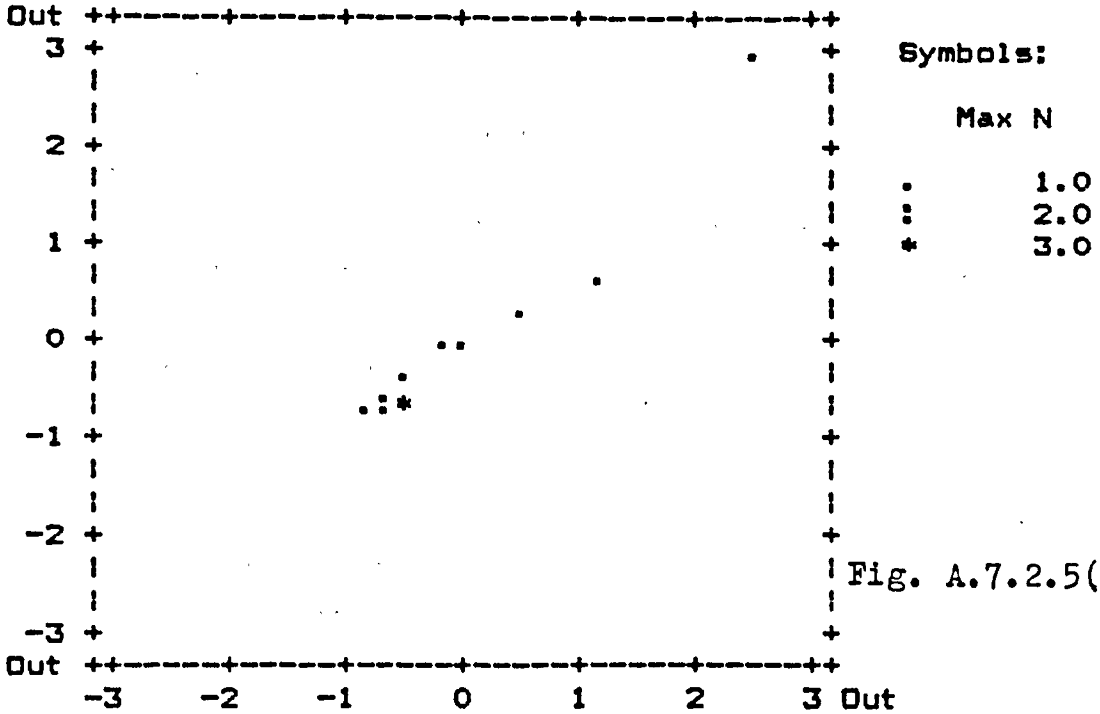


Fig. A.7.2.5(a)

Standardized Scatterplot
Across - KQBB Down - KTBB

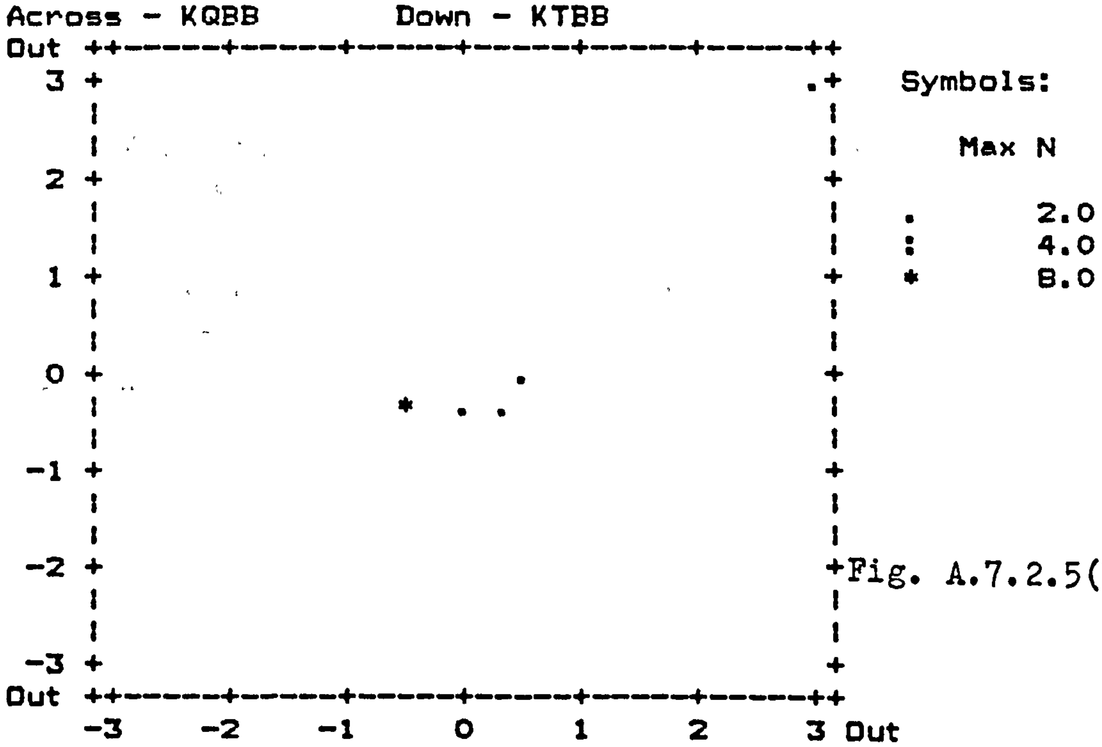


Fig. A.7.2.5(b)

Legend:
KTAA - THE SHOPPERS FOODTRIPS
KTBB - THE SHOPPERS NON-FOOD-TRIPS
KQAA - THE NUMBER OF FOOD TRADERS
KQBB - THE NUMBER OF NON-FOOD TRADERS

the CMP has such atypically very high values, it is not an outlier as demonstrated by the standardized scatterplot in Figure A.7.2.5a page A119. This, therefore, implies that the CMP belongs to the same family of data in spite of its estranged high values on both variables. Since its values are far removed from the others, the majority of cases appear bunched together in order to permit the atypical CMP to appear on the same plot. The consequences of that are the figures 8 and 2 on the scatterplot which imply that eight market places have similar values on either variable and that two market places also have similar values on either variable. The truth is that these market places have very close values on either variable but not exactly the same values as could be verified in Tables 7.9 and 7.2, pages 304 and 291, that no two or three market places have identical values on both variables. From Figure A.7.2.5 there appears to be a positive linear association between the number of non-food traders and shoppers non-food-trips. This implies that as the number of non-food traders increases, so does shoppers non-food-trips. The relationship shows correlation coefficient 'r' of 0.96 and 'r^2' of 0.92. The relationship is termed linear since the observed points cluster more or less around a straight line of slope .3889 with an intercept of - 129 on the shoppers' axis. The significance of the overall relationship is shown by the significance statistics of 0.0000.

Variable(s) Removed on Step Number 9.. $X6^{3}$ IMMEDIATE SUROUNDING WHOLESALE SHOPS/WAREHOUSES

Multiple R	.99943		
R Square	.99885	R Square Change	-0.00011
Adjusted R Square	.99790	F Change	.51252
Standard Error	.05803	Signif F Change	.5061

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	17.61003	3.52201
Residual	6	.02021	.00337

F = 1045.82222 Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance Above: Correlation

**3	$Y8^{3}$	$X4^{3}$	$X2^{3}$	$Y6^{3}$	$X3^{3}$
Y8	6.102E-06	-0.06740	-0.37334	.03721	-0.60511
X4	-1.912E-07	1.319E-06	-0.26283	.21381	-0.11242
X2	-1.571E-06	-5.141E-07	2.902E-06	-0.11657	-0.12460
Y6	3.188E-07	8.514E-07	-6.885E-07	1.202E-05	-0.60837
X3	-1.100E-05	-9.498E-07	-1.561E-06	-1.552E-05	5.413E-05

Equation Number 1 Dependent Variable.. RCHTA GROWTH RATE OF THE SHOPPERS FOODTRIPS

-- Variables in the Equation --

Variable **3	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.052732	.002470	.046688	.058777	.983002	.923996	.295030	.993481	455.678	.0000
X4	.010167	.001148	.007357	.012977	.157403	.595416	.122368	.963796	78.391	.0001
X2	.011455	.001703	.007287	.015623	.224391	.883451	.092941	.939606	45.221	.0005
Y6	.084437	.003468	.075952	.092922	.873721	.901520	.336544	.994979	592.938	.0000
X3	-0.157501	.007357	-0.175503	-0.139499	-1.169441	.845765	-.295882	-.993518	458.315	.0000
(Constant)	.265177	.016752	.224185	.306168					250.564	.0000

------------ Variables not in the Equation ------------

Variable **3	Beta In	Partial	Min Toler	F	Sig F
X5	-0.305454	-.574954	.004061	2.469	.1769
X6	-0.021356	-.304915	.033596	.513	.5061
Y1	.602375	.570281	.001027	2.410	.1813
Y2	.167269	.201153	.001657	.211	.6654
Y3	.368371	.486859	.002002	1.553	.2678
Y4	.014821	.072802	.020523	.027	.8767
Y5	-0.027698	-.110290	.016931	.062	.8139
Y7	-0.013659	-.202212	.063288	.213	.6637

End Block Number 2 POUT = .100 Limits reached.

0 Outliers found. No casewise plot produced.

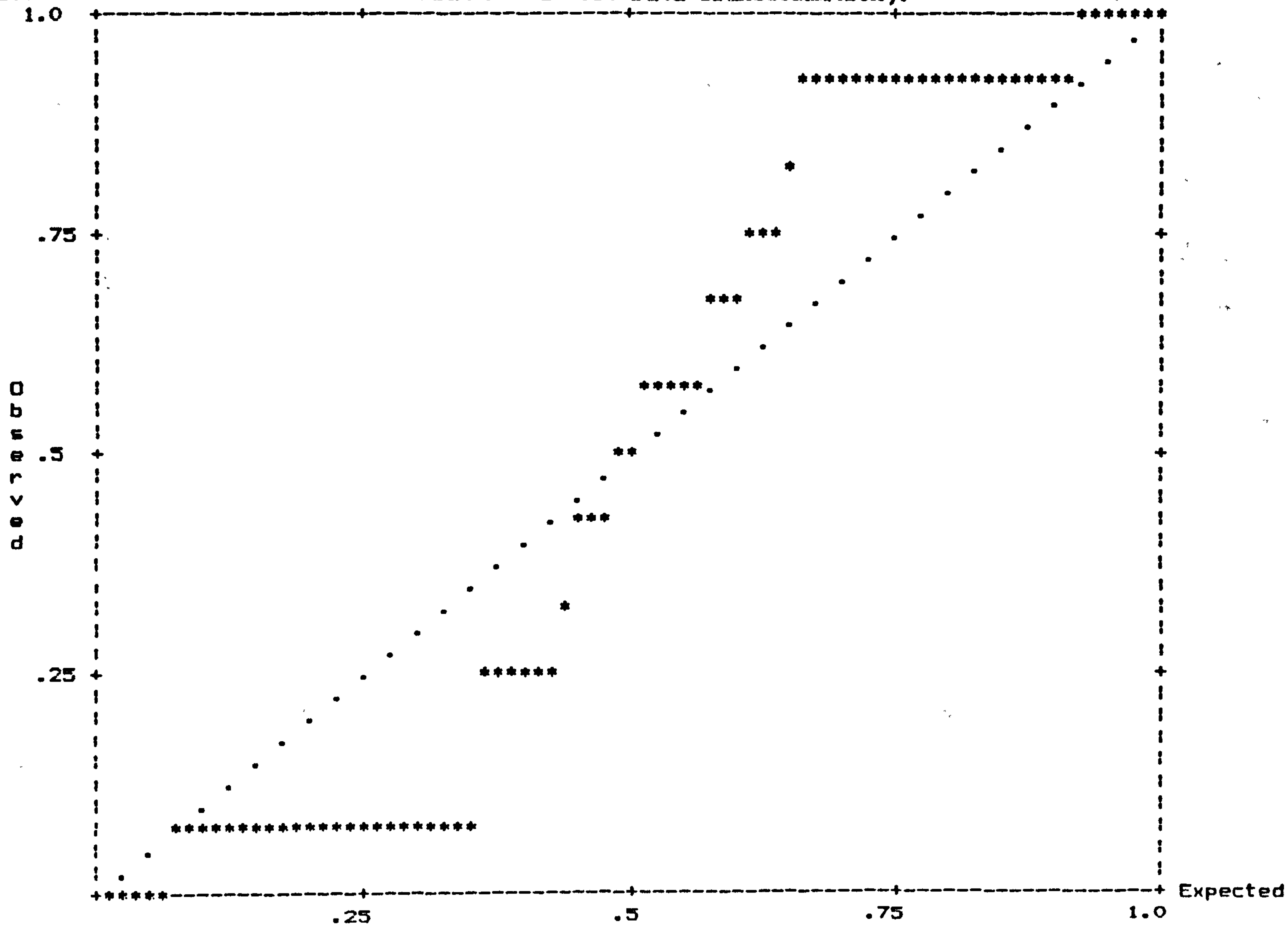
Notes: **3 - EXPONENTIAL

APPENDIX (Output) A.7.3.1:

Regression Equation for Prediction of the Growth Rate of the Shoppers Food-Trips; (dT_a - X & Y).

APPENDIX A.7.3.1(x):

Normal Probability (P-P) Plot (Predictive Equation for Growth Rate of Shoppers Food-Trips - Standardized Residual Trial Run Before Data Transformation).



APPENDIX A.7.3.2

Causal Relationship between the Growth Rate of the Shoppers' Non-Food-Trips and the Locational and Structural Potential in the Market Place (2.1b)

With reference to the computer output shown in Appendix A.7.3.2, page A124 the predictive equation for the growth rate of the shoppers' non-food-trips to a market place was given as:

$$\delta T_b = 0.059X_2^3 + 0.0124X_3^3 + 0.0454Y_8^3 + 0.0137 \quad (2.1b)$$

The summary statistics of the equation and the significance of F for the independent variables in the equation are entered in column 2.1b of Table 7.36, page 394 . Further information about the equation may be obtained by reading the Appendix A.7.3.2, page A 124 in conjunction with sections 7.3.1 (1-14) and 7.3.3, pages 369 - 379 and 386 - 395 respectively.

From an examination of the statistics in Table 7.36, column 2.1b, R $>$ Adjusted $R^2 > 0.5$, Signif $F < 0.05$ and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth of the shoppers' non-food-trips and the locational and structural potentials of Kaduna city market places is rejected; and the alternative that there is strong multiple cubic relationship between the growth rate of the shoppers' non-food-trips and the locational and structural potentials in the system of urban market places of Kaduna city is accepted.

The predictive ability of the equation is confirmed by the plot of the predicted values against the observed trend growth rate of shoppers' non-food trips, shown in Figure A.7.3.2, page A 125 . A table of the predicted values, observed values and percentage accuracy of the prediction is shown in Table A.7.3.2, page A 126. The percentage accuracy of the prediction is shown for each market place and they all lie within the range 81.71 - 113.48%. The mean

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. RCHTB GROWTH RATE OF THE SHOPPERS NON-FOOD-TRIPS

Variable(s) Removed on Step Number 11.. $Y7^{3}$ PRESERVATION OF FOOD STUFFS

Multiple R	.99943		
R Square	.99886	R Square Change	-0.00029
Adjusted R Square	.99844	F Change	2.40478
Standard Error	.05206	Signif F Change	.1649

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	19.03903	6.34634
Residual	8	.02168	.00271

F = 2341.73301 Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance Above: Correlation

**3	$Y8^{3}$	$X2^{3}$	$X3^{3}$
Y8	4.875E-06	-0.40423	-0.73505
X2	-1.313E-06	2.165E-06	-0.25016
X3	-8.498E-06	-1.927E-06	2.742E-05

------------------------------------ Variables in the Equation ------------------------------------

Variable **3	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.045384	.002208	.040293	.050475	.813658	.997409	.245105	.990666	422.531	.0000
X2	.005925	.001471	.002532	.009318	.111624	.918841	.048017	.818314	16.216	.0038
X3	.012421	.005237	3.45484E-04	.024497	.088698	.955470	.028284	.642572	5.626	.0451
(Constant)	.013679	.015028	-0.020976	.048333					.828	.3893

------------ Variables not in the Equation ------------

Variable **3	Beta In	Partial	Min Toler	F	Sig F
X4	-0.020949	-.494335	.090204	2.264	.1761
X5	.209742	.450995	.005259	1.787	.2231
X6	-0.026536	-.408125	.034588	1.399	.2755
Y1	-0.023986	-.031092	.001873	.007	.9367
Y2	.364424	.544751	.002542	2.954	.1294
Y3	-0.054360	-.096511	.003585	.066	.8049
Y4	.067774	.359222	.023453	1.037	.3424
Y5	.119984	.649551	.028309	5.109	.0583
Y6	5.625E-04	.006576	.064834	.000	.9866
Y7	.021051	.505666	.081110	2.405	.1649

Notes: **3 - EXPONENTIAL

<u>APPENDIX (Output) A.7.3.2</u>:

Regression Equation for Prediction of the Growth Rate of the Shoppers Non-Food-Trips; (dT_b - X & Y).

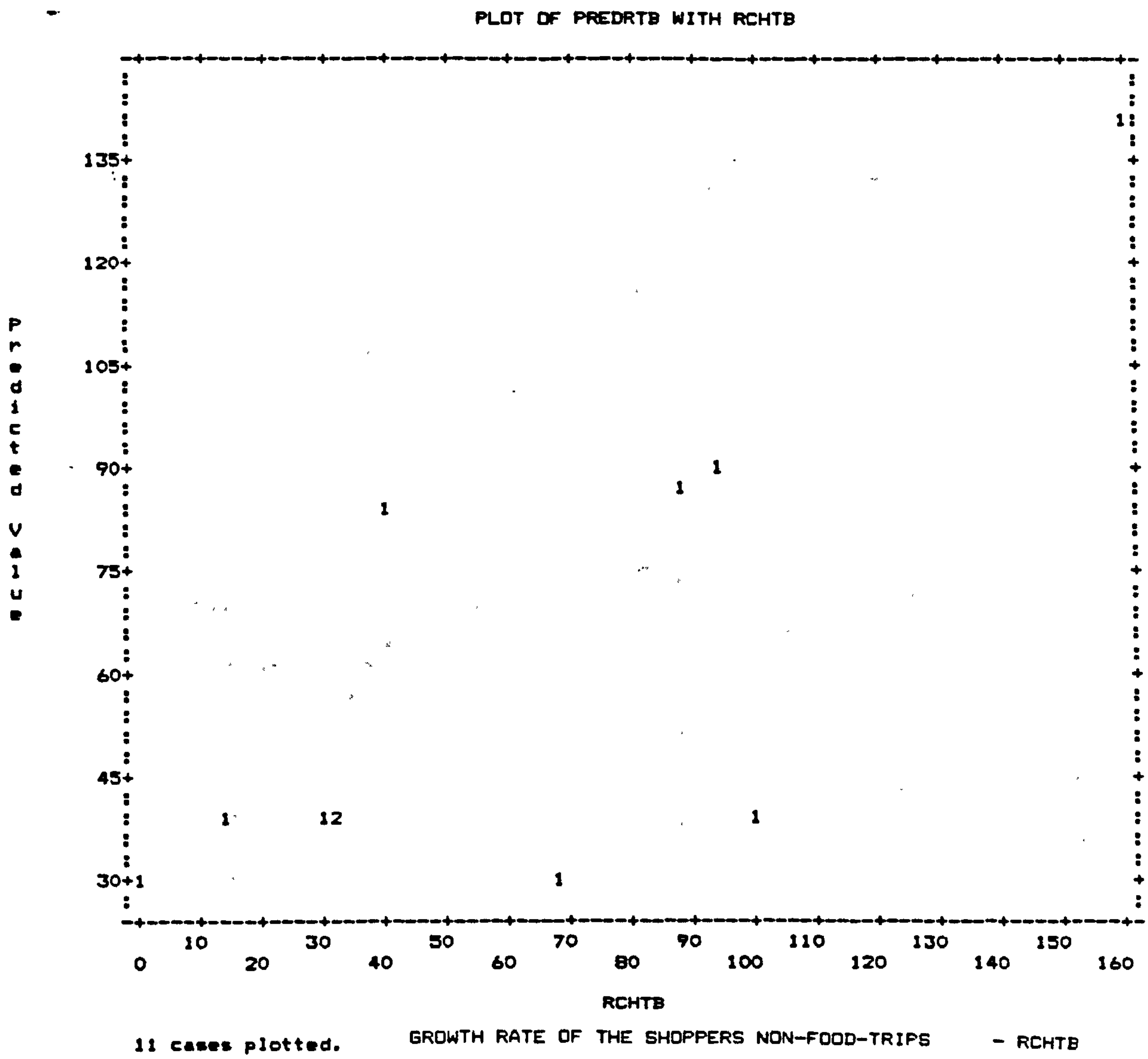


Fig. A.7.3.2: Plot of Observed and Predicted Growth Rates of the Shoppers Non-Food Trips.

TABLE A.7.3.2: Observed and Predicted Trend Growth Rate of the Shoppers' Non-food-Trips

Name of Market Place	The Shoppers' Non-Food-Trips in 1977	The Shoppers' Non-Food-Trips in 1984	Observed growth rate of the shoppers' non-food-trips	Predicted Trend Growth rate of the shoppers' non-food-trips	Percentage Accuracy of the prediction
CMP	7648	14410.88	88.43	86.84612	98.21
RSMP	109	140.93	29.29	39.45596	134.71
PMP	.	495.52	.	145.23643	.
M-KGMP	456	640.99	40.57	84.45466	208.18
TWMP	679	1313.80	93.49	89.83811	96.09
K-TMP	105	272.76	159.77	141.88893	88.81
URMP	105	209.12	99.16	39.40411	39.74
BMP	65	86.37	32.88	39.40411	119.83
UTMP	54	90.92	68.37	28.83475	42.17
BDMP	55	72.74	32.25	39.46988	122.40
USMP	0	.00	.00	28.81960	.
KGMP	4	4.55	13.65	39.44353	288.95

97.60;($\pm$ 15.89), for Kaduna city is calculated. (One atypical case, the Tudun Wada had a % value of 268.43% and was not included in the calculation of the mean).

The plot of the predicted against the observed trend growth rate of the shoppers' non-food-trips, Figure page A125, showed the very high values of the CMP far aloof from the others. The majority of the other city retail market places are bunched together in order to permit the CMP to appear on the same plot. A huge gap existed between the CMP and the other market places. A very small gap is noticed between the subgroup of the 4 DMPs and the subgroup of the 5 L/NMPs. The 2 SMPs found their positions somewhere between the other 3 subgroups. Since there is a strong multiple cubic effect - causal relationship between the shoppers' non-food-trips and the locational and structural in the city retail market places, the observed unbalanced distribution of the growth rate of shoppers' non-food-trips must be accounted for by disproportionate locational and structural potentials possessed by Kaduna city market places.

The over-predicted values for the Tudun Wada Market Place is explicable. The locational potentials of Tudun Wada Market Place seemed considerably high to enable it to perform a high functional role in shopping for non-food. But the structural potentials, especially security of life and property, are so low that they do not allow it to attract considerable non-food traders and shoppers' non-food trips. It is the conflict between the locational and structural potentials of Tudun Wada market place that is manifested in the over-prediction of non-food trips.

APPENDIX A.7.3.3

Causal Relationship Between the Growth Rate of the Number of Food Traders, and the Locational and Structural Potentials in a Market Place; (2.2a)

With reference to the computer output shown in Appendix A.7.3.3 page A129 , the predictive equation for the growth rate of the number of food traders in a market place was given as:

$$dQ_a = -0.0187X_5^2 + 0.102Y_6^2 - 0.0203Y_7^2 + 0.0866 \quad (2.2a)$$

The summary statistics for the equation and the significance of F for the independent variables in the equation are entered in column 2.2a of Table 7.36, page 394 , Further information about the equation may be obtained by reading the Appendix A.7.3.3, page A129 in conjunction with sections 7.3.1 (1-14) and 7.3.3, pages 369 - 379 , and 386 - 395 , respectively.

From an examination of the statistics in Table 7.36 column 2.2a , R > Adjusted $R^2 > 0.5$, Signif $F < 0.05$ and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth in the number of food traders, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong multiple quadratic relationship between the growth rate of the number of food traders, and the locational and structural potentials in the system of urban market places of Kaduna city is accepted.

The predictive ability of the equation is demonstrated by the plot of the predicted against the observed growth rate of the number of food-traders in Kaduna

*** * * * M U L T I P L E   R E G R E S S I O N * * * ***

Equation Number 1   Dependent Variable..   RCHQA   GROWTH RATE OF THE NUMBER OF FOOD TRADERS

Variable(s) Removed on Step Number 13.. $\overset{2}{Y}4$ SECURITY OF LIFE AND PROPERTY

Multiple R	.99081		
R Square	.98170	R Square Change	-0.00633
Adjusted R Square	.97385	F Change	3.17098
Standard Error	.16170	Signif F Change	.1253

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	9.81697	3.27232
Residual	7	.18303	.02615

F = 125.14790   Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance   Above: Correlation

**2	$\overset{2}{Y}7$	$\overset{2}{Y}6$	$\overset{2}{X}5$
Y7	3.398E-05	-0.71699	.78176
Y6	-4.337E-05	1.076E-04	-0.92750
X5	2.893E-05	-6.108E-05	4.029E-05

------------------ Variables in the Equation ------------------

Variable **2	B	SE B	95% Confdnce	Intrvl B	Beta	Correl	Part Cor	Partial	F	Sig F
Y7	-0.020314	.005830	-0.034099	-0.006530	-0.285929	-.130324	-.178190	-.796453	12.143	.0102
Y6	.102019	.010375	.077486	.126553	1.345864	.974472	.502806	.965655	96.687	.0000
X5	-0.018737	.006347	-0.033746	-0.003728	-0.451672	.812700	-.150947	-.744671	8.714	.0213
(Constant)	.086591	.049788	-0.031138	.204320					3.025	.1256

------------ Variables not in the Equation ------------

Variable **2	Beta In	Partial	Min Toler	F	Sig F
X2	.031382	.072275	.057322	.032	.8650
X3	.079304	.119754	.034737	.087	.7776
X4	.058917	.256436	.110786	.422	.5398
X6	.080011	.374781	.110642	.980	.3603
Y1	.104136	.282213	.074613	.519	.4983
Y2	.081495	.159745	.044743	.157	.7055
Y3	.153386	.296870	.061939	.580	.4752
Y4	.231660	.588016	.063143	3.171	.1253
Y5	.470455	.681399	.031364	5.200	.0628
Y8	.148118	.314153	.068471	.657	.4486

Notes: **2 - EXPONENTIAL

APPENDIX (Output) A.7.3.3:

Regression Equation for Prediction of the Growth Rate of the Number of Food Traders; (dQ_a - X & Y).

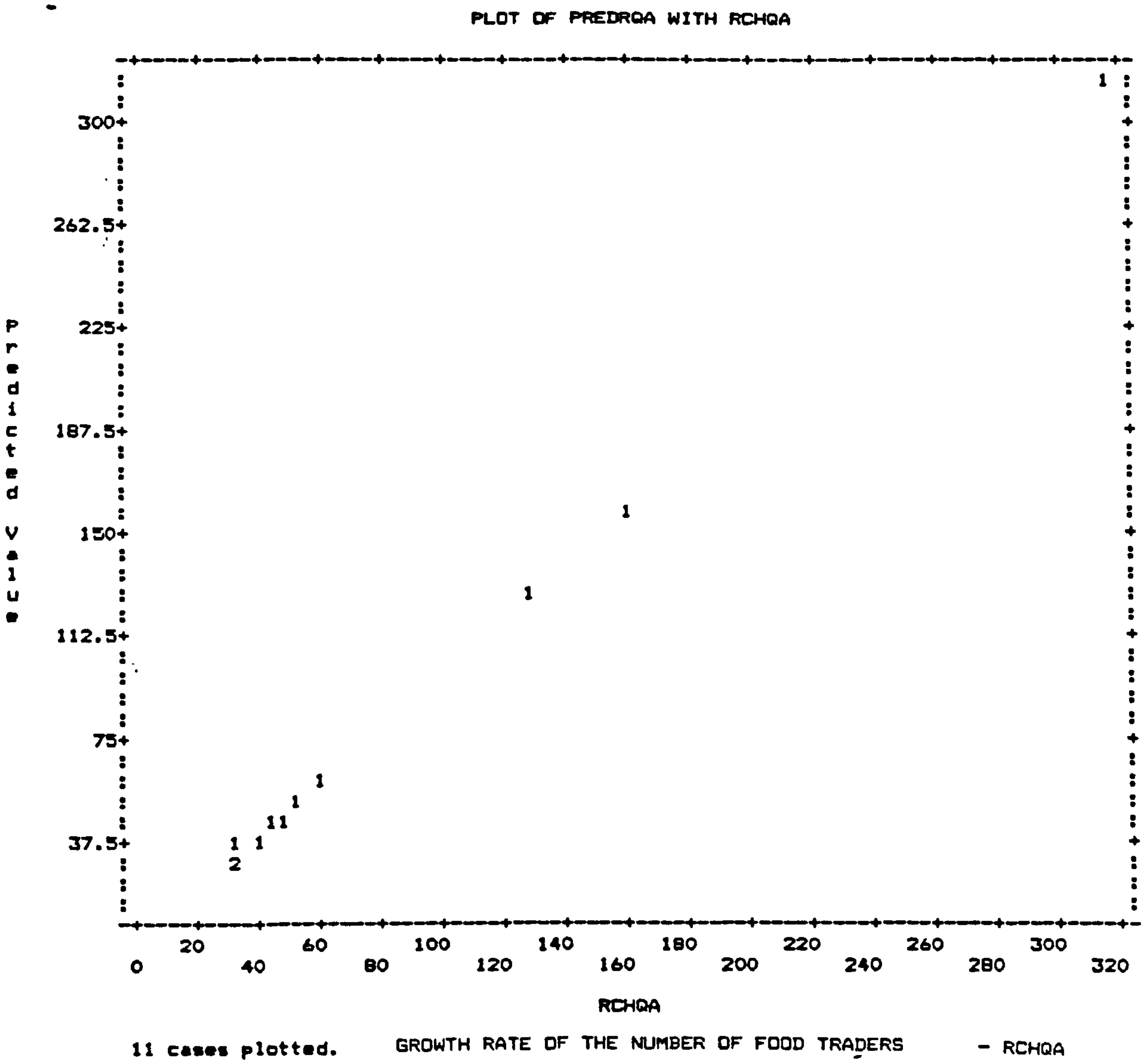


Fig. A.7.3.3: Plot of Observed and Predicted Growth Rates of the Number of Food Traders.

city market place hierarchy shown in Figure A.7.7.3, page A129. The table of predicted and observed values is given in Table A.7.7.3 page A132. The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. The maximum, minimum and mean percentage accuracy of prediction are 142.39%, 74.69% and 108.54%, respectively; i.e. (± 34.85% range).

The plot of the predicted against the observed growth rate of number of food-traders showed very high values of the CMP far removed from the other market places in Kaduna city. Makera and Kawo district centre market places came midway of the scatterplot; this accounted for by the periodic markets associated with them. These weekly periodic markets mainly devoted to the marketing of food stuffs, may not be very strong outside the seasons of locally produced food stuffs. Since the periodic traders use the market places only once a week, they bring in their wares with them and carry away what they were only unable to sell at the end of the day; security of property at the close of the marketing is not of the essence. Again the periodic trader would not be keen to carry home a lot of unsold heavy food stuffs, they would be more inclined to sell off their wares, even at lower prices than would be expected of a resident trader. The Railway and Tudun Wada Market Places maintained the usual position of the subgroup, DMP, with small gap separating them from the others which are bunched together in order to allow the CMP to appear on the same plot. The differences in the gaps represent unbalanced distribution of growth rate of the number of food-traders among the Kaduna city retail market place hierarchy. Since

TABLE A.7.3.3: Observed and Predicted Trend Growth Rate of the Number of Food Traders

Name of Market Place	The number of food traders in 1977	The number of food traders in 1984	Observed growth rate of the number of food traders	Predicted Trend Growth rate of the number of food traders	Percentage Accuracy of the prediction
CMP	977	4066.00	316.17	316.50269	100.10
RSMP	499	765.00	53.31	52.69226	98.85
PMP	.	.00	.	17.07751	.
M-KOMP	1058	1574.00	48.77	48.53516	99.52
TWMP	438	997.50	127.74	127.24417	99.61
K-TMP	940	2453.00	160.96	160.68647	99.83
URMP	202	280.00	38.61	37.97644	98.35
BMP	189	252.50	33.60	35.51010	105.69
UTMP	272	359.00	31.99	32.89905	102.86
BDMP	87	124.00	42.53	42.82749	100.70
USMP	275	363.00	32.00	30.91972	96.62
KOMP	101	163.00	61.39	61.26537	99.80

there exist strong multiple quadratic effect-causal relationship between the growth rate of food-traders, and the locational and structural potentials in Kaduna city retail market place hierarchy, the observed unbalanced distribution of growth rate of number of food-traders, among the Kaduna market places, must be dependent on the magnitude of the locational and structural potentials possessed by these market places.

APPENDIX A.7.3.4

Causal Relationship Between the Growth Rate of the Number of Non-food Traders, and the Locational and Structural Potentials in a Market Place; (2.2b)

With reference to the computer output shown in Appendix A.7.3.4, page A134 , the predictive equation for the growth rate of the number of non-food traders in a market place was given as:

$$dQ_b = -0.069X_4^2 + 0.0204X_5^2 + 0.0035X_6^2 + 0.0207Y_6^2 + 0.0123Y_8^2 + 0.0118 \quad \ldots\ldots\ (2.2b)$$

The summary statistics for the equation, and the significance of F for the independent variables in the equation are entered in column 2.2b of Table 7.36, page 394. For further information about the equation, read the Appendix A.7.3,4, page A134 , in conjunction with sections 7.3. (1-14) and 7.3.3, pages 369 - 379 and 386 - 395 , respectively.

From an examination of the statistics in Table 7.36 column 2.2b , R > Adjusted $R^2 > 0.5$, Signif F < 0.05 and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that

Variable(s) Removed on Step Number 11.. $Y7^2$ PRESERVATION OF FOOD STUFFS

				Analysis of Variance	DF	Sum of Squares	Mean Square
Multiple R	.99950						
R Square	.99901	R Square Change	-0.00018				
Adjusted R Square	.99801	F Change	.91501	Regression	5	9.99007	1.99801
Standard Error	.04457	Signif F Change	.3930	Residual	5	.00993	.00199

F = 1005.76955 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. RCHQB GROWTH RATE OF THE NUMBER OF NON-FOOD TRADERS

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance Above: Correlation

**2	$Y8^2$	$X6^2$	$X4^2$	$Y6^2$	$X5^2$
Y8	4.832E-06	-0.40362	.13828	-0.35228	-0.73403
X6	-1.128E-06	1.617E-06	-0.07881	-0.12538	.17529
X4	3.009E-07	-9.921E-08	9.801E-07	.24198	-0.51056
Y6	-1.834E-06	-3.776E-07	5.674E-07	5.609E-06	-0.19135
X5	-3.386E-06	4.678E-07	-1.061E-06	-9.511E-07	4.405E-06

------------------ Variables in the Equation ------------------

Variable **2	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.012276	.002198	.006625	.017926	.301847	.975915	.078711	.928347	31.187	.0025
X6	.003478	.001271	2.09407E-04	.006746	.062644	.778847	.038552	.774215	7.482	.0410
X4	-0.006912	9.9001E-04	-0.009457	-0.004367	-0.141831	.509693	-.098409	-.952352	48.749	.0009
Y6	.020710	.002368	.014622	.026798	.273208	.938277	.123245	.968824	76.460	.0003
X5	.020439	.002099	.015044	.025834	.492699	.957145	.137264	.974640	94.845	.0002
(Constant)	.011770	.015060	-0.026944	.050483					.611	.4699

------------ Variables not in the Equation ------------

Variable **2	Beta In	Partial	Min Toler	F	Sig F
X2	.020614	.164920	.021713	.112	.7549
X3	.194287	.418230	.004603	.848	.4092
Y1	-0.986913	-.539937	1.552E-04	1.646	.2688
Y2	.556481	.414377	5.508E-04	.829	.4140
Y3	-0.265894	-.457419	.002940	1.058	.3617
Y4	.048886	.414060	.032566	.828	.4144
Y5	.068823	.425157	.037906	.883	.4007
Y7	.028198	.431471	.059619	.915	.3930

End Block Number 2 POUT = .100 Limits reached.

0 Outliers found. No casewise plot produced.

Notes: **2 - EXPONENTIAL

APPENDIX (Output) A.7.3.4:

Regression Equation for Prediction of the Growth Rate of the Number of Non-Food-Traders; (dQ_b - X & Y).

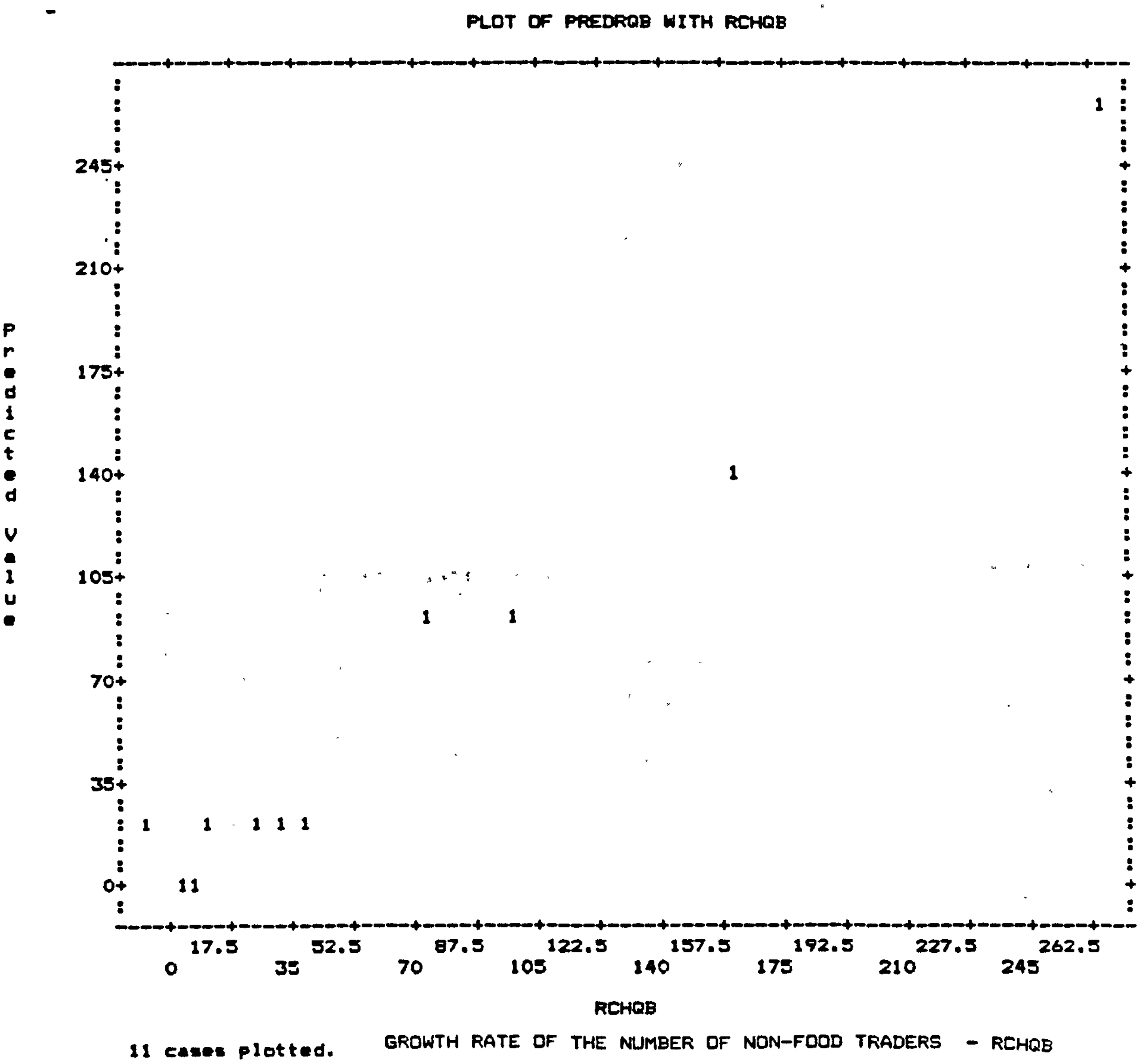


Fig. A.7.3.4: Plot of Observed and Predicted Growth Rates of the Number of Non-Food Traders.

TABLE A.7.3.4: Observed and Predicted Trend Growth Rate of the Number of Non-Food Traders

Name of Market Place	The Number of food traders in 1977	The Number of non-food traders in 1984	Observed Growth Rate of the number of non-food traders	Predicted Growth rate of the number of non-food traders	Percentage Accuracy of the prediction
CMP	1894	6912.00	264.94	268.66550	101.41
RSMP	125	157.00	25.60	21.70621	84.79
PMP	.	.00	.	142.94077	.
M-KOMP	992	1707.00	72.08	93.54891	129.79
TWMP	979	1952.50	99.44	93.54891	94.08
K-TMP	434	1136.00	161.75	142.94077	88.37
URMP	168	220.00	30.95	21.70621	70.13
BMP	153	211.50	38.24	21.70621	56.77
UTMP	80	83.00	3.75	-0.74464	-19.86
BDMP	88	83.00	-5.68	21.70621	-382.03
USMP	127	134.00	5.51	-0.74464	-13.51
KOMP	229	250.00	9.17	21.70621	236.70

there is no causal relationship between the growth of the number of non-food traders, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong multiple quadratic relationship between the growth rate of the number of non-food traders, and the locational and structural potentials in the system of urban market places of Kaduna city is accepted.

The predictive ability of the equation is demonstrated by the plot of the predicted against the observed growth rate of the number of non-food-traders in Kaduna city retail market place hierarchy, shown in Figure A.7.3.4 page A135. The table of predicted and observed values is given in Table A.7.3.4, page A136. The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. The maximum, minimum and mean percentage accuracy of prediction are 114.32% 88.10% and 101.21% respectively, i.e. a range of ± 13.11%.

The plot of the predicted against the observed growth rate of the number of non-food traders, Figure A.7.3.4, page A135, showed very high values of the CMP far removed from the other market places in Kaduna city. The majority of the other market places are bunched together in order to permit the CMP to appear on the same plot. A very big gap existed between the CMP and the other market places. A small gap is observed between 3 of the DMPs and the remaining 9 (5 L/NMPs, 2 SMPs and 1 DMP). Since there is a strong multiple quadratic causal relationship between the growth rate of the number of non-food traders, and the locational and structural potentials in the Kaduna city market place hierarchy, the observed unbalanced distribution of growth rate of number of non-food traders, must be accounted for by disproportionate magnitude of the locational and structural potentials possessed by these market places in Kaduna city.

APPENDIX A.7.3.5

Causal Relationship Between the Growth Rate of Stallage Food Floor-space and the Locational and Structural Potentials in the Market Place; (2.3a)

With reference to the computer output shown in the Appendix A.7.3.5, page A139 , the predictive equation for the growth rate of the stallage food floor-space in a market place was given as:

$$\delta Z_a = 0.0113X_2^3 - 0.1445X_3^3 + 0.0882Y_6^3 - 0.0079Y_7^3$$

$$+ 0.0373Y_8^3 + 0.00 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.3a)$$

The summary statistics for the predictive equation and the significance of F for the independent variable in the equation are entered in Table 7.36, page 394. Further information about the equation may be obtained by reading Appendix A.7.3.5, page A139 , in conjunction with sections 7.3.1 (1-14) and 7.3.3, pages 369 - 379 and 386 - 395, respectively.

From an examination of the statistics in Table 7.36, column 2.3a , R > Adjusted R^2 > 0.5, Signif F < 0.05 and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth of the stallage food floor-space, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong

Variable(s) Removed on Step Number 9.. $\overset{3}{X6}$ IMMEDIATE SUROUNDING WHOLESALE SHOPS/WAREHOUSES

Multiple R	.99724		
R Square	.99448	R Square Change	-0.00051
Adjusted R Square	.98988	F Change	.50913
Standard Error	.10058	Signif F Change	.5074

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	10.93931	2.18786
Residual	6	.06069	.01012

F = 216.28592 Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance Above: Correlation

**3	$\overset{3}{Y8}$	$\overset{3}{Y7}$	$\overset{3}{X2}$	$\overset{3}{Y6}$	$\overset{3}{X3}$
Y8	2.123E-05	.37501	-0.14924	-0.20310	-0.58035
Y7	5.778E-06	1.118E-05	.48193	-0.64199	-0.02017
X2	-2.236E-06	5.239E-06	1.057E-05	-0.35242	-0.15057
Y6	-7.166E-06	-1.644E-05	-8.773E-06	5.863E-05	-0.44850
X3	-3.389E-05	-8.547E-07	-6.203E-06	-4.352E-05	1.606E-04

Equation Number 1 Dependent Variable.. RCHZA GROWTH RATE OF THE STALLAGE FOOD FLOOR-SPACE

-- Variables in the Equation --

Variable **3	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.037285	.004608	.026010	.048560	.879925	.888798	.245378	.957107	65.475	.0002
Y7	-0.007977	.003344	-0.016160	2.04612E-04	-0.116471	-.251470	-.072346	-.697719	5.692	.0543
X2	.011318	.003251	.003363	.019272	.280680	.865845	.105576	.817856	12.121	.0131
Y6	.088178	.007657	.069441	.106914	1.155128	.898501	.349214	.978117	132.612	.0000
X3	-0.144470	.012672	-0.175478	-0.113462	-1.358021	.808376	-.345717	-.977687	129.970	.0000
(Constant)	-2.46924E-17	.029034	-0.071043	.071043					.000	1.0000

------------- Variables not in the Equation -------------

Variable **3	Beta In	Partial	Min Toler	F	Sig F
X4	.024359	.205704	.063288	.221	.6581
X5	-0.423295	-.390422	.004694	.899	.3865
X6	.049432	.303999	.031262	.509	.5074
Y1	-0.058942	-.026355	.001095	.003	.9553
Y2	-0.781046	-.402639	.001466	.967	.3705
Y3	-0.060767	-.045789	.003133	.011	.9223
Y4	.344970	.502452	.007498	1.689	.2505
Y5	.583974	.454202	.002635	1.300	.3059

End Block Number 2 POUT = .100 Limits reached.

0 Outliers found. No casewise plot produced.

Notes: **3 - EXPONENTIAL

APPENDIX (Output) A. 7.3.5:

Regression Equation for Prediction of the Growth Rate of the Stallage Food Floor-Space; (dZ_a - X & Y).

multiple cubic relationship between the growth rate of the stallage food floor-space, and the locational and structural potentials in the system of urban market places in Kaduna city is accepted.

The predictive ability of the equation is demonstrated by the plot of the predicted values against the observed growth rate of stallage food floor-spaces in Kaduna city market places, shown in Figure A.7.3.5, page A141. A table of the predicted and observed values is shown in Table A.7.3.5, page A142.

The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. Again, Tudun Wada market place* has shown itself as an abnormal case. Having allowed for Tudun Wada market place abnormality, the percentage accuracy of prediction of the equation ranges from 77.17% to 121.65% with a mean of 99.41%; (± 22.24%).

The plot (Figure A.7.3.5, page A141) of the predicted against the observed growth rate of stallage food floor-space showed the atypically high values of the CMP far removed from the others. The majority of the other city market places are bunched together in order to permit the CMP to appear on the same plot. A big gap existed between the CMP and the other market places. A small gap is noticed between the subgroup of the 4 district market places, DMPs, and the subgroup of the 5 local market places, L/NMPs; the two special market places, SMPs, found their places somewhere between the DMP and the L/NMP. Since there is strong multiple cubic effect-causal relationship between the growth rate of stallage food floor-space and the locational and structural potentials in Kaduna city market places, the observed unbalanced distribution of the growth rate of the stallage food floor spaces among the market places, seem strongly dependent on disproportionate locational and structural potentials possessed by the Kaduna city market places.

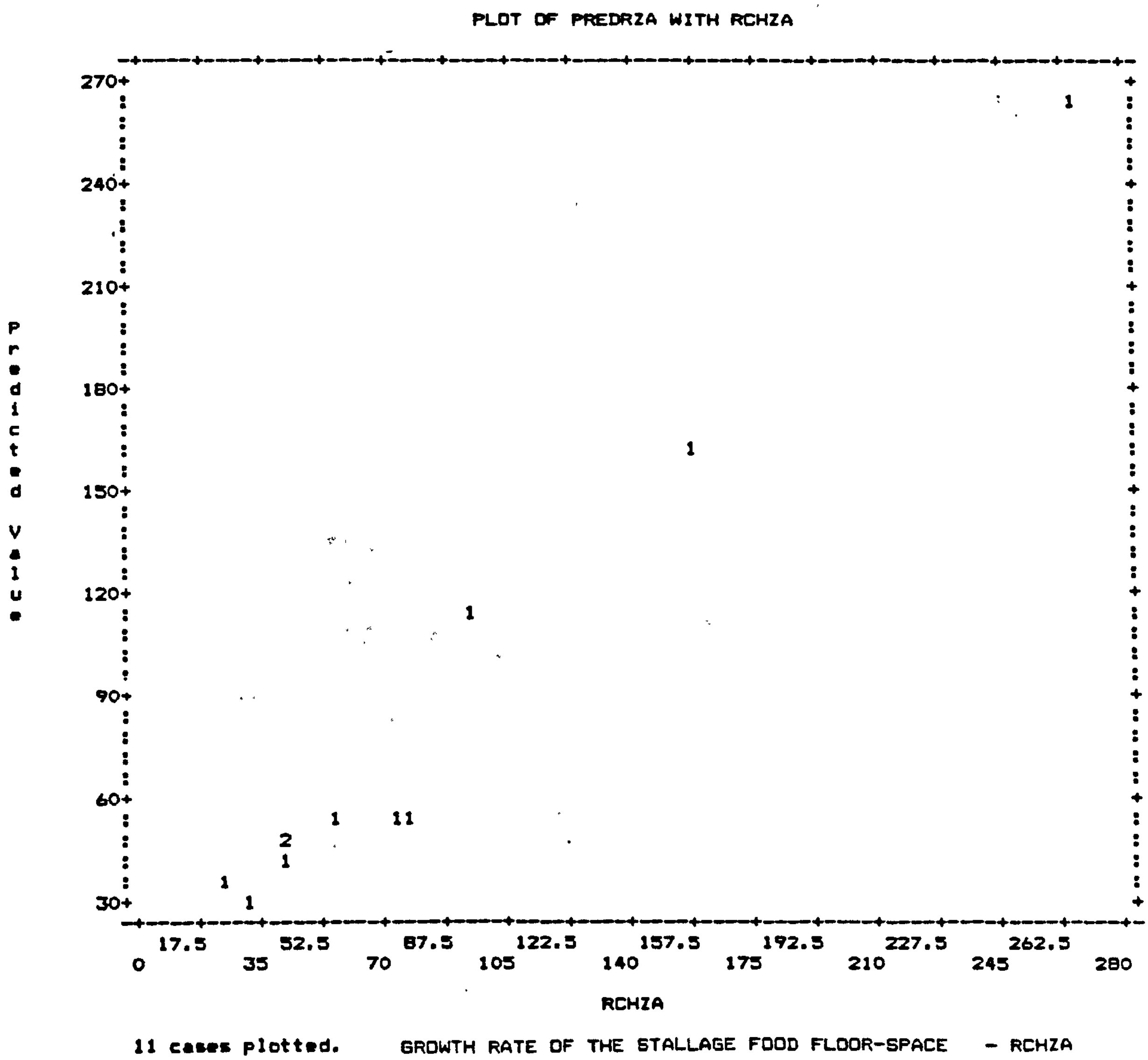


Fig. A.7.3.5: Plot of Observed and Predicted Growth Rates of the Stallage Food Floor-Space.

TABLE A.7.3.5: Observed and Predicted Trend Growth Rate of Stallage Food Floor-Space

Name of Market Place	The Stallage food floor-space in 1977	The Stallage food floor-space in 1984	Observed growth rate of the stallage floor-space	Predicted growth rate of the stallage food floor-space	Percentage accuracy of the prediction
CMP	5162	18975.50	267.60	262.93281	98.26
RSMP	2550	3610.00	41.57	47.09530	113.30
PMP	.	1065.00	.	46.15667	.
M-KGMP	4634	6510.00	40.48	44.33837	109.52
TWMP	2602	5049.00	94.04	111.67112	118.74
K-TMP	3459	8961.00	159.06	161.41248	101.48
URMP	1008	1570.00	55.75	51.73302	92.79
BMP	1044	1478.00	41.57	50.82511	122.26
UTMP	1338	1643.00	22.80	35.60310	156.19
BDMP	407	721.00	77.15	52.39555	67.91
USMP	1643	2140.00	30.25	32.48675	107.40
KGMP	549	944.00	71.95	51.73302	71.90

APPENDIX A.7.3.6

Causal Relationship Between the Growth Rate of Stallage Non-Food Floor-Space and the Locational and Structural Potentials in the Market Place; (2.3b)

With reference to the computer output shown in Appendix A.7.3.6, page A 144, the predictive equation for the growth rate of the stallage non-food floor-space in a market place was given as:

$$dZ_b = 0.1928X_3^3 + 0.0072X_4^3 + 0.0129X_6^3 + 0.0098Y_6^3$$

$$+ 0.0036Y_7^3 - 0.0663Y_8^3 + 0.00 \quad \ldots\ldots\ldots \quad (2.3b)$$

The summary statistics for the predictive equation and the significance of F for the independent variables in the equation are entered in Table 7.36, page 394. Further information about the equation may be obtained by reading Appendix A.7.3.6, page A 144, in conjunction with sections 7.3.1 (1-14) and 7.3.3, pages 369 - 379, and 386 - 395, respectively.

From an examination of the statistics in Table 7.36, column 2.3b, R > Adjusted $R^2 > 0.05$, Signif $F < 0.05$ and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth of the stallage non-food floor-space, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong multiple cubic relationship between the growth rate of the stallage non-food floor space, and the locational and structural potentials in the system of urban market places of Kaduna city is accepted.

* * * * M U L T I P L E   R E G R E S S I O N * * * *

Equation Number 1   Dependent Variable..   RCHZB   GROWTH RATE OF THE STALLAGE N-FOOD FLOOR-SPACE

Beginning Block Number 2. Method: Backward

Variable(s) Removed on Step Number 8.. X_2^3 ROAD TRANSPORT LINKAGES

Multiple R	.99959			Analysis of Variance	DF	Sum of Squares	Mean Square
R Square	.99918	R Square Change	-0.00016				
Adjusted R Square	.99819	F Change	1.00499	Regression	6	10.99097	1.83183
Standard Error	.04250	Signif F Change	.3728	Residual	5	.00903	.00181

F = 1013.96143   Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance   Above: Correlation

**3	Y_8^3	Y_7^3	X_6^3	X_4^3	Y_6^3	X_3^3
Y_8	6.361E-06	.45524	.62617	.19344	-0.40537	-0.77279
Y_7	1.829E-06	2.538E-06	.08036	.62760	-0.58888	-0.08512
X_6	1.614E-06	1.308E-07	1.045E-06	.05640	-0.27272	-0.62411
X_4	5.085E-07	1.042E-06	6.009E-08	1.086E-06	-0.25546	-0.14928
Y_6	-3.324E-06	-3.050E-06	-9.061E-07	-8.656E-07	1.057E-05	-0.19267
X_3	-1.335E-05	-9.289E-07	-4.369E-06	-1.066E-06	-4.290E-06	4.692E-05

------------------------------------ Variables in the Equation ------------------------------------

Variable **3	B	SE B	95% Confdnce	Intrvl B	Beta	Correl	Part Cor	Partial	F	Sig F
Y_8	-0.066262	.002522	-0.072745	-0.059779	-1.563786	.454254	-.336690	-.996398	690.223	.0000
Y_7	.003618	.001593	-4.76923E-04	.007713	.052826	.151741	.029106	.712593	5.158	.0723
X_6	.012938	.001022	.010311	.015566	.298879	.903418	.162233	.984756	160.253	.0001
X_4	.007152	.001042	.004472	.009831	.140176	.342641	.087931	.950784	47.078	.0010
Y_6	.009756	.003251	.001399	.018112	.127802	.704244	.038460	.801883	9.006	.0301
X_3	.192801	.006850	.175193	.210408	1.812327	.713708	.360722	.996859	792.275	.0000
(Constant)	1.27580E-17	.012270	-0.031540	.031540					.000	1.0000

------------ Variables not in the Equation ------------

Variable **3	Beta In	Partial	Min Toler	F	Sig F
X_2	-0.040853	-.448105	.030244	1.005	.3728
X_5	-0.015981	-.076795	.018964	.024	.8850
Y_1	.160056	.151324	7.340E-04	.094	.7747
Y_2	-0.063607	-.036193	2.659E-04	.005	.9457
Y_3	.625316	.226340	1.076E-04	.216	.6663
Y_4	.017431	.056624	.005494	.013	.9152
Y_5	-0.076401	-.354137	.014131	.574	.4910

End Block Number 2 POUT = .100 Limits reached.

0 Outliers found. No casewise plot produced.

Notes: **3 - EXPONENTIAL

APPENDIX (Output) A.7.3.6:

Regression Equation for Prediction of the Growth Rate of the Stallage Non-Food Floor-Space; (dZ_b - X & Y).

The predictive ability of the equation is demonstrated by the plot of the predicted against the observed growth rate of stallage non-food floor-space in Kaduna city retail market place hierarchy; shown in Figure A.7.3.6, page A146. The table of predicted and observed values is given in Table A.7.3.6, page A147. The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. The maximum, minimum and mean percentage accuracy of prediction are 109.93%, 90.77% and 100.35% respectively; i.e. ± 9.58% range.

The plot of the predicted against the observed growth rates of stallage non-food floor-space showed very high values of the CMP far aloof from the other market places in Kaduna city. The Panteka Market Place has far too high values because of its peculiarity in timber, second hand auto spare parts and workshops. The majority of the other market places are bunched together in order to permit the CMP and the Panteka to appear on the same plot. A big gap existed between the CMP and the other market places. A small gap is observed between the subgroup of 4 and another subgroup of 6. The difference in the gaps represents unbalanced distribution of stallage non-food floor-spaces among the market place hierarchy. Since there exist strong multiple cubic-causal relationship between stallage non-food floor space, and the locational and structural potentials in Kaduna retail market places, the observed unbalanced distribution of stallage non-food floor-space among the Kaduna retail market places strongly suggests disproportionate locational and structural potentials possessed by these market places.

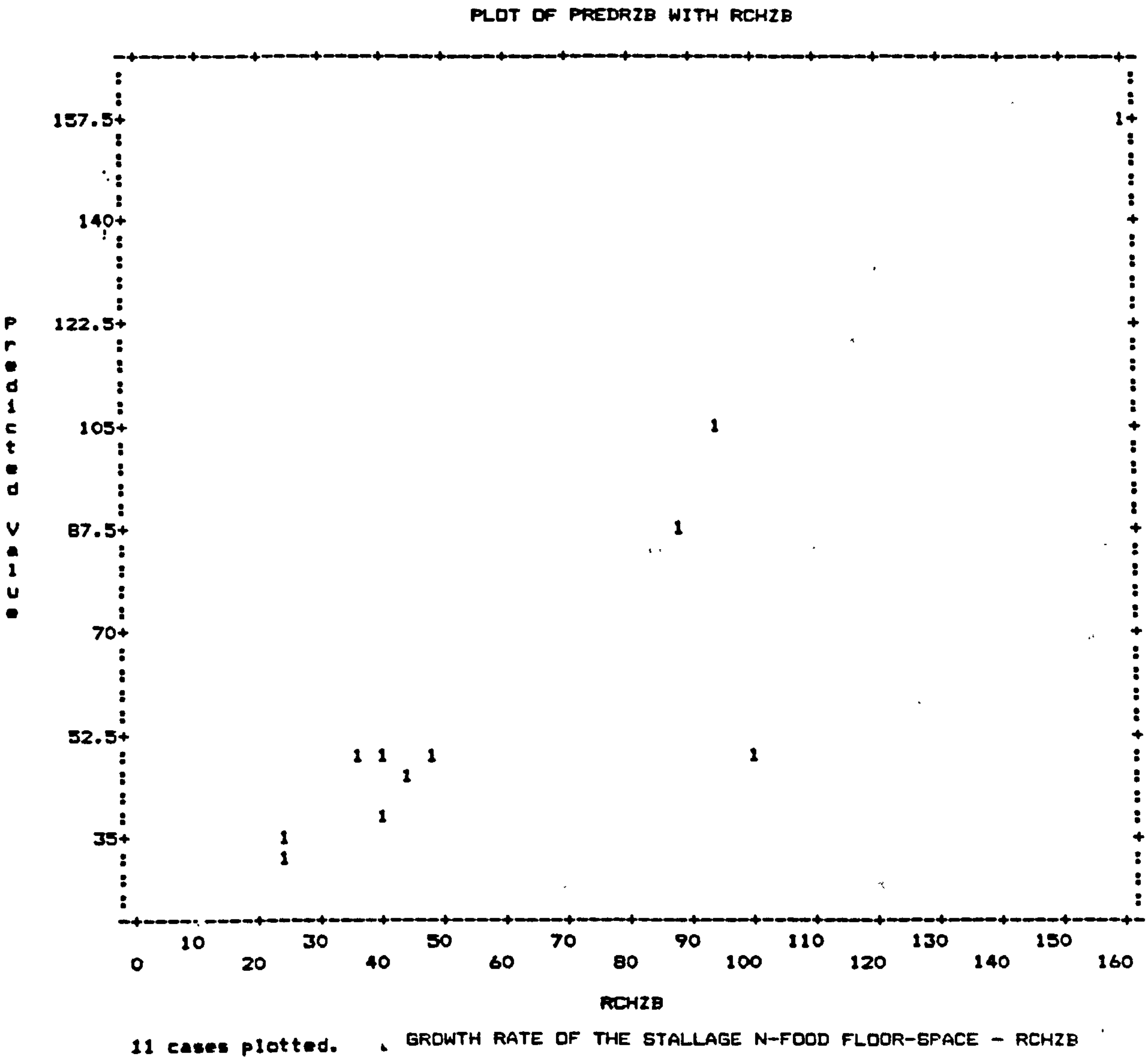


Fig. A.7.3.6: Plot of Observed and Predicted Growth Rates of Stallage Non-Food Floor-Space.

TABLE A.7.3.6: Observed and Predicted Trend Growth Rate of the Stallage Non-Food Floor-Space

Name of Market Place	The Stallage non-food floor-space in 1977	The Stallage non-food floor-space in 1984	Observed growth rate of the stallage non-food floor-space	Predicted Trend growth rate of the stallage non-food floor-space	Percentage accuracy of the prediction
CMP	17046	32119.50	88.43	88.31058	99.87
RSMP	4855	6975.00	43.67	45.14700	103.39
PMP	.	49897.00	.	51.80739	.
M-KGMP	5334	7497.00	40.55	38.73559	95.52
TWMP	5874	11368.00	93.53	105.46188	112.76
K-TMP	1766	4580.00	159.34	156.13095	97.98
URMP	888	1247.00	40.43	49.41007	122.22
BMP	915	1243.00	35.85	48.56751	135.49
UTMP	354	438.00	23.73	33.73493	142.17
BDMP	244	487.00	99.59	50.07672	50.28
USMP	635	785.00	23.62	30.83096	130.52
KGMP	1004	1477.00	47.11	49.44112	104.94

APPENDIX A.7.3.7

Causal Relationship Between the Growth Rate of the Number of Food Stalls and the Locational and Structural Potentials in the Market Place; (2.4a)

With reference to the computer output shown in Appendix A.7.3.7, page A149, the predictive equation for the growth rate of the number of food stalls in a market place was given as:

$$dR_a = 0.0197X_2^2 - 0.1279X_3^2 - 0.0324X_5^2 + 0.0915Y_6^2$$

$$- 0.017\ Y_7^2 + 0.0484Y_8^2 + 0.00 \quad \ldots\ldots \quad (2.4a)$$

The summary statistics for the predictive equation and the significance of F for the independent variables in the equation are entered in Table 7.36, page 394. Further information about the equation may be obtained by reading Appendix A.7.3.7, page A149, in conjunction with sections 7.3.1 (1-14) and 7.3.3, pages 369 - 379 and 386 - 395, respectively.

From an examination of the statistics in Table 7.36, column 2.4a, R $>$ Adjusted $R^2 > 0.5$, Signif $F < 0.05$ and Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth of the number of food stalls, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong multiple quadratic relationship between the growth rate of the number of food stalls, and the locational and structural potentials in the system of urban market places in Kaduna city is accepted.

* *

Variable(s) Removed on Step Number 12.. $Y4^{2}$ SECURITY OF LIFE AND PROPERTY

Multiple R	.99491		
R Square	.98985	R Square Change	-0.00315
Adjusted R Square	.97766	F Change	1.80230
Standard Error	.14947	Signif F Change	.2506

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	6	10.88830	1.81472
Residual	5	.11170	.02234

F = 81.23184 Signif F = .0001

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. RCHRA ZSCORE: GROWTH RATE OF THE NUMBER OF FOOD STALLS

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance Above: Correlation

**2	$Y8^{2}$	$Y7^{2}$	$X2^{2}$	$Y6^{2}$	$X3^{2}$	$X5^{2}$
Y8	5.663E-05	.01220	.54238	-0.22847	-0.11735	-0.74868
Y7	4.935E-07	2.889E-05	.04651	-0.64882	-0.01431	.31903
X2	2.843E-05	1.742E-06	4.854E-05	-0.20075	-0.01254	-0.78945
Y6	-1.724E-05	-3.498E-05	-1.403E-05	1.006E-04	-0.44179	-0.01114
X3	-1.216E-05	-1.059E-06	-1.204E-06	-6.103E-05	1.897E-04	-0.16398
X5	-7.154E-05	2.178E-05	-6.984E-05	-1.419E-06	-2.868E-05	1.612E-04

------------------------------------ Variables in the Equation ------------------------------------

Variable **2	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.048419	.007525	.029076	.067763	1.142697	.840607	.289971	.944588	41.402	.0013
Y7	-0.017002	.005375	-0.030820	-0.003184	-0.248229	-.191008	-.142540	-.816555	10.004	.0250
X2	.019758	.006967	.001849	.037666	.489990	.743918	.127803	.785264	8.043	.0364
Y6	.091452	.010029	.065671	.117233	1.198023	.830295	.410928	.971224	83.146	.0003
X3	-0.127888	.013774	-0.163295	-0.092481	-1.202148	.661568	-.418420	-.972203	86.206	.0002
X5	-0.032402	.012698	-0.065043	2.38484E-04	-0.748497	.777627	-.114997	-.752098	6.511	.0512
(Constant)	3.95555E-17	.043147	-0.110911	.110911					.000	1.0000

------------ Variables not in the Equation ------------

Variable **2	Beta In	Partial	Min Toler	F	Sig F
X4	.056232	.316269	.021306	.445	.5414
X6	-0.082835	-.427963	.023057	.897	.3972
Y1	.672600	.559218	.005611	1.820	.2486
Y2	.505832	.477342	.009043	1.180	.3384
Y3	.424503	.628415	.022253	2.611	.1815
Y4	.257069	.557332	.022924	1.802	.2506
Y5	.869271	.891885	.009889	15.556	.0169

End Block Number 2 POUT = .100 Limits reached.

0 Outliers found. No casewise plot produced.

Notes: **2 - EXPONENTIAL

APPENDIX (Output) A.7.3.7:

Regression Equation for Prediction of the Growth Rate of the Number of Food Stalls; (dR_a - X & Y).

The capacity of the equation to predict accurately, is demonstrated by the plot of the predicted against the observed number of food-stalls in Kaduna city retail market place hierarchy; shown in Figure A.7.3.7, page A151. The table of predicted and observed values is given in Table A.7.3.7, page A152. The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. The maximum, minimum and mean percentage accuracy of prediction are 136.98%, 79.80% and 108.39%, respectively; i.e. ± 28.59% range.

The plot of the predicted against the observed growth rate of the number of food-stalls, Figure A.7.3.7, page A151, showed very high values of the CMP far removed from the other market places in Kaduna city. Makera and Kawo district market places come midway of the scatterplot. This is accounted for by the periodic markets associated with them. These weekly periodic markets, mainly devoted to the marketing of food stuffs, may not be very strong outside the seasons of locally produced food stuffs. The Railway Station market place and Tudun Wada came as the third batch. The other market places are bunched together in order to permit the CMP to appear on the same plot.

When account is taken of the fact that the periodic markets provide shopping opportunities once in a week, it would be realised that there is a very big gap between the CMP and other market places and a small gap between the DMP subgroup and the L/NMP subgroup. The differences in the groups represent the unbalanced distribution of food-stalls among the

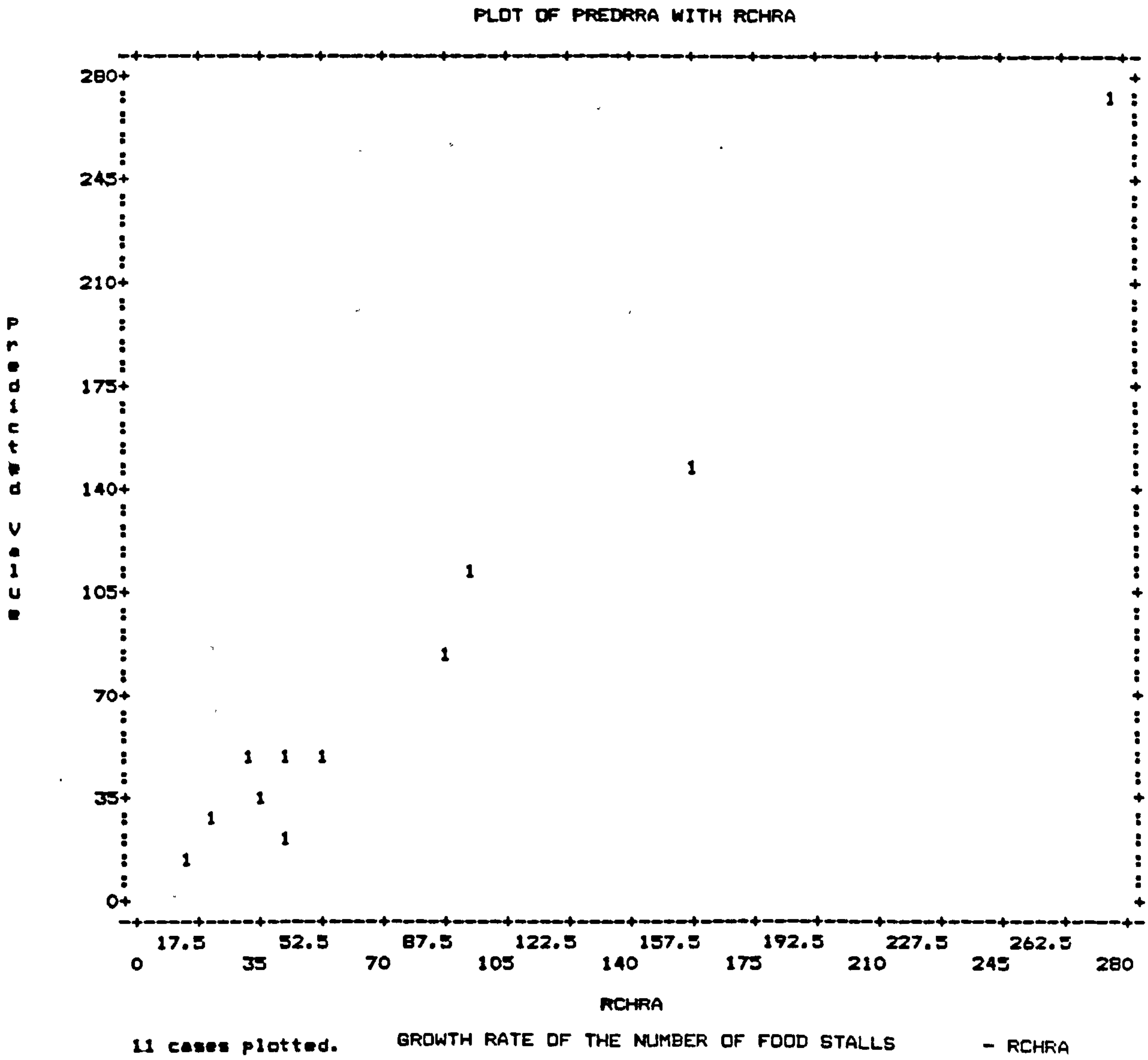


Fig. A.7.3.7: Plot of Observed and Predicted Growth Rates of the Number of Food Stalls.

TABLE A.7.3.7: Observed and Predicted Trend Growth Rate of the Number of Food Stalls

Name of Market Place	The number of food stalls in 1977	The number of food stalls in 1984	Observed growth rate of the number of food stalls	Predicted Trend growth rate of the shoppers non-food stalls	Percentage accuracy of the prediction
CMP	977	3691.00	277.79	276.41880	99.51
RSMP	499	706.00	41.48	19.16561	46.20
PMP	.	.00	.	36.61381	.
M-KGMP	1058	1487.00	40.55	47.97022	118.30
TWMP	438	849.50	93.95	109.05134	116.07
K-TMP	940	2432.00	158.72	147.13162	92.70
URMP	172	262.00	52.33	51.96763	99.32
BMP	189	246.50	30.42	46.05534	151.38
UTMP	299	339.00	13.38	10.74478	80.32
BDMP	88	120.00	36.36	31.95879	87.89
USMP	191	357.00	86.91	83.95015	96.59
KGMP	128	157.00	22.66	30.13688	133.02

Kaduna retail market place hierarchy. The strong multiple quadratic relationship between the growth rate of the number of foodstalls, and the locational and structural potentials suggests strongly that the observed unbalanced distribution of growth rate of food-stalls among the Kaduna retail market place system must be dependent on disproportionate locational and structural potentials possessed by these market places in Kaduna city.

APPENDIX A.7.3.8

Causal Relationship Between the Growth Rate of the Number of Non-Food Stalls and the Locational and Structural Potentials in a Market Place; (2.4b)

With reference to the computer output shown in Appendix A.7.3.8, page A154 , the predictive equation for the growth rate of the number of non-food stalls in a market was given as:

$$dR_b = -0.0522X_3^2 - 0.0117X_4^2 + 0.0381X_5^2 + 0.0311Y_6^2 + 0.0148Y_8^2 + 0.00 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2.4b)$$

The summary statistics for the predictive equation and the significance of F for the independent variables in the equation are entered in Table 7.36, page 394. Further information about the equation may be obtained by reading Appendix A.7.3.8, page A 154 , in conjunction with section 7.3.1 (1-14) and 7.3.3, pages 369 - 379 and 386 - 395, respectively.

From an examination of the statistics in Table 7.36, column 2.4b , R > Adjusted R^2 > 0.5, Signif F < 0.05 and

*** * * * M U L T I P L E   R E G R E S S I O N * * * ***

Equation Number 1   Dependent Variable..   RCHRB - GROWTH RATE OF THE NUMBER OF NON- FOOD STALLS

Variable(s) Removed on Step Number 13.. $X2^{2}$ ROAD TRANSPORT LINKAGES

Multiple R	.99780		
R Square	.99561	R Square Change	-0.00127
Adjusted R Square	.99195	F Change	2.03603
Standard Error	.08975	Signif F Change	.2130

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	10.95167	2.19033
Residual	6	.04833	.00805

F = 271.92913   Signif F = .0000

Var-Covar Matrix of Regression Coefficients (B)
Below Diagonal: Covariance   Above: Correlation

**2	$Y8^{2}$	$X4^{2}$	$Y6^{2}$	$X3^{2}$	$X5^{2}$
Y8	1.522E-05	.23077	-0.16950	-0.15214	-0.75845
X4	1.731E-06	3.699E-06	.12472	-0.10656	-0.44187
Y6	-2.976E-06	1.080E-06	2.026E-05	-0.61621	.08502
X3	-4.936E-06	-1.704E-06	-2.307E-05	6.917E-05	-0.25447
X5	-1.257E-05	-3.611E-06	1.626E-06	-8.993E-06	1.806E-05

------------------------------------ Variables in the Equation ------------------------------------

Variable **2	B	SE B	95% Confdnce Intrvl B		Beta	Correl	Part Cor	Partial	F	Sig F
Y8	.014843	.003901	.005297	.024388	.350283	.948058	.102959	.840822	14.477	.0089
X4	-0.011698	.001923	-0.016404	-0.006992	-0.229274	.449842	-.164590	-.927604	36.995	.0009
Y6	.031135	.004501	.020122	.042148	.407866	.843427	.187191	.942648	47.853	.0005
X3	-0.052215	.008317	-0.072566	-0.031865	-0.490824	.827160	-.169893	-.931607	39.418	.0008
X5	.038074	.004249	.027677	.048471	.879511	.942159	.242466	.964605	80.286	.0001
(Constant)	-5.67608E-18	.025908	-0.063395	.063395					.000	1.0000

------------ Variables not in the Equation ------------

Variable **2	Beta In	Partial	Min Toler	F	Sig F
X2	.140669	.537934	.021396	2.036	.2130
X6	.016436	.139365	.063200	.099	.7657
Y1	-0.417403	-.444906	.003707	1.234	.3172
Y2	-0.138601	-.212028	.010282	.235	.6481
Y3	-0.132396	-.258795	.016787	.359	.5752
Y4	.008698	.037458	.042360	.007	.9365
Y5	.029430	.099552	.046091	.050	.8318
Y7	-0.009740	-.070379	.062072	.025	.8808

APPENDIX (Output) A.7.3.8:

Regression Equation for Prediction of the Growth Rate of the Number of Non-Food Stalls; (∂R_b - X & Y).

Notes: **2 - EXPONENTIAL

Signif t (for each of the independent variables in the equation) < 0.05. Therefore the null proposition that there is no causal relationship between the growth of the number of non-food stalls, and the locational and structural potentials in Kaduna city market places is rejected; and the alternative that there is strong multiple quadratic relationship between the growth rate of the number of non-food stalls, and the locational and structural potentials in the system of urban market places in Kaduna city is accepted.

The ability of the equation to predict accurately, is demonstrated by the plot of the predicted against the observed number of non-food-stalls in Kaduna city market place hierarchy; shown in Figure A.7.3.8, page A156. The table of predicted and observed values is given in Table A.7.3.8, page A156. The percentage accuracy of the prediction is shown in the last column of the same table, for each market place. The maximum, minimum and mean percentage accuracy of prediction are 126.67%, 73.04% and 99.85%, respectively; (± 26.81% range).

The plot of the predicted against the observed growth rate of the number of non-food-stalls, Figure A.7.3.8, page A 156 showed very high values of the CMP far aloof from the other market places in Kaduna. The majority of the other market places in Kaduna city market place hierarchy are bunched together in order to permit the CMP to appear on the same plot. A big gap existed between the CMP and the other market places. A small gap is observed between the subgroup of 3 DMP and the remaining 8, (6 L/NMPs and 2 SMPs). The

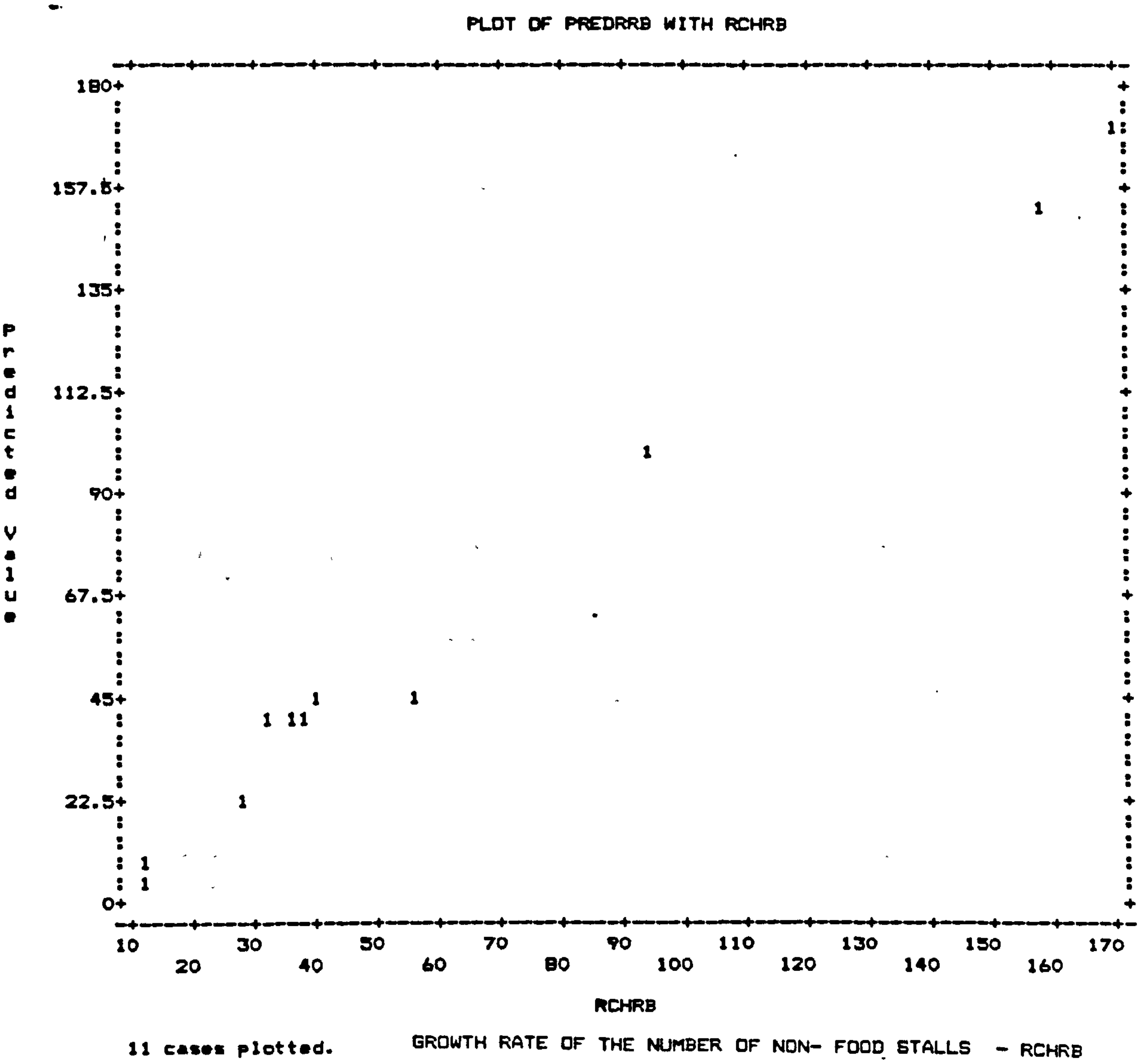


Fig. A.7.3.8: Plot of Observed and Predicted Rates of Growth of the Number of Non-Food Stalls.

TABLE A.7.3.8: Observed and Predicted Trend Growth Rate of the Number of Non-Food Stalls

Name of Market Place	The Number of non-food stalls in 1977	The Number of non-food stalls in 1984	Observed growth rate of the number of food stalls	Predicted Trend Growth Rate of the number of non-food-stalls	Percentage accuracy of the prediction
CMP	1894	5122.00	170.43	168.75992	99.02
RSMP	111	143.00	28.83	22.72616	78.83
PMP	.	.00	.	68.69978	.
M-KGMP	1102	1549.00	40.56	45.21703	111.47
TWMP	979	1894.50	93.51	100.37738	107.34
K-TMP	434	1124.00	158.99	154.22319	97.00
URMP	158	208.00	31.65	42.02422	132.80
BMP	153	207.50	35.62	39.73024	111.54
UTMP	69	77.00	11.59	10.75987	92.80
BDMP	52	81.00	55.77	44.97362	80.64
USMP	116	131.00	12.93	6.49962	50.26
KGMP	179	246.00	37.43	42.02422	112.27

differences in the gaps represent the unbalanced distribution of growth of non-food-stalls among the Kaduna city market places. Since there exist strong multiple quadratic effect-causal relationship between the rate of the number of non-food-stalls, and the locational and structural potentials in Kaduna retail market place hierarchy, the observed unbalanced distribution of growth rates of the number of non-food-stalls among the Kaduna market places, strongly depend on disproportionate magnitude of the locational and structural potentials, possessed by those retail market places.

APPENDIX 9.2.1.1 : Alternative Strategy SG1 Incidence Scores

Locational (X) and Structural (Y) Potentials and Interval Levels	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
5 X_1			-2AC	4AC											
9 X_2		-2AB		4AB 4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA
4/1000p X_3															
7 X_4															
5 X_5															
4 X_6				4AB											
10 Y_1	-2GC	-2GC													
6 Y_2															
1/1000m² Y_3	-2HA	-2HA													
5 Y_4					2HC	2HC	2HC	2HC	2HC	2HC	2HC	2HC	2HC	2HC	2HC
6 Y_5	-2GB	-2GB		2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA	2GB 4HA
10 Y_6	-2HA	-2HA		2HA	2HA	2HA	2HA	2HA	2HA	2HA	2HA	2HA	2HA	2HA	2HA
10 Y_7				4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD
* Y_8	-2AA	-2AA		2AA 4AC	4AA	4AA	4AA	4AA	4AA	4AA	4AA	4AA	4AA	4AA	4AA

APPENDIX 9.2.1.2 Alternative Strategy SG1 Crude Proposal Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Places														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			-10	20											
X_2		-18		36	36	36	36	36	36	36	36	36	36	36	36
X_3															
X_4															
X_5															
X_6				16											
Y_1	-20	-20													
Y_2															
Y_3	-2	-2													
Y_4					10	10	10	10	10	10	10	10	10	10	10
Y_5	-12	-12		36	36	36	36	36	36	36	36	36	36	36	36
Y_6	-20	-20		20	20	20	20	20	20	20	20	20	20	20	20
Y_7				40	40	40	40	40	40	40	40	40	40	40	40
Y_8	-2	-2		143	7	18	9	20	15	11	30	19	5	4	3

APPENDIX 9.2.1.3 : Alternative Strategy SG1 Crude Prescription Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			10	24	5	3	2	4	2	4	2	2	4	1	1
X_2		18		132	73	67	58	53	71	65	64	53	70	59	53
X_3				350	89	101	77	50	174	242	90	48	91	49	64
X_4				14	15	4	7	0	2	8	4	0	0	4	0
X_5				26	12	10	0	0	15	6	0	0	0	0	0
X_6				31	6	14	4	6	0	17	6	0	7	3	3
Y_1	-20	-20		40	20	20	20	20	20	20	20	20	20	20	20
Y_2				560	0	0	0	0	222	98	36	0	0	36	36
Y_3	-2	-2		176	61	0	0	0	58	0	49	0	0	0	0
Y_4				90	35	45	35	25	45	40	50	25	30	55	45
Y_5	-12	-12		146	71	91	81	71	101	71	96	76	71	96	71
Y_6	-20	-20		100	50	70	50	40	70	80	80	50	40	50	50
Y_7				51	49	54	52	52	54	56	56	54	52	56	54
Y_8	-20	-20		511	23	148	34	29	115	32	121	29	21	29	22

APPENDIX 9.2.1.4: Transformed, Standardized and Weigted Locational Potential Scores Prescribed by the Alternative SG1

Name of Market Place	Railway Transport Linkages	Road Transport Linkages	Immediate Surrounding Resident-ial Population	Immediate Surrounding Places of Work	Immediate Surrounding Other Shopping Centres	Immediate Surrounding Wholesale Shops and Warehouses
	X_1^2	X_2^2	X_3^2	X_4^2	X_5^2	X_6^2
CMP	.00	76.74	26.54	36.77	68.01	69.39
RSMP	.00	1.64	-3.70	44.01	5.37	-8.45
PMP	.00	-5.21	9.67	3.79	-7.35	12.84
M-KOMP	.00	-3.57	-3.09	-8.20	.19	5.01
TWMP	.00	-0.15	2.20	-11.20	14.90	-11.48
K-TMP	.00	-6.01	-3.65	-8.20	-11.59	-8.45
URMP	.00	-9.83	-5.15	-8.20	-11.59	-10.72
BMP	.00	-10.56	-4.22	.04	-11.59	-10.13
UTMP	.00	-14.01	-5.13	-12.20	-11.59	-8.45
BDMP	.00	-14.01	-5.18	-12.20	-11.59	-11.48
USMP	.00	-1.02	-3.60	-12.20	-11.59	-7.36
KOMP	.00	-14.01	-4.70	-12.20	-11.59	-10.72
	X_1^3	X_2^3	X_3^3	X_4^3	X_5^3	X_6^3
CMP	.00	77.96	28.22	35.99	71.77	72.19
RSMP	.00	-1.41	-3.66	46.58	-1.21	-8.14
PMP	.00	-6.16	6.52	-1.44	-8.18	4.62
M-KOMP	.00	-5.07	-3.42	-8.95	-4.57	-1.27
TWMP	.00	-2.70	-0.21	-9.89	6.37	-8.73
K-TMP	.00	-6.68	-3.65	-8.95	-9.17	-8.14
URMP	.00	-9.03	-4.11	-8.95	-9.17	-8.65
BMP	.00	-9.46	-3.85	-4.27	-9.17	-8.55
UTMP	.00	-11.38	-4.10	-10.03	-9.17	-8.14
BDMP	.00	-11.38	-4.11	-10.03	-9.17	-8.73
USMP	.00	-3.32	-3.63	-10.03	-9.17	-7.80
KOMP	.00	-11.38	-4.00	-10.03	-9.17	-8.65

APPENDIX 9.2.1.5 : Transformed, Standardized and Weighted Structural Potential Scores Prescribed by the Alternative SG1

Name of Market Place	Building Design Factors	Facilities and Amenities	Parking and Stationing for Vehicles	Security of Life and Property	Environmental Design Qualities	Zoning of Market Place by Commodity	Freshness of Food Commodity	Food and Non-Food Capacity
	Y_1^2	Y_2^2	Y_3^2	Y_4^2	Y_5^2	Y_6^2	Y_7^2	Y_8^2
CMP	31.75	7.21	18.80	35.13	53.26	30.61	-15.62	74.57
RSMP	-2.89	-0.80	.24	-5.52	-11.74	-7.81	-28.22	-8.23
PMP	-2.89	-0.56	-2.30	-3.30	-11.74	12.17	18.10	-8.07
M-KOMP	-2.89	-0.80	-2.30	-0.79	1.20	4.48	4.23	-1.44
TWMP	-2.89	.46	-0.01	-0.79	8.87	4.48	4.23	-4.19
K-TMP	-2.89	-0.77	-0.66	2.02	4.93	12.17	18.10	-3.74
URMP	-2.89	-0.77	-2.30	5.12	4.93	-7.81	18.10	-8.13
BMP	-2.89	-0.80	-2.30	-5.52	-5.67	-7.81	-9.13	-8.03
UTMP	-2.89	-0.80	-2.30	-9.07	-11.74	-12.43	-9.13	-8.13
BDMP	-2.89	-0.80	-2.30	-9.07	-8.81	-7.81	4.23	-8.13
USMP	-2.89	-0.80	-2.30	-7.44	-11.74	-12.43	-9.13	-8.25
KOMP	-2.89	-0.77	-2.30	-0.79	-11.74	-7.81	4.23	-8.24
	Y_1^3	Y_2^3	Y_3^3	Y_4^3	Y_5^3	Y_6^3	Y_7^3	Y_6^3
CMP	31.75	7.29	19.03	36.74	55.60	33.59	-15.65	74.91
RSMP	-2.89	-0.71	-1.05	-5.01	-10.22	-7.72	-27.54	-7.18
PMP	-2.89	-0.67	-1.92	-3.72	-10.22	10.55	18.39	-7.17
M-KOMP	-2.89	-0.71	-1.92	-2.07	-0.76	2.57	4.01	-5.19
TWMP	-2.89	-0.21	-1.17	-2.07	5.85	2.57	4.01	-6.25
K-TMP	-2.89	-0.71	-1.47	-0.01	2.37	10.55	18.39	-6.10
URMP	-2.89	-0.71	-1.92	2.51	2.37	-7.72	18.39	-7.17
BMP	-2.89	-0.71	-1.92	-5.01	-6.07	-7.72	-9.35	-7.16
UTMP	-2.89	-0.71	-1.92	-6.66	-10.22	-10.61	-9.35	-7.17
BDMP	-2.89	-0.71	-1.92	-6.66	-8.28	-7.72	4.01	-7.17
USMP	-2.89	-0.71	-1.92	-5.97	-10.22	-10.61	-9.35	-7.18
KGMP	-2.89	-0.71	-1.92	-2.07	-10.22	-7.72	4.01	-7.18

APPENDIX 9.2.2.1 : Alternative Strategy SG2 Incidence Scores

Locational (X) and Structural (Y) Potentials, and Interval Levels	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
5 X_1			2BC	4BC	4BC	4BC		4BC		4BC			4BC		
9 X_2	2BC	2BC		4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA
4/1000p X_3															
7 X_4				4BA	4IB	5IA	4IC	4IC	5IA	4IB	5IA	4IC	4IC	5IA	4IC
5 X_5															
4 X_6															
10 Y_1	-2GC	-2GC		4BA	4IB	6IA	4IC	4IC	6IA	4IB	6IA	4IC	4IC	6IA	4IC
6 Y_2				4BC	4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC
$1/1000m^2$ Y_3	-2HA -2IA -2IB -2IC	-2HA -2IA -2IB -2IC		4BA 4BC	4IB	4IA	4IC	4IC	4IA	4IB	4IA	4IC	4IC	4IA	4IC
5 Y_4				4BA	2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IA	2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IC	2HC 4IC
6 Y_5	-2GB	-2GB		2GB 4HA 4BA	2GB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IC
10 Y_6	-2HA	-2HA		2HA 4BA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IC
10 Y_7				4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD
* Y_8				4BA 4BB	4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC

APPENDIX 9.2.2.2 : Alternative Strategy SG2 Crude Proposal Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			10	20	20	20		20		20			20		
X_2	18	18		36	36	36	36	36	36	36	36	36	36	36	36
X_3															
X_4				28	28	35	28	28	35	28	35	28	28	35	28
X_5															
X_6															
Y_1	-20	-20		40	40	60	40	40	60	40	60	40	40	60	40
Y_2				24	24	48	24	24	48	24	48	24	24	48	24
Y_3	-8	-8		8	4	4	4	4	4	4	4	4	4	4	4
Y_4				20	30	50	30	30	50	30	50	30	30	50	30
Y_5	-12	-12		60	60	60	60	60	60	60	60	60	60	60	60
Y_6	-20	-20		60	60	70	60	60	70	60	60	60	60	70	60
Y_7				40	40	40	40	40	40	40	40	40	40	40	40
Y_8				143	7	148	9	20	115	11	120	19	5	29	3

APPENDIX 9.2.2.3 : Alternative Strategy SG2 Crude Prescription Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1			10	24	45	24	2	24	2	24	2	2	24	1	1
X_2	18	18		96	73	67	58	53	83	65	64	53	70	59	53
X_3				350	89	101	77	50	174	242	90	48	91	49	64
X_4				42	43	39	35	28	37	36	39	28	28	39	28
X_5				26	12	10	0	0	15	6	0	0	0	0	0
X_6				15	6	14	4	6	0	17	6	0	7	3	3
Y_1	-20	-20		80	60	80	60	60	80	60	80	60	60	80	60
Y_2				584	24	48	24	24	270	122	84	24	24	84	60
Y_3	-8	-8		184	65	4	4	4	62	4	53	4	4	4	4
Y_4				100	55	85	55	45	85	60	90	45	50	95	65
Y_5	-12	-12		170	95	135	105	95	145	95	140	100	95	140	95
Y_6	-20	-20		140	90	120	90	80	120	120	120	90	80	120	90
Y_7				51	49	54	54	52	54	56	56	54	52	56	54
Y_8				511	23	296	34	29	230	32	241	29	21	58	22

APPENDIX 9.2.2.4: Transformed, Standardized and Weighted Locational Potential Scores Prescribed by the Alternative SG2

Name of Market Place	Railway Transport Linkages	Road Transport Linkages	Immediate Surrounding Resident-ial Population	Immediate Surrounding Places of Work	Immediate Surrounding Other Shopping Centres	Immediate Surrounding Wholesale Shops and Warehouses
	x_1^2	x_2^2	x_3^2	x_4^2	x_5^2	x_6^2
CMP	.00	60.94	26.54	24.60	68.01	34.38
RSMP	.00	10.34	-3.70	28.81	5.37	-8.96
PMP	.00	-4.03	9.67	1.44	-7.35	49.06
M-KOMP	.00	-0.59	-3.09	12.58	.19	27.73
TWMP	.00	30.65	2.20	5.06	14.90	-17.22
K-TMP	.00	-5.71	-3.65	12.58	-11.59	-8.96
URMP	.00	-13.72	-5.15	12.58	-11.59	-15.15
BMP	.00	-15.24	-4.22	-2.07	-11.59	-13.55
UTMP	.00	-22.46	-5.13	-23.89	-11.59	-8.96
BDMP	.00	-22.46	-5.18	-23.89	-11.59	-17.22
USMP	.00	4.76	-3.60	-23.89	-11.59	-5.98
KOMP	.00	-22.46	-4.70	-23.89	-11.59	-15.15
	x_1^3	x_2^3	x_3^3	x_4^3	x_5^3	x_6^3
CMP	.00	64.73	28.22	25.81	71.77	32.50
RSMP	.00	7.63	-3.66	30.90	-1.21	-10.94
PMP	.00	-5.55	6.52	.03	-8.18	53.65
M-KOMP	.00	-2.53	-3.42	11.93	-4.57	23.82
TWMP	.00	28.68	-0.21	3.78	6.37	-13.91
K-TMP	.00	-6.98	-3.65	11.93	-9.17	-10.94
URMP	.00	-13.52	-4.11	11.93	-9.17	-13.54
BMP	.00	-14.70	-3.85	-3.53	-9.17	-13.03
UTMP	.00	-20.03	-4.10	-23.19	-9.17	-10.94
BDMP	.00	-20.03	-4.11	-23.19	-9.17	-13.91
USMP	.00	2.33	-3.63	-23.19	-9.17	-9.20
KOMP	.00	-20.03	-4.00	-23.19	-9.17	-13.54

APPENDIX 9.2.2.5: Transformed, Standardized and Weighted Structural Potential Scores Prescribed by the '' Alternative SG2

Name of Market Place	Building Design Factors	Facilities and Amenities	Parking and Stationing for Vehicles	Security of Life and Property	Environmental Design Qualities	Zoning of Market Place by Commodity	Freshness of Food Commodity	Food and Non-Food Capacity
	Y_1^2	Y_2^2	Y_3^2	Y_4^2	Y_5^2	Y_6^2	Y_7^2	Y_8^2
CMP	11.33	7.14	18.77	19.60	39.71	24.83	-17.03	69.55
RSMP	-8.09	-0.87	.30	-8.69	-14.94	-9.99	-29.85	-12.29
PMP	-8.09	-0.54	-2.32	-6.35	-14.94	9.09	17.28	-10.87
M-KOMP	11.33	-0.83	-2.32	8.35	10.36	9.09	3.17	14.16
TWMP	11.33	.83	.07	8.35	18.05	9.09	3.17	3.08
K-TMP	11.33	-0.72	-0.58	11.90	14.14	9.09	17.28	4.73
URMP	11.33	-0.72	-2.32	15.65	14.14	9.09	17.28	-9.36
BMP	-8.09	-0.87	-2.32	-8.69	-9.44	-9.99	3.17	-10.49
UTMP	-8.09	-0.87	-2.32	-12.74	-14.94	-15.14	-10.42	-11.39
BDMP	-8.09	-0.87	-2.32	-12.74	-12.26	-9.99	3.17	-11.39
USMP	-8.09	-0.87	-2.32	-10.82	-14.94	-15.14	-10.42	-12.54
KOMP	-8.09	-0.80	-2.32	-3.82	-14.94	-9.99	3.17	-13.19
	Y_1^3	Y_2^3	Y_3^3	Y_4^3	Y_5^3	Y_6^3	Y_7^3	Y_8^3
CMP	11.33	7.27	19.02	21.25	43.03	27.08	-17.08	73.21
RSMP	-8.09	-0.74	-1.01	-8.88	-14.19	-10.11	-29.19	-9.72
PMP	-8.09	-0.67	-1.93	-7.09	-14.19	8.32	17.61	-9.37
M-KOMP	11.33	-0.74	-1.93	7.30	8.43	8.32	2.95	6.24
TWMP	11.33	.05	-1.13	7.30	16.73	8.32	2.95	-2.34
K-TMP	11.33	-0.72	-1.43	11.45	12.43	8.32	17.61	-1.20
URMP	11.33	-0.72	-1.93	16.09	12.43	8.32	17.61	-8.90
BMP	-8.09	-0.74	-1.93	-8.88	-9.95	-10.11	2.95	-9.26
UTMP	-8.09	-0.74	-1.93	-11.60	-14.19	-14.12	-10.66	-9.51
BDMP	-8.09	-0.74	-1.93	-11.60	-12.17	-10.11	2.95	-9.51
USMP	-8.09	-0.74	-1.93	-10.38	-14.19	-14.12	-10.66	-9.77
KOMP	-8.09	-0.74	-1.93	-4.97	-14.19	-10.11	2.95	-9.87

APPENDIX 9.2.3.1 : Alternative Strategy SG4 Incidence Scores

Locational (X) and Structural (Y) Potentials, and Interval Levels	MARKET PLACES															
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
5 X_1															
9 X_2				4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA	4GA
4/1000p X_3															
7 X_4					4IB	5IA	4IC	4IC	5IA	4IB	5IA	4IC	4IC	5IA	4IC
5 X_5															
4 X_6															
10 Y_1	-2GC	-2GC			4IB	6IA	4IC	4IC	6IA	4IB	6IA	4IC	4IC	6IA	4IC
6 Y_2					4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC
1/1000 m^2 Y_3	-2HA -2IA -2IB -2IC	-2HA -2IA -2IB -2IC			4IB	4IA	4IC	4IC	4IA	4IB	4IA	4IC	4IC	4IA	4IC
5 Y_4					2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IA	2HC 4IB	2HC 8IA	2HC 4IC	2HC 4IC	2HC 8IA	2HC 4IC
6 Y_5	-2GB	-2GB		2GB 4HA 4IB	2GB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IB	2GB 4HA 8IA	2GB 4HA 4IC	2GB 4HA 4IC	2GB 4HA 8IA	2GB 4HA 4IC
10 Y_6	-2HA	-2HA		2HA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IB	2HA 4IA	2HA 4IC	2HA 4IC	2HA 4IA	2HA 4IC
10 Y_7				4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD	4GD
Y_8				2IA 2IB 2IC	4IB	8IA	4IC	4IC	8IA	4IB	8IA	4IC	4IC	8IA	4IC

APPENDIX 9.2.3.2 Alternative Strategy SG4 Crude Proposal Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1															
X_2				36	36	36	36	36	36	36	36	36	36	36	36
X_3															
X_4					28	35	28	28	35	28	35	28	28	35	28
X_5															
X_6															
Y_1	-20	-20			40	60	40	40	60	40	60	40	40	60	40
Y_2					24	48	24	24	48	24	48	24	24	48	24
Y_3	-8	-8			4	4	4	4	4	4	4	4	4	4	4
Y_4					30	50	30	30	50	30	50	30	30	50	30
Y_5	-12	-12		36	60	70	60	60	70	60	60	60	60	60	60
Y_6	-20	-20		20	60	70	60	60	70	60	60	60	60	70	60
Y_7				40	40	40	40	40	40	40	40	40	40	40	40
Y_8				143	7	148	9	20	115	11	120	19	5	29	3

APPENDIX 9.2.3.3 : Alternative Strategy SG4 Crude Prescription Scores

Locational (X) and Structural (Y) Potentials	MARKET PLACES														
	Doka District				Makera District				Tudun Wada District		Kawo District			Gabasawa District	
	City Central Market Place														
	Private Car/Van Traffic/Accumulation	Commercial Vehicle Traffic/Accumulation	Passenger/Goods Train	City Central Market Place (CMP)	Railway Station Market Place (RSMP)	Makera-Kurmin Gwari Market Place (M-KGMP)	Barnawa Market Place (BMP)	Ungwan Television Market Place (UTMP)	Tudun Wada Market Place (TWMP)	Panteka Market Place (PMP)	Kawo-Talata Market Place (K-TMP)	Badarawa Market Place (BDMP)	Ungwan Shanu Market Place (USMP)	Ungwan Rimi Market Place (URMP)	Kabala Gabas Market Place (K-GMP)
X_1				4	5	3	2	4	2	4	2	2	4	1	1
X_2				96	73	67	58	53	83	65	64	53	70	59	53
X_3				350	89	101	77	50	174	242	90	48	91	49	64
X_4				14	43	39	35	28	37	36	39	28	28	39	28
X_5				26	12	10	0	0	15	6	0	0	0	0	0
X_6				15	6	14	4	6	0	17	6	0	7	3	3
Y_1	-20	-20		40	60	80	60	60	80	60	80	60	60	80	60
Y_2				560	24	48	24	24	270	122	84	24	24	84	60
Y_3	-8	-8		176	65	4	4	4	62	4	53	4	4	4	4
Y_4				80	55	85	55	45	85	60	90	45	50	95	65
Y_5	-12	-12		146	95	135	105	95	145	95	140	100	95	140	95
Y_6	-20	-20		100	90	120	90	80	120	120	120	90	80	120	90
Y_7				51	49	54	54	52	54	56	56	54	52	56	54
Y_8				511	23	296	34	29	130	32	241	29	21	58	22

APPENDIX 9.2.3.4: Transformed, Standardjze and Weighted Locational Potential Scores Prescribed by the Alternative SG4

Name of Market Place	Railway Transport Linkages	Road Transport Linkages	Immediate Surrounding Resident-ial Population	Immediate Surrounding Places of Work	Immediate Surrounding Other Shopping Centres	Immediate Surrounding Wholesale Shops and Warehouses
	x_1^2	x_2^2	x_3^2	x_4^2	x_5^2	x_6^2
CMP	.00	60.94	26.54	-39.29	68.01	34.38
RSMP	.00	10.34	-3.70	29.79	5.37	-8.96
PMP	.00	-4.03	9.67	6.68	-7.35	49.06
M-KOMP	.00	-0.59	-3.09	16.08	.19	27.73
TWMP	.00	30.65	2.20	9.73	14.90	-17.22
K-TMP	.00	-5.71	-3.65	16.08	-11.59	-8.96
URMP	.00	-13.72	-5.15	16.08	-11.59	-15.15
BMP	.00	-15.24	-4.22	3.71	-11.59	-13.55
UTMP	.00	-22.46	-5.13	-14.72	-11.59	-8.96
BDMP	.00	-22.46	-5.18	-14.72	-11.59	-17.22
USMP	.00	4.76	-3.60	-14.72	-11.59	-5.98
KOMP	.00	-22.46	-4.70	-14.72	-11.59	-15.15
	x_1^3	x_2^3	x_3^3	x_4^3	x_5^3	x_6^3
CMP	.00	64.73	28.22	-33.16	71.77	32.50
RSMP	.00	7.63	-3.66	33.93	-1.21	-10.94
PMP	.00	-5.55	6.52	5.22	-8.18	53.65
M-KOMP	.00	-2.53	-3.42	16.29	-4.57	23.82
TWMP	.00	28.68	-0.21	8.71	6.37	-13.91
K-TMP	.00	-6.98	-3.65	16.29	-9.17	-10.94
URMP	.00	-13.52	-4.11	16.29	-9.17	-13.54
BMP	.00	-14.70	-3.85	1.92	-9.17	-13.03
UTMP	.00	-20.03	-4.10	-16.37	-9.17	-10.94
BDMP	.00	-20.03	-4.11	-16.37	-9.17	-13.91
USMP	.00	2.33	-3.63	-16.37	-9.17	-9.20
KOMP	.00	-20.03	-4.00	-16.37	-9.17	-13.54

APPENDIX 9.2.3.5: Transformed, Standardized and Weighted Structural Potential Scores Prescribed by the Alternative SG4

Nam of Market Place	Building Design Factors	Facilities and Amenities	Parking and Stationing for Vehicles	Security of Life and Property	Environmental Design Qualities	Zoning of Market Place by Commodity	Freshness of Food Commodity	Food and Non-Food Capacity
	Y_1^2	Y_2^2	Y_3^2	Y_4^2	Y_5^2	Y_6^2	Y_7^2	Y_8^2
CMP	-17.25	7.11	18.72	7.14	25.23	-2.26	-17.03	69.55
RSMP	-4.78	-0.89	.49	-8.58	-16.18	-9.42	-29.85	-12.29
PMP	-4.78	-0.52	-2.37	-5.90	-16.18	14.32	17.28	-10.87
M-KGMP	12.68	-0.85	-2.37	10.99	14.82	14.32	3.17	14.16
TWMP	12.68	.96	.24	10.99	24.25	14.32	3.17	3.08
K-TMP	12.68	-0.72	-0.47	15.06	19.45	14.32	17.28	4.73
URMP	12.68	-0.72	-2.37	19.37	19.45	14.32	17.28	-9.36
BMP	-4.78	-0.89	-2.37	-8.58	-9.44	-9.42	3.17	-10.49
UTMP	-4.78	-0.89	-2.37	-13.24	-16.18	-15.83	-10.42	-11.39
BDMP	-4.78	-0.89	-2.37	-13.24	-12.89	-9.42	3.17	-11.39
USMP	-4.78	-0.89	-2.37	-11.03	-16.18	-15.83	-10.42	-12.54
KGMP	-4.78	-0.81	-2.37	-2.99	-16.18	-9.42	3.17	-13.19
	$Y1^3$	$Y2^3$	$Y3^3$	$Y4^3$	$Y5^3$	$Y6^3$	$Y7^3$	$Y8^3$
CMP	-14.79	7.26	19.01	6.06	26.00	-3.19	-17.08	73.21
RSMP	-5.34	-0.75	-0.90	-8.85	-15.90	-9.76	-29.19	-9.72
PMP	-5.34	-0.67	-1.96	-6.71	-15.90	14.46	17.61	-9.37
M-KGMP	13.05	-0.75	-1.96	10.47	13.89	14.46	2.95	6.24
TWMP	13.05	.14	-1.04	10.47	24.82	14.46	2.95	-2.34
K-TMP	13.05	-0.73	-1.39	15.42	19.16	14.46	17.61	-1.20
URMP	13.05	-0.73	-1.96	20.96	19.16	14.46	17.61	-8.90
BMP	-5.34	-0.75	-1.96	-8.85	-10.32	-9.76	2.95	-9.26
UTMP	-5.34	-0.75	-1.96	-12.09	-15.90	-15.02	-10.66	-9.51
BDMP	-5.34	-0.75	-1.96	-12.09	-13.25	-9.76	2.95	-9.51
USMP	-5.34	-0.75	-1.96	-10.63	-15.90	-15.02	-10.66	-9.77
KGMP	-5.34	-0.75	-1.96	-4.18	-15.90	-9.76	2.95	-9.87

APPENDIX 9.3.1:

Objective 2.1b

To achieve optimal demand for activity spaces by the shoppers' non-food-trips.

Predicted Growth Rate:

The predictive equation, 2.1b, of the rate of growth of the shoppers' non-food-trips, dT_b , in the 12 Kaduna market places was established in page A 123 of this thesis as:-

$$dT_b = 0.0059X_2^3 + 0.0124X_3^3 + 0.0454Y_8^3 + 0.0137 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2.1b)$$

X_2 - Road transport linkages

X_3 - Immediate surrounding residential population

Y_8 - Food and non-food capacity

This predictive equation was solved for dT_b on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives SG1, SG2, SG3 and SG4, on the above listed locational and structural potentials in the market places. The The growth rates of demand for activity spaces by the shoppers' non-food-trips predicted by the alternatives are shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	42.66	79.66	79.66	86.22	88.43
RSMP	10.60	30.38	30.38	4.99	29.29
PMP	.00	.00	.00	.00	.
M-KGMP	61.82	48.50	48.50	51.60	40.57
TWMP	69.81	131.71	131.71	82.81	93.49
K-TMP	110.46	240.27	240.27	87.63	159.77
URMP	41.26	207.75	223.12	164.44	99.16
BMP	46.21	264.23	264.23	156.22	32.88
UTMP	65.80	65.35	65.35	56.07	68.37
BDMP	67.93	274.72	274.72	162.12	32.25
USMP	.	.	.	.	.00
KGMP	67.80	274.87	274.87	162.20	13.65

To this list was added the "trend growth rates" of demands for activity spaces by the shoppers' non-food-trips predicted by the "trend strategy", SG5. The trend strategy constituted the "reference strategy", that was required to be improved by the planning exercise. At 95% confidence level, the equation predicted within ± 15.89% accuracy.

Predicted Distribution Score:

Forecasting with the above growth rates predicted by the alternatives produced in the target year, 2005, the predicted distribution of the shoppers' non-food-trips are shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	560077.5	500204.5	496954.0	640270.4	977885.1
RSMP	40206.87	36835.37	37600.28	24225.42	3089.31
PMP	414.73	213.25	212.21	295.31	.
M-KGMP	120584.8	65246.65	65040.58	90381.20	18058.28
TWMP	110170.8	128256.9	128275.0	111557.3	96533.15
K-TMP	300352.8	298599.3	297180.1	202106.4	48498.86
URMP	12699.77	51820.33	57330.97	48755.63	16755.52
BMP	10780.03	36371.62	36005.91	18242.70	2055.74
UTMP	1885.07	957.50	952.82	1013.63	4401.83
BDMP	7394.42	35480.79	34852.80	21040.09	1706.42
USMP	.	.	.	.	.00
KGMP	4485.30	15065.78	14647.36	11163.96	67.69
Total	1169052	1169052	1169052	1169052	1169052

Predicted Distribution Level:

The above predicted distribution of the shoppers' non-food-trips in each market place, was calculated as a percentage of the total shoppers non-food-trips, in the 11 market places. The predicted percentage distribution of the shoppers' non-food-trips, called " predicted distribution level" of the alternative strategies, is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	47.91	42.79	42.51	54.77	83.65
RSMP	3.44	3.15	3.22	2.07	.26
PMP	.04	.02	.02	.03	.
M-KGMP	10.31	5.58	5.56	7.73	1.54
TWMP	9.42	10.97	10.97	9.54	8.26
K-TMP	25.69	25.54	25.42	17.29	4.15
URMP	1.09	4.43	4.90	4.17	1.43
BMP	.92	3.11	3.08	1.56	.18
UTMP	.16	.08	.08	.09	.38
BDMP	.63	3.04	2.98	1.80	.15
USMP	.	.	.	.	.00
KGMP	.38	1.29	1.25	.95	.01
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy, comprising:

1. Decrease of predicted percentage distribution of the shoppers' non-food-trips from that of the trend strategy, in the case of the CMP.

2. Increase of predicted percentage distribution of the stallage food floor-space over those of the trend strategy in the case of the other market places (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP attracted 88.4% of the shoppers' non-food-trips than it did 7 years ago, for the same designed space capacity. The additional stallage floor-space was cannibalized from the accessibility floor-space, which had consequently diminished by 28331 sq. m., lost to stallage floor-spaces.

2. The other market places, (SMPs, DMPs, L/NMPs) are neglected by the city residents for food shopping, and people do not show estate interest in development of stalls in these other market places.

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-35.74	-40.86	-41.14	-28.88	.00
RSMP	3.18	2.89	2.95	1.81	.00
PMP	.	.	.	.	.
M-KGMP	8.77	4.04	4.02	6.19	.00
TWMP	1.17	2.71	2.72	1.29	.00
K-TMP	21.54	21.39	21.27	13.14	.00
URMP	-0.35	3.00	3.47	2.74	.00
BMP	.75	2.94	2.90	1.38	.00
UTMP	-0.22	-0.29	-0.30	-0.29	.00
BDMP	.49	2.89	2.84	1.65	.00
USMP	.	.	.	.	.00
KQMP	.38	1.28	1.25	.95	.00
Efficiency Score	71.47	81.70	82.70	57:74	.00
Rank	3	2	1	4	

APPENDIX 9.3.2:

Objective 2.2a

To achieve optimal demand for activity spaces by food traders.

Predicted Growth Rate:

The predictive equation, 2.2a, of the rate of change of the number of food traders, $\dot{d}Q_a$, in the 12 Kaduna market places was established in page A 128 of this thesis as:-

$$\dot{d}Q_a = -0.0187\dot{X}_5^2 + 0.102\dot{Y}_6^2 - 0.0203\dot{Y}_7^2 + 0.866 \quad \ldots\ldots\ldots\ldots \quad (2.2a)$$

X_5 - Immediate surrounding other shopping centres

Y_6 - Zoning of market place by commodity

Y_7 - Food and Non-food capacity

This predictive equation was solved for $\dot{d}Q_a$ on the VAX computer employing SPSSX package, using, in turn the "prescription weighted scores" of the alternatives SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places.
The growth rates of demands for activity spaces

by food traders predicted by the alternatives are shown as:-

Name of Market Place	Alternative Strategies SG1	SG2	SG3	SG4	Trend/Reference Strategy SG5
CMP	125.69	118.32	142.33	10.66	316.17
RSMP	107.83	8.90	99.33	29.70	53.31
PMP	.00	.00	.00	.00	.
M-KGMP	160.66	169.41	139.30	156.09	48.77
TWMP	118.58	185.56	151.83	158.02	127.74
K-TMP	166.26	162.70	164.08	169.70	160.96
URMP	54.51	313.65	267.31	252.07	38.61
BMP	163.27	70.10	118.23	70.87	33.60
UTMP	144.27	193.11	77.41	135.69	31.99
BDMP	106.49	117.86	191.63	75.48	42.53
USMP	177.15	32.87	66.14	111.17	32.00
KGMP	223.42	286.40	280.97	152.90	61.39

To this list was added the "trend growth rates" of demands for activity spaces by food traders, predicted by the trend strategy, SG5. The trend strategy, SG5 constituted the "reference strategy", that was required to be improved by the planning exercise. At 95% confidence level, the equation predicts within ± 26.94% accuracy.

Predicted Redistribution Score:

Forecasting with the above growth rates predicted by the alternatives, produced in the target year, 2005, the predicted distribution of the number of food traders is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	37740.08	31645.18	42684.18	5872.77	107281.8
RSMP	5545.23	738.91	4469.17	1779.19	1008.98
PMP	.00	.00	.00	.00	.
M-KOMP	22507.12	23022.06	15911.69	28180.31	1897.15
TWMP	8411.52	17372.66	11752.35	18264.11	4312.90
K-TMP	37384.77	33263.61	33327.65	51297.82	15956.84
URMP	834.01	14823.66	10236.16	13025.63	272.97
BMP	3720.25	929.48	1935.82	1342.64	220.39
UTMP	4224.83	6761.93	1478.68	5010.10	302.14
BDMP	881.46	959.00	2268.75	714.22	131.42
USMP	6239.42	636.84	1227.98	3643.77	305.61
KOMP	4452.31	7033.49	6648.57	2810.45	250.80
Total	131941	131941	131941	131941	131941

Predicted distribution Level:

The above predicted distribution of the number of food traders, in each market place, was calculated as a percentage of the total number of food traders in the 11 market places. The predicted percentage distribution of the number of food traders, called "predicted distribution level" by the alternative strategies is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	28.60	23.98	32.35	4.45	81.31
RSMP	4.20	.56	3.39	1.35	.76
PMP	.00	.00	.00	.00	.
M-KOMP	17.06	17.45	12.06	21.36	1.44
TWMP	6.38	13.17	8.91	13.84	3.27
K-TMP	28.33	25.21	25.26	38.88	12.09
URMP	.63	11.24	7.76	9.87	.21
BMP	2.82	.70	1.47	1.02	.17
UTMP	3.20	5.12	1.12	3.80	.23
BDMP	.67	.73	1.72	.54	.10
USMP	4.73	.48	.93	2.76	.23
KOMP	3.37	5.33	5.04	2.13	.19
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of the number of food traders from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of the numbers of food traders over those of the trend strategy in the cases of the other market places, (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP contained 316.2% of the number of food traders over its designed capacity. The additional stallage food floor-space was cannabalized from the accessibility floor-spaces which had consequently diminished by 13258 square metres.

2. The other market places, (SMP, DMP, L/NMPs) are neglected by the city residents for food shopping, and people do not show estate interest in development of stalls in these other market places. The average squatting food trader ratio in the market places are: CMP (.09 %), SMPs (·08 %), DMPs (·07 %) and L/NMPs (·03 %)

Efficiency Scores:

Name of Market Place	Alternative Strategies SG1	SG2	SG3	SG4	Trend/Reference Strategy SG5
CMP	-52.71	-57.33	-48.96	-76.86	.00
RSMP	3.44	-0.20	2.62	.58	.00
PMP	.	.	.	.	.
M-KOMP	15.62	16.01	10.62	19.92	.00
TWMP	3.11	5.53	5.64	10.57	.00
K-TMP	16.24	13.51	13.17	26.79	.00
URMP	.43	11.03	7.55	9.67	.00
BMP	2.65	.54	1.30	.85	.00
UTMP	2.97	-0.12	.89	3.57	.00
BDMP	.57	.63	1.62	.44	.00
USMP	4.50	.21	.70	2.53	.00
KOMP	3.18	5.14	4.85	1.94	.00
Efficiency Score	105.42	109.60	97.92	153.72	.00
Rank	3	2	4	1	

APPENDIX 9.3.3:

Objective 2.2b

To achieve optimal demand for activity spaces by non-food traders.

Predicted Growth Rate:

The predictive equation, 2.2b, of the rate of change of the number of non-food traders, dQ_b , in the 11 Kaduna market places was established in page A133 of this thesis as:

$$dQ_b = -0.0069X_4^2 + 0.0204X_5^2 + 0.0035X_6^2 + 0.0207Y_6^2 + 0.0123Y_8^2 + 0.0118 \quad (2.2b)$$

X_4 - Immediate surrounding places of work
X_5 - Immediate surrounding other shopping centres
X_6 - Immediate surrounding wholesale shops and warehouses
Y_6 - Zoning of market place by commodity
Y_8 - Food and Non-Food capacity

This predictive equation was solved for dQ_b on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives, SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places.
The growth rates of demand for activity spaces by non-food traders predicted by the alternatives are shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	127.94	98.71	111.59	80.43	264.94
RSMP	27.30	29.33	49.10	30.88	25.60
PMP	.00	.00	.00	.00	.
M-KGMP	74.94	113.65	106.47	111.53	72.08
TWMP	55.72	127.58	104.12	122.51	99.44
K-TMP	141.95	257.11	247.29	133.34	161.75
URMP	28.93	132.72	130.53	126.68	30.95
BMP	136.14	225.71	225.71	156.22	38.24
UTMP	38.54	140.20	108.26	143.99	3.75
BDMP	87.35	625.72	65.02	178.05	-5.68
USMP	6.03	51.85	68.75	55.05	5.51
KGMP	138.48	466.29	46.95	13.54	9.17

To this list was added the "trend growth rates" of demands for activity spaces by non-food traders predicted the "trend strategy", SG5. The trend strategy, SG5, constituted the "reference strategy" that was required to be improved by the planning exercise. At 95% confidence level the equation predicted within ± 20.64% accuracy.

Predicted Distribution Score:

Forecasting with the above achievable rates of change predicted by the alternatives produced in the target year, 2005, the predicted distribution of the number of non-food traders is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategies
	SG1	SG2	SG3	SG4	SG5
CMP	124539.1	42999.92	77251.95	73358.04	163493.4
RSMP	492.73	269.27	613.99	636.03	151.39
PMP	.00	.00	.00	.00	.
M-KCMP	13903.58	13198.06	17728.61	29192.10	4232.77
TWMP	11217.70	18247.36	19591.95	38868.31	7537.74
K-TMP	24480.24	41016.47	56145.76	26077.42	9914.47
URMP	717.33	2198.35	3180.07	4630.18	240.43
BMP	4236.99	5794.34	8623.10	6428.05	271.89
UTMP	335.80	912.01	884.57	2178.29	45.11
BDMP	830.37	25152.11	440.09	3223.90	33.89
USMP	243.02	372.03	759.77	902.46	76.60
KCMP	5159.14	35996.07	936.14	661.22	158.30
Total	186156	186156	186156	186156	186156

Predicted Distribution Level:

The above predicted distribution of the number of non-food traders in each market place was calculated as a percentage of the total number of non-food traders in the 11 market places. The predicted percentage distribution of the number of non-food traders called "predicted distribution level" of the alternative strategies, is shown as:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
	%	%	%	%	%
CMP	66.90	23.10	41.50	39.41	87.83
RSMP	.26	.14	.33	.34	.08
PMP	.00	.00	.00	.00	.
M-KCMP	7.47	7.09	9.52	15.68	2.27
TWMP	6.03	9.80	10.52	20.88	4.05
K-TMP	13.15	22.03	30.16	14.01	5.33
URMP	.39	1.18	1.71	2.49	.13
BMP	2.28	3.11	4.63	3.45	.15
UTMP	.18	.49	.48	1.17	.02
BDMP	.45	13.51	.24	1.73	.02
USMP	.13	.20	.41	.48	.04
KCMP	2.77	19.34	.50	.36	.09
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of the number of non-food traders from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of the numbers of non-food traders over those of the trend strategy in the case of the other market places, (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP contained 264.9% of the number of non-food traders over its designed capacity. The additional stallage food floor-space was cannibalized from the accessibility floor-spaces which had consequently diminished by 13258 sq. m., lost to food stalls.

2. The other marked places, (SMP, DMP, L/NMP) are neglected by the city residents for food shopping and people do not show estate interest in development of stalls in these other market places. The average squatting non-food traders in the market places are: CMP (·26 %), SMP (·09 %), DMP (·08 %), L/NMP (·04 %).

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-20.93	-64.73	-46.33	-48.42	.00
RSMP	.18	.06	.25	.26	.00
PMP	.	.	.	.	.
M-KOMP	5.20	4.82	7.25	13.41	.00
TWMP	1.98	5.75	6.48	16.83	.00
K-TMP	7.82	16.71	24.83	8.68	.00
URMP	.26	1.05	1.58	2.36	.00
BMP	2.13	2.97	4.49	3.31	.00
UTMP	.16	.47	.45	1.15	.00
BDMP	.43	13.49	.22	1.71	.00
USMP	.09	.16	.37	.44	.00
KOMP	2.69	19.25	.42	.27	.00
Efficiency Score	41.86	129.46	92.66	96.84	.00
Rank	4	1	3	2	

APPENDIX 9.3.4:

Objective 2.3a

To achieve optimal supply of stallage food floor-space

Predicted Growth Rate:

The predictive equation, 2.3a, of the rate of growth of stallage food floor-spaces, dZ_a, in the 12 Kaduna retail market places was established in page A 138 of this thesis as:-

$$dZ_a = 0.0113X_2^3 - 0.1445X_3^3 + 0.0882Y_6^3 - 0.0079Y_6^3 + 0.0373Y_8^3 + 0.00 \quad \ldots \quad (2.3a)$$

X_2	-	Road transport linkages
X_3	-	Immediate surrounding residential population
Y_6	-	Zoning of market place by commodity
Y_7	-	Preservation of food stuffs
Y_8	-	Food and Non-Food capacity

This predictive equation was solved for dZ_a on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places.

The growth rates of supply of stallage food floor-spaces predicted by the alternatives are shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	84.71	146.42	142.19	56.48	267.60
RSMP	14.06	101.65	131.00	77.20	41.57
PMP	.00	.00	.00	.00	.
M-KCMP	95.24	121.61	123.75	92.64	40.48
TWMP	107.25	184.09	199.32	126.31	94.04
K-TMP	162.57	159.76	159.98	198.55	159.06
URMP	49.14	209.55	207.09	139.99	55.75
BMP	190.90	220.91	208.14	151.44	41.57
UTMP	106.61	78.47	36.10	55.33	22.80
BDMP	212.65	235.93	213.55	161.47	77.15
USMP	84.86	56.41	31.97	70.43	30.25
KCMP	211.97	230.19	207.81	157.78	71.95

To this list was added the trend growth rates of supply of stallage food floor-spaces predicted by the trend strategy, SG5. The trend strategy, SG5, constituted the "reference strategy" that was required to be improved by the planning exercise. At 95% confidence level the optimal equation predicted within $\pm$ 22.24% accuracy.

Predicted Distribution Score:

Forecasting with the above growth rate predicted by the alternatives produced in the target year, 2005, the predicted distribution of stallage food floor-space is shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	116336.9	166521.8	158877.4	67188.96	386661.7
RSMP	5210.95	17359.26	26227.03	18560.97	4201.66
PMP	1036.04	624.59	627.70	984.13	.
M-KGMP	47130.97	41555.08	42983.04	43004.38	7404.03
TWMP	43726.54	67890.27	79799.82	54075.76	15132.54
K-TMP	157797.7	92117.07	92800.81	220359.3	63912.59
URMP	5066.98	27312.41	26797.06	20053.35	2433.49
BMP	35394.65	28645.59	25487.77	21710.72	1720.32
UTMP	14097.06	5477.59	2441.42	5689.57	1247.94
BDMP	21435.28	16030.29	13099.52	11909.25	1644.26
USMP	13151.04	4802.25	2899.03	9788.76	1939.79
KGMP	27882.84	19930.83	16226.39	14941.85	1968.72
Total	488267	488267	488267	488267	488267

Predicted Distribution Level:

The above predicted distribution of stallage food floor-spaces in each market place was calculated as a percentage of the total stallage food floor-space in the 12 market places. The predicted percentage distribution of stallage food floor-space, called "predicted distribution level" of the alternative strategies is shown as follows:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	23.83	34.10	32.54	13.76	79.19
RSMP	1.07	3.56	5.37	3.80	.86
PMP	.21	.13	.13	.20	.
M-KGMP	9.65	8.51	8.80	8.81	1.52
TWMP	8.96	13.90	16.34	11.08	3.10
K-TMP	32.32	18.87	19.01	45.13	13.09
URMP	1.04	5.59	5.49	4.11	.50
BMP	7.25	5.87	5.22	4.45	.35
UTMP	2.89	1.12	.50	1.17	.26
BDMP	4.39	3.28	2.68	2.44	.34
USMP	2.69	.98	.59	2.00	.40
KGMP	5.71	4.08	3.32	3.06	.40
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of stallage food floor-space from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of stallage food floor-space over that of the trend strategy in the case of the other market places, (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP contained 256.8% of stallage food floor-space over its designed capacity. The additional stallage food floor-space was cannibalized from the accessibility floor-spaces which had consequently diminished by 13258 square metres.

2. The other market places, (SMPs, DMPs, L/NMPs) are neglected by the city residents for food shopping and people do not show estate interest in development of stalls in these other market places. The average floor-space vacancy ratios in the market places are CMP (0.00%), SMP (0.06%), DMP (0.16%) and L/NMP (0.57%).

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-55.36	-45.09	-46.65	-65.43	.00
RSMP	.21	2.69	4.51	2.94	.00
PMP	.	.	.	.	.
M-KOMP	8.14	6.99	7.29	7.29	.00
TWMP	5.86	10.81	13.24	7.98	.00
K-TMP	19.23	5.78	5.92	32.04	.00
URMP	.54	5.10	4.99	3.61	.00
BMP	6.90	5.51	4.87	4.09	.00
UTMP	2.63	.87	.24	.91	.00
BDMP	4.05	2.95	2.35	2.10	.00
USMP	2.30	.59	.20	1.61	.00
KOMP	5.31	3.68	2.92	2.66	.00
Efficiency Score	110.51	90.05	92.17	80.66	.00
Rank	2	4	3	1	

APPENDIX 9.3.5:

Objective 2.3b

To achieve optimal supply of stallage non-food floor-space.

Predicted Growth Rate:

The predictive equation, 2.3b, of the rate of growth of stallage non-food floor-spaces, dZ_b , in the 12 Kaduna retail market places was established in page A 143 of this thesis as:-

$$dZ_b = 0.1928X_3^3 + 0.0072X_4^3 + 0.0129X_6^3 + 0.098Y_6^3 + 0.0036Y_7^3 - 0.0663\ Y_8^3 + 0.00 \quad \ldots \quad (2.3b)$$

X_3	-	Immediate surrounding residential population
X_4	-	Immediate surrounding places of work
X_6	-	Immediate surrounding wholesale shops and warehouses
Y_6	-	Zoning of market place by commodity
Y_7	-	Preservation of food stuffs
Y_8	-	Food and Non-Food capacity

This predictive equation was solved for dZ_b on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives, SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places.
The growth rates of supply of stallage non-food floor-space predicted by the alternatives are shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	22.22	116.41	89.58	115.42	88.43
RSMP	38.63	50.99	62.79	28.12	43.67
PMP	.00	.00	.00	.00	.
M-KGMP	101.21	88.97	91.46	104.52	40.55
TWMP	35.00	116.38	128.45	75.96	93.53
K-TMP	167.04	176.07	176.38	192.25	159.34
URMP	37.87	213.82	210.95	193.70	40.43
BMP	85.42	111.16	102.73	119.27	35.85
UTMP	161.18	87.56	39.24	19.98	23.73
BDMP	83.41	127.41	112.62	135.52	99.59
USMP	203.68	105.30	51.02	171.32	23.62
KGMP	83.17	86.18	76.18	91.66	47.11

To this list was added the "trend growth rates" of supply of stallage non-food floor-spaces predicted the trend strategy, SG5. The trend strategy constituted the "reference strategy" that was required to be improved by the planning exercise. At 95% confidence level the equation predicted within ± 9.58% accuracy.

Predicted Distribution Score:

Forecasting with the above growth rates predicted by the alternatives produced in the target year, 2005, the predicted distribution of stallage non-food floor-spaces is shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	60459.92	162373.6	124077.1	167626.7	181061.9
RSMP	19160.35	11974.99	17059.41	7656.66	17427.24
PMP	51441.84	24887.41	28289.10	26047.39	.
M-KOMP	62965.30	25234.16	29829.73	33481.50	17539.23
TWMP	28834.61	57445.28	76846.01	32329.55	69431.09
K-TMP	89917.13	48066.89	54817.39	59679.77	67314.61
URMP	3368.99	19222.27	21256.70	16491.53	2909.69
BMP	8168.96	5837.65	5871.51	6840.22	2625.67
UTMP	8044.91	1441.34	670.34	394.88	699.05
BDMP	3097.69	2856.87	2653.83	3321.07	3262.62
USMP	22665.49	3387.88	1532.89	8185.04	1249.62
KGMP	9357.81	4754.64	4578.98	5428.64	3962.24
Total	367483	367483	367483	367483	367483

Predicted Distribution Level:

The above predicted distribution of stallage non-food floor-spaces in each market place was calculated as a percentage of the total stallage non-food floor-space in the 12 market places. The predicted percentage distribution of stallage non-food floor-space, called "predicted distribution level" of the alternative strategies, is shown as follows:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1 %	SG2 %	SG3 %	SG4 %	SG5 %
CMP	16.45	44.19	33.76	45.61	49.27
RSMP	5.21	3.26	4.64	2.08	4.74
PMP	14.00	6.77	7.70	7.09	.
M-KOMP	17.13	6.87	8.12	9.11	4.77
TWMP	7.85	15.63	20.91	8.80	18.89
K-TMP	24.47	13.08	14.92	16.24	18.32
URMP	.92	5.23	5.78	4.49	.79
BMP	2.22	1.59	1.60	1.86	.71
UTMP	2.19	.39	.18	.11	.19
BDMP	.84	.78	.72	.90	.89
USMP	6.17	.92	.42	2.23	.34
KGMP	2.55	1.29	1.25	1.48	1.08
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of stallage non-food floor-spaces from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of stallage non-food floor-spaces over that of the trend strategy in the case of the other market places, (SMPs, DMPs, and L/NMPs).

Performance Situation:

1. The CMP contained 88.4% of stallage non-food floor-space over its designed capacity. The additional stallage food floor-space was cannibalized from the accessibility floor-spaces which had consequently diminished by 15073 square metres.

2. The other market places, (SMPs, DMPs, L/NMPs) are neglected by the city residents for non-food shopping and people do not show estate interest in development of stalls in these other market places. The average floor-space vacancy ratios in these market places are, CMP (0.0%), SMP (0.02%), DMP (.16 %) and L/NMP (0.59%).

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-32.82	-5.09	-15.51	-3.66	.00
RSMP	.47	-1.48	-0.10	-2.66	.00
PMP	.	.	.	.	.
M-KOMP	12.36	2.09	3.34	4.34	.00
TWMP	-11.05	-3.26	2.02	-10.10	.00
K-TMP	6.15	-5.24	-3.40	-2.08	.00
URMP	.12	4.44	4.99	3.70	.00
BMP	1.51	.87	.88	1.15	.00
UTMP	2.00	.20	-0.01	-0.08	.00
BDMP	-0.04	-0.11	-0.17	.02	.00
USMP	5.83	.58	.08	1.89	.00
KOMP	1.47	.22	.17	.40	.00
Efficiency Score	51·64	13·41	23·32	0·14	0·00
Rank	1	3	2	4	0·00

APPENDIX 9.3.6:

Objective 2.4a

To achieve optimal supply of number of food stalls.

Predicted Growth Rate:

The predictive equation, 2.4a, of the rate of growth of the number of food stalls, dR_a, in the 12 Kaduna market places was established in page A 148 of this thesis as:-

$$dR_a = 0.0197X_2^2 - 0.1279X_3^2 - 0.0324X_5^2 + 0.0915Y_6^2 - 0.017Y_7^2 + 0.0484Y_8^2 + 0.00 \quad \text{........} \quad (2.4a)$$

X_2 - Road transport linkages

X_3 - Immediate surrounding residential population

X_5 - Immediate surrounding other shopping centres

Y_6 - Zoning of market place by commodity

Y_7 - Preservation of food stuffs

Y_8 - Food and Non-food capacity

This predictive equation was solved for dR_a on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives, SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places.
The growth rates of supply of the number of food stalls predicted by the alternatives are shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	173.11	128.64	169.17	86.72	277.79
RSMP	165.78	16.56	105.47	16.51	41.48
PMP	.00	.00	.00	.00	.
M-KGMP	93.08	211.67	182.26	154.59	40.55
TWMP	34.63	313.55	164.11	196.77	93.95
K-TMP	156.97	194.13	183.67	150.54	158.72
URMP	86.80	203.14	206.71	150.37	52.33
BMP	193.53	157.29	259.82	179.34	30.42
UTMP	94.00	110.38	64.83	113.69	13.38
BDMP	56.08	152.40	278.47	77.87	36.36
USMP	205.50	386.57	243.05	159.26	86.91
KGMP	88.52	228.66	281.29	193.63	22.66

To this list was added the "trend growth rates" of supply of number of food stalls predicted by the trend strategy, SG5. The trend strategy constituted the "reference strategy" that was required to be improved by the planning exercise. At 95% confidence level the equation predicted within $\pm$ 28.59% accuracy.

Predicted Distribution Score:

Forecasting with the above achievable rates of change predicted by the alternatives produced in the target year, 2005, the predicted distribution of the number of food stalls is shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	47559.82	16671.90	32178.80	18697.76	80200.66
RSMP	8384.08	422.51	2737.66	868.88	805.75
PMP	.00	.00	.00	.00	.00
M-KGMP	6770.54	17012.79	14948.33	19094.34	1663.69
TWMP	1311.37	22705.24	6996.41	17277.09	2497.56
K-TMP	26103.80	23385.63	24816.97	29759.98	16972.90
URMP	1080.33	2758.12	3379.52	3199.78	373.17
BMP	3943.36	1586.55	5133.49	4181.08	220.38
UTMP	1565.79	1192.93	678.68	2574.00	199.10
BDMP	288.62	729.20	2908.33	525.47	122.62
USMP	6438.90	15540.92	6443.28	4840.75	939.42
KGMP	665.39	2106.22	3890.53	3092.88	116.75
Total	104112	104112	104112	104112	104112

Predicted Distribution Level:

The above predicted distribution of the number of food stalls in each market place was calculated as a percentage of the total number of food stalls in the 12 market places. The predicted percentage distribution of the number of food stalls, called "predicted distribution level" of the alternative strategies is shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	45.68	16.01	30.91	17.96	77.03
RSMP	8.05	.41	2.63	.83	.77
PMP	.00	.00	.00	.00	.00
M-KGMP	6.50	16.34	14.36	18.34	1.60
TWMP	1.26	21.81	6.72	16.59	2.40
K-TMP	25.07	22.46	23.84	28.58	16.30
URMP	1.04	2.65	3.25	3.07	.36
BMP	3.79	1.52	4.93	4.02	.21
UTMP	1.50	1.15	.65	2.47	.19
BDMP	.28	.70	2.79	.50	.12
USMP	6.18	14.93	6.19	4.65	.90
KGMP	.64	2.02	3.74	2.97	.11
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of the number of food stalls from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of the number of food stalls over those of the trend strategy in the case of the other market places, (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP contained 277.7% of number of food stalls over designed capacity. The additional number of food stalls was cannibalized from the accessibility floor-spaces which had consequently diminished by 13258 square metres.

2. The other market places, (SMPs, DMPs, L/NMPs), are neglected by the city residents for food shopping and people do not show estate interest in development of stalls in these other market places.

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-31.35	-61.02	-46.13	-59.07	.00
RSMP	7.28	-0.37	1.86	.06	.00
PMP	.00	.00	.00	.00	.00
M-KGMP	4.91	14.74	12.76	16.74	.00
TWMP	-1.14	19.41	4.32	14.20	.00
K-TMP	8.77	6.16	7.53	12.28	.00
URMP	.68	2.29	2.89	2.71	.00
BMP	3.58	1.31	4.72	3.80	.00
UTMP	1.31	.95	.46	2.28	.00
BDMP	.16	.58	2.68	.39	.00
USMP	5.28	14.02	5.29	3.75	.00
KGMP	.53	1.91	3.62	2.86	.00
Efficiency Score	62.7	122.7	92.26	118.14	.00
Rank	4	1	3	2	

APPENDIX 9.3.7:

Objective 2.4b

To achieve optimal supply of number of non-food stalls.

Predicted Growth Rate:

The predictive equation, 2.4b, of the rate of growth of the number of non-food stalls, δR_b, in the 12 Kaduna market places was established in page A153 of this thesis as:-

$$\delta R_b = -0.0522X_3^2 - 0.0117X_4^2 + 0.0381X_5^2 + 0.0311Y_6^2 + 0.0148Y_8^2 + 0.00 \;\ldots\ldots \quad (2.4b)$$

X_3 - Immediate surrounding residential population

X_4 - Immediate surrounding places of work

X_5 - Immediate surrounding other shopping centres

Y_6 - Zoning of market place by commodity

Y_8 - Food and Non-food capacity

This predictive equation was solved for δR_b on the VAX computer employing SPSSX package, using, in turn, the "prescription weighted scores" of the alternatives SG1, SG2, SG3 and SG4 on the above listed locational and structural potentials in the market places. The growth rates of supply of the number of non-food stalls predicted by the alternatives are shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	106.56	134.83	122.37	41.35	170.43
RSMP	130.04	8.38	60.82	110.10	28.83
PMP	.00	.00	.00	.00	.
M-KGMP	28.67	80.86	86.27	40.81	40.56
TWMP	30.19	128.06	130.90	57.86	93.51
K-TMP	58.04	238.00	250.54	62.48	158.99
URMP	13.15	.	.	.	31.65
BMP	282.62	206.08	197.44	202.66	35.62
UTMP	63.09	67.29	84.72	85.64	11.59
BDMP	290.01	243.33	225.91	241.42	55.77
USMP	51.11	94.50	121.13	115.06	12.93
KGMP	216.72	139.29	150.12	143.80	37.43

To this list was added the "trend growth rates" of creation of the number of non-food stalls predicted by the trend strategy, SG5. The trend strategy constituted the "reference strategy" that was required to be improved by the planning exercise. At 95% confidence level the equation predicted within ± 26.81% accuracy.

Predicted Distribution Score:

Forecasting with the above growth rates predicted by the alternatives produced in the target year, 2005, the predicted distribution of the number of non-food stalls is shown as:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	50217.30	39928.11	34524.36	28974.11	67052.46
RSMP	1936.44	109.60	364.59	2656.29	202.38
PMP	.00	.00	.00	.00	.00
M-KQMP	3671.03	5516.47	6136.22	8661.08	2847.46
TWMP	4650.59	13527.15	14296.84	14926.74	9087.13
K-TMP	4935.28	26128.14	29677.89	9657.14	12923.86
URMP	335.20	.	.	.	314.11
BMP	12930.51	3581.83	3347.03	11522.71	342.61
UTMP	371.60	217.00	297.49	986.61	70.83
BDMP	5345.66	1973.38	1718.75	6456.83	202.64
USMP	502.80	580.26	868.24	2609.95	124.88
KQMP	8694.60	2029.05	2359.59	7139.53	422.65
Total	93591	93591	93591	93591	93591

Predicted Distribution Level:

The above predicted distribution of the number of non-food stalls in each market place was calculated as a percentage of the total number of non-food stalls in the 12 market places. The predicted percentage distribution of the number of non-food stalls, called "predicted distribution level" of the alternative strategies is shown as follows:-

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	53.66	42.66	36.89	30.96	71.64
RSMP	2.07	.12	.39	2.84	.22
PMP	.00	.00	.00	.00	.00
M-KQMP	3.92	5.89	6.56	9.25	3.04
TWMP	4.97	14.45	15.28	15.95	9.71
K-TMP	5.27	27.92	31.71	10.32	13.81
URMP	.36	.	.	.	.34
BMP	13.82	3.83	3.58	12.31	.37
UTMP	.40	.23	.32	1.05	.08
BDMP	5.71	2.11	1.84	6.90	.22
USMP	.54	.62	.93	2.79	.13
KQMP	9.29	2.17	2.52	7.63	.45
Total	100.00	100.00	100.00	100.00	100.00

Efficiency Criterion:

A combined index for each alternative strategy comprising:

1. Decrease of predicted percentage distribution of the number of non-food stalls from that of the trend strategy in the case of the CMP.

2. Increase of predicted percentage distribution of the number of non-food stalls over those of the trend strategy in the case of the other market places, (SMPs, DMPs and L/NMPs).

Performance Situation:

1. The CMP contained 170.4% of the number of non-food stalls over its designed capacity. The additional number of non-food stalls was cannibalized from the accessibility floor-spaces which had consequently diminished by 15073 square metres.

2. The other market places, (SMP, DMP, L/NMP) are neglected by the city residents for food shopping and people do not show estate interest in development of stalls in these other market places.

Efficiency Scores:

Name of Market Place	Alternative Strategies				Trend/Reference Strategy
	SG1	SG2	SG3	SG4	SG5
CMP	-17.99	-28.98	-34.76	-40.69	.00
RSMP	1.85	-0.10	.17	2.62	.00
PMP	.00	.00	.00	.00	.00
M-KGMP	.88	2.85	3.51	6.21	.00
TWMP	-4.74	4.74	5.57	6.24	.00
K-TMP	-8.54	14.11	17.90	-3.49	.00
URMP	.02	.	.	.	.00
BMP	13.45	3.46	3.21	11.95	.00
UTMP	.32	.16	.24	.98	.00
BDMP	5.50	1.89	1.62	6.68	.00
USMP	.40	.49	.79	2.66	.00
KGMP	8.84	1.72	2.07	7.18	.00
Efficiency Score	35.98	58.30	69.55	81.72	.00
Rank	4	3	2	1	

APPENDIX 9.4.1

Objective 1.2a

To achieve balanced demand and supply; between the shoppers food-trips and the number of food stalls; ($\bar{T}a - \bar{R}a$)

Measurements:

The scatterplots produced by the relationship between the shoppers food-trips and the number of food stalls achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in the Figure 9.4.1. page A 203 . The summary statistics and the numerical-continuua are presented in Table 9.4.1. page A203.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of Market Places Introduced	2	2	3	4	1
Slope of regression	6.7105	4.4094	6.1113	7.2631	7.1875

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	3	4	1
Slope Score	.0136	.1317	.034	.0019	0
Efficiency Score	.0272	.2634	.102	.0076	0
Rank	3	1	2	4	

Figure/Table 9.4.1:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shoppers Food-trips and the Number of Food Stalls; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

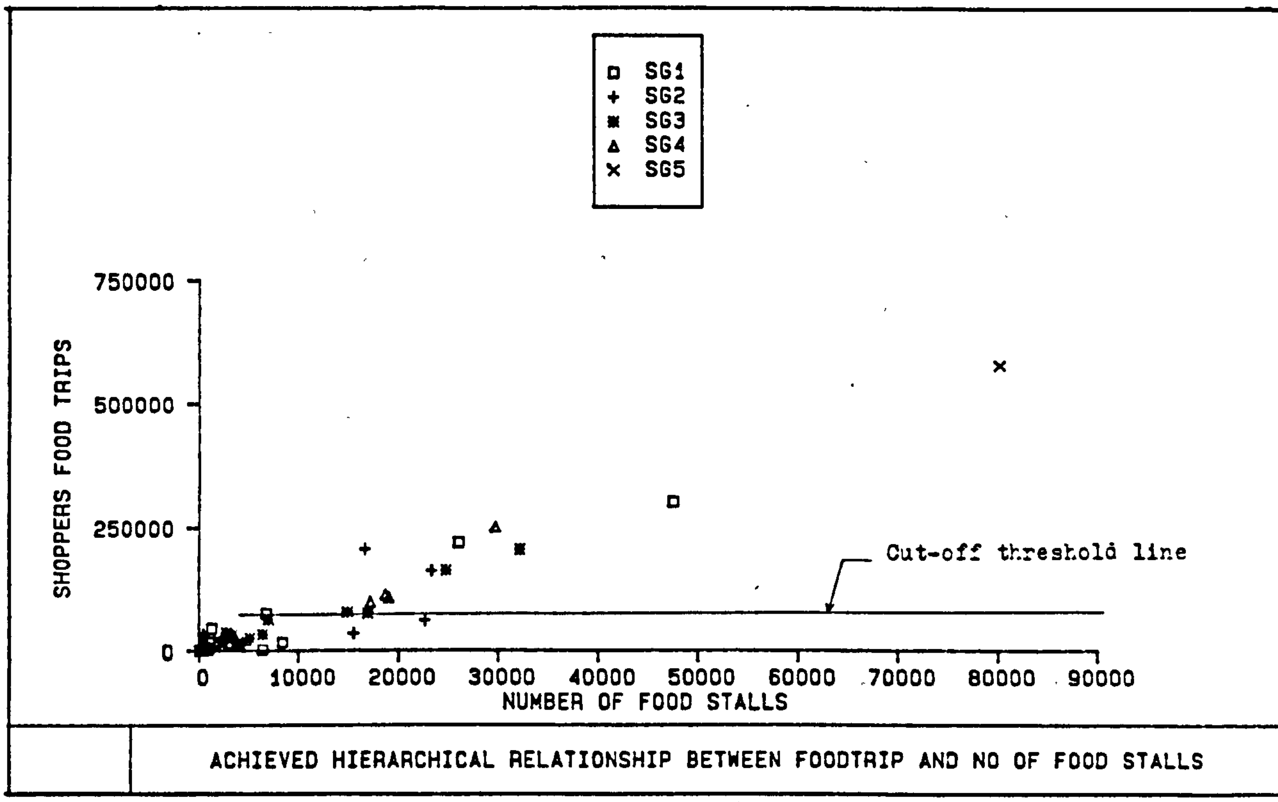


Figure 9.4.1: Multi-Scatterplots.

TABLE 9.4.1: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.9601	.65905	.9831	.9598	.9968
R Square	.9218	.4343	.9664	.9212	.9935
Signif F	.0000	.0191	.0000	.0000	.0000
SE of EST	31437.1	51171.6	12511.5	22900.1	15416.0
Ca	-319.7	23117.37	5286.6	-5253.4	-6183.1
$\bar{\alpha}/\hat{\alpha}$	6.7105	4.4094	6.1113	7.2631	7.1875
N-Continuum	2	2	3	4	1 - i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.2

Objective 1.2b

To achieve balanced demand and supply; between the shoppers non-food-trips and the number of non-food stalls; ($\bar{T}b - \bar{R}b$)

Measurements:

The scatterplots produced by the relationships between the shoppers non-food-trips and the number of non-food stalls achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.2. page A 205 . The summary statistics and the numerical-continuua are presented in Table 9.4.2, page A 205 .

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places Introduced	4	3	3	3	1
Slope of regression	10.0424	11.9741	12.3148	22.2664	14.4836

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	4	3	3	3	1
Slope Score	.0364	.0169	.0142	-.0272	0
Efficiency Score	.1456	.0507	.0426	-.0816	0
Rank	1	2	3	4	

Figure/Table 9.4.2:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shoppers Non-Food-trips and the Number of Non-Food Stalls; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

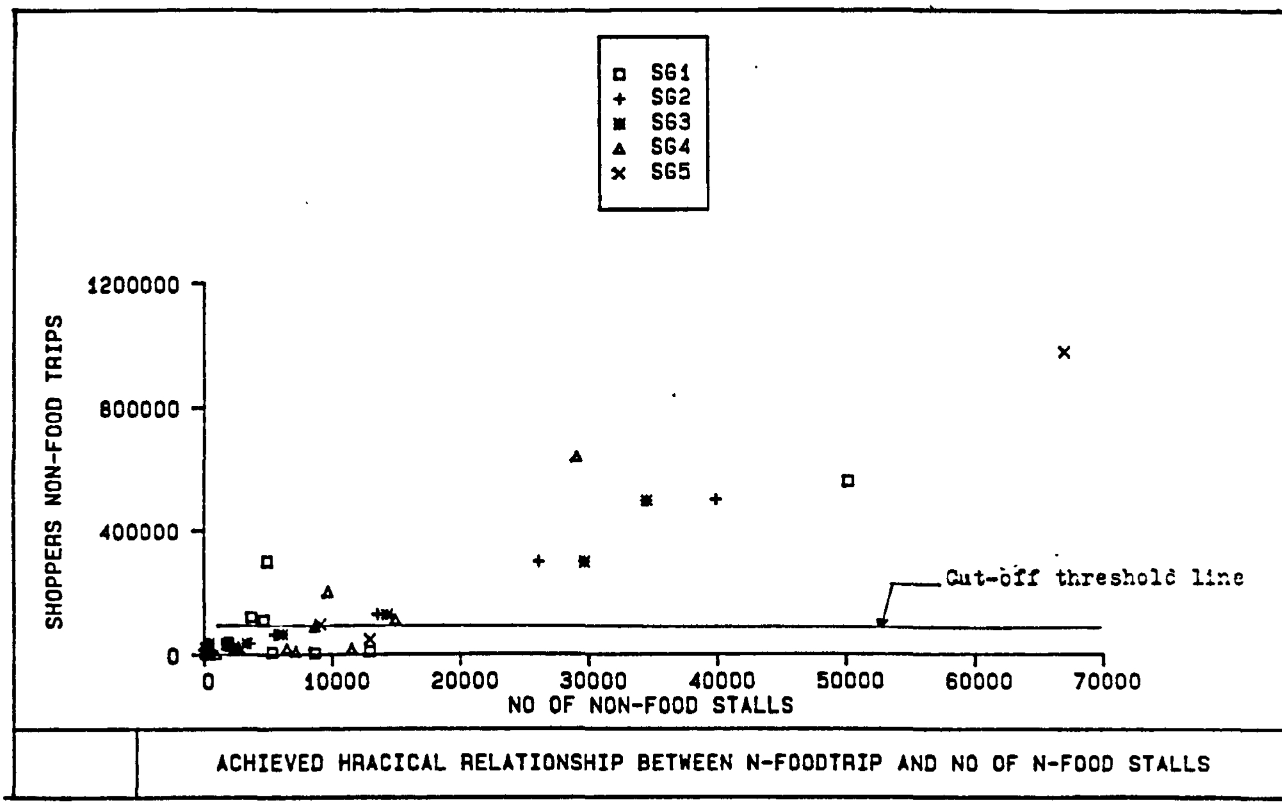


Figure 9.4.2: Multi-Scatterplots.

TABLE 9.4.2: Summary Statistics

	Alternative Strategies				Trend Strategy
Statistic	SG1	SG2	SG3	SG4	SG5
R	.8235	.9925	.9689	.8995	.9892
R Square	.6781	.9851	.9388	.8092	.9786
Signif F	.0017	.0000	.0000	.0005	.0000
SE of EST	109133.3	21912.0	44137.3	95354.3	47227.5
Cb	23380.9	366.4	-3372.3	-100646.7	-18467.6
≈ / ≈	10.0424	11.9741	12.3148	22.2604	14.4836
N-Continuum	4	3	3	3	1

- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.3

Objective 1.3a

To achieve balanced demand and supply; between the stallage food floor-space and the number of food-stalls; ($\bar{Z}a$ - $\bar{R}a$)

Measurements:

The scatterplots produced by the relationship between the stallage food floor-space and the number of food stalls achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.3, page A 207. The summary statistics and the numerical-continuua are presented in Table 9.4.3. page A 207.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	2	2	3	1	1
Slope of regression	2.6848	3.1313	4.2087	5.3429	4.7917

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	3	1	1
Slope Score	.3298	.2055	.048	-.0334	0
Efficiency Score	.6596	.411	.144	-.0334	0
Rank	1	2	3	4	

Figure/Table 9.4.3:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Stallage Food Floor-space and the Number of Food Stalls; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

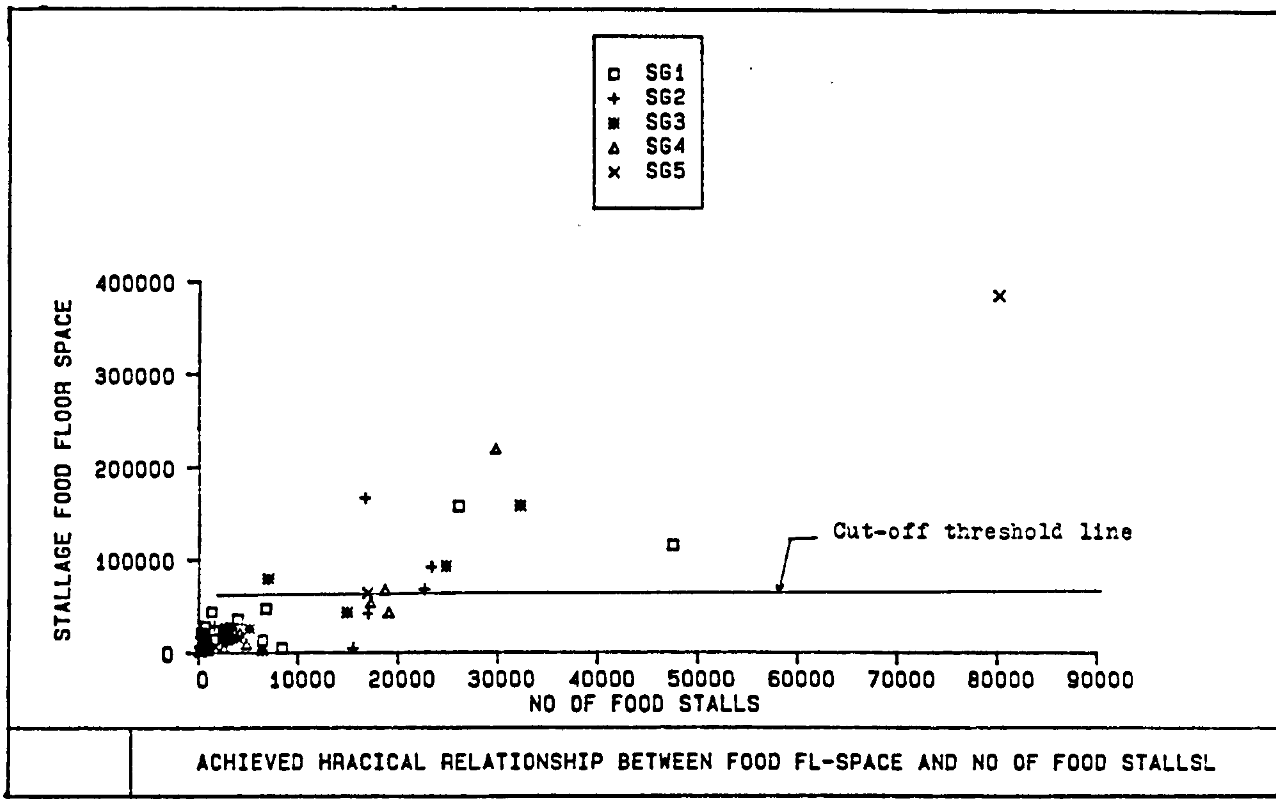


Figure 9.4.3: Multi-Scatterplots.

TABLE 9.4.3: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5	
R	.8028	.6136	.8997	.8589	.99879	
R Square	.6445	.3765	.8095	.7378	.9976	
Signif F	.0015	.0223	.0001	.0004	.0000	
SE of EST	30727.3	40356.4	22041.8	33263.4	5960.6	
Ca	18883.1	14693.8	4497.1	-6270.3	.964.2	
ã/â	2.6848	3.1313	4.2089	5.3429	4.7917	
N-Continuum	2	2	3	1	1	- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.4

Objective 1.3b

To achieve balanced demand and supply; between the stallage non-food floor-space and the number of non-food stalls; ($\bar{Z}b$ - $\bar{R}b$)

Measurements:

The scatterplots produced by the relationships between the stallage non-food floor-space and the number of non-food stalls achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.4. page A209. The summary statistics and the numerical-continuua are presented in Table 9.4.4. page 209.

Balancing Statistics:

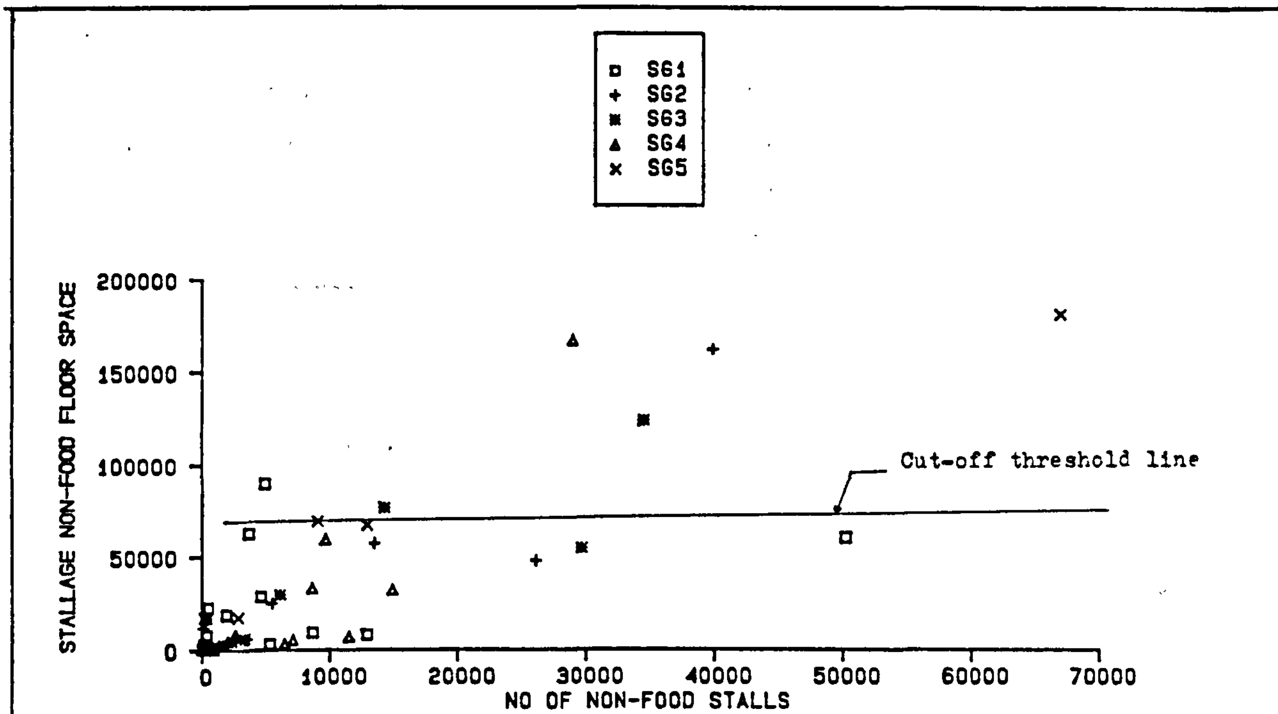
	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of Market places introduced	1	1	2	1	1
Slope of regression	0.6854	3.4657	2.9183	5.6223	2.6713

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	1	1	2	1	1
Slope Score	2.5803	-.1927	-.0770	-.3820	0
Efficiency Score	2.5803	-.1927	-.1540	-.3820	0
Rank	1	3	2	4	

Figure/Table 9.4.4:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Stallage Non-Food Floor-Space and the Number of Non-Food Stalls; Predicted by the Alternative and Trend Strategies in the Target Year 2005.



ACHIVED HRACICAL RELA-SHIP BETWEEN N-FOOD FL-SPACE & NO OF N-FOOD STALL

Figure 9.4.4: Multi-Scatterplots.

TABLE 9.4.4: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.3359	.9370	.8972	.8951	.9620
R square	.1128	.8780	.8049	.8013	.9256
Signif F	.1562	.0000	.0002	.0002	.0000
SE of EST	29076.8	18475.6	19405.9	24150.9	15885.6
$\bar{C}b$	22899.3	-98.8	4480.7	-20137.4	10679.6
$\bar{\beta} / \beta$	.6854	3.4657	2.9183	5.6236	2.6712
N-Continuum	1	1	2	1	1

– i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.5

Objective 1.4a

To achieve balanced demand and supply; between the stallage food floor-space and the number of food traders; ($\bar{Z}a - \bar{Q}a$)

Measurements:

The scatterplots produced by the relationship between the stallage food floor-space and the number of food traders achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.5. page A211. The summary statistics and the numerical-continuua are presented in Table 9.4.5. page A211.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	2	2	3	1	1
Slope of regression	3.2607	3.2515	3.2413	3.4908	3.5993

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	3	1	1
Slope Score	.0576	.0594	.0615	.0168	0
Efficiency Score	.1152	.1188	.1845	.0168	0
Rank	3	2	1	4	

Figure/Table 9.4.5:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Stallage Food Floor-Space and the Number of Food Traders; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

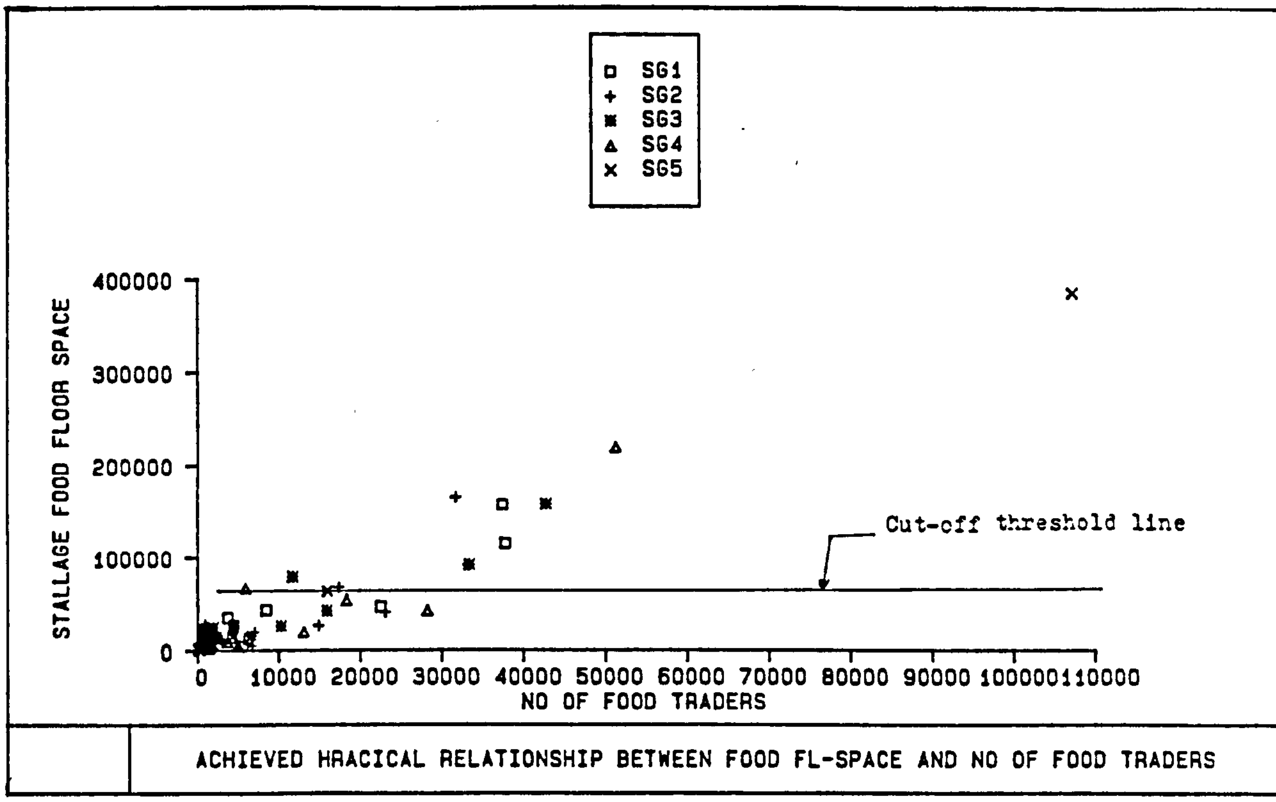


Figure 9.4.5: Multi-Scatterplots.

TABLE 9.4.5: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.9288	.8339	.9381	.8835	.9999
R square	.8627	.6955	.8799	.7806	.9998
Signif F	.0000	.0007	.0000	.0002	.0000
SE of EST	19092.8	28204.5	17496.3	30423	2031.3
Ca	5182.4	3780.6	5453.1	2427.8	1220.4
$\tilde{\alpha}$ / $\tilde{\alpha}$	3.2607	3.2514	3.2413	3.4907	3.5993
N-Continuum	2	2	3	1	1

- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.6

Objective 1.4b

To achieve balanced demand and supply; between the stallage non-food floor-spaces and the number of non-food traders; $(\bar{Z}b - \bar{Q}b)$

Measurements:

The scatterplots produced by the relationship between the stallage food floor-space and the number of non-food traders achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.6. page A 213. The summary statistics and the numerical-continuua are presented in Table 9.4.6. page A213.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	1	1	2	1	1
Slope of regression	0.4268	1.7024	1.3461	1.9532	1.0379

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	1	1	2	1	1
Slope Score	24.0358	24.9616	23.4950	25.3361	0
Efficiency Score	24.6406	24.9616	46.9918	25.3361	0
Rank	4	3	1	2	

Figure/Table 9.4.6:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Stallage Non-Food Floor-Space and the Number of Non-Food Traders; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

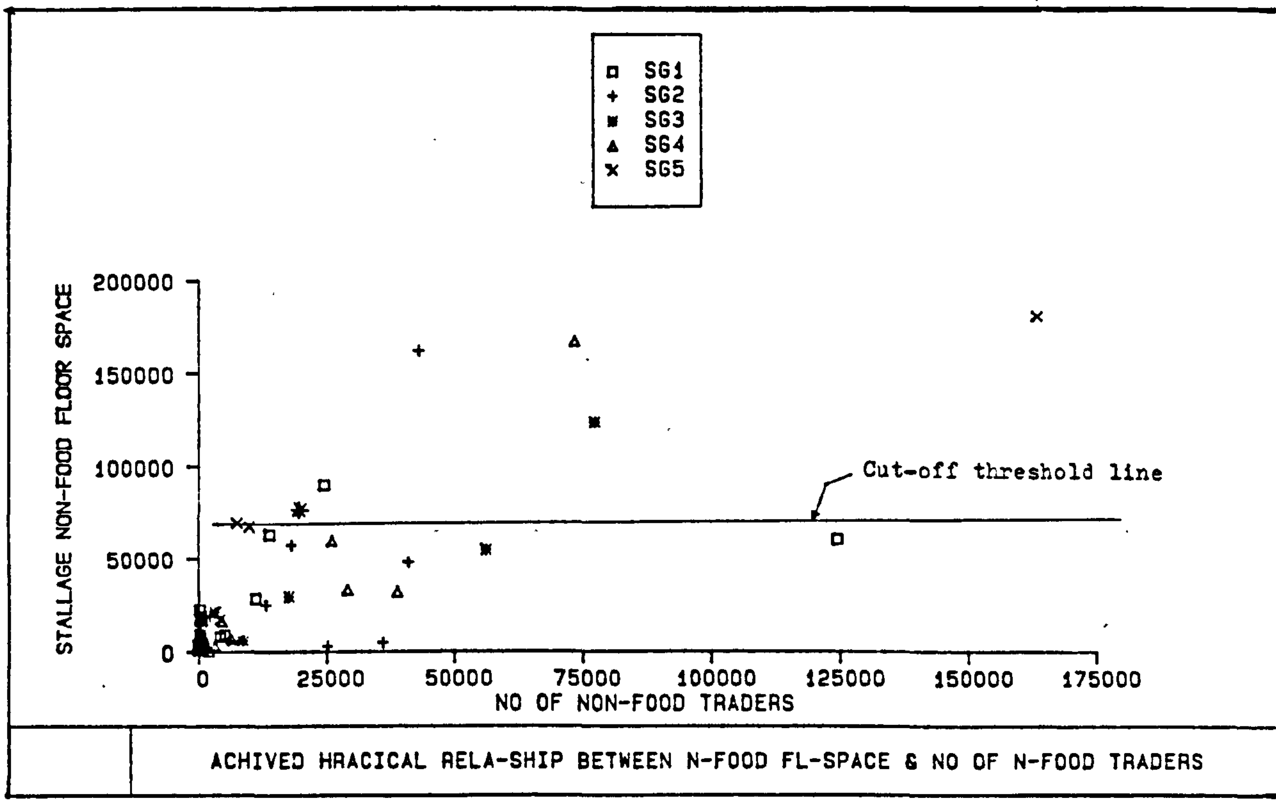


Figure 9.4.6: Multi-Scatterplots.

TABLE 9.4.6: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.5319	.6061	.8874	.9281	.9157
R square	.28298	.3673	.7874	.8613	.8386
Signif F	.0461	.02405	.0001	.0000	.0000
SE of EST	26140.8	39800.4	19160.9	19118.7	23394.9
Cb	21508.1	2335.0	8056.0	-2015.1	15842.8
β / β̂	.4268	1.7023	1.3461	1.9532	1.0379
N-Continuum	1	1	2	1	1

- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.7

Objective 1.5a

To achieve balanced demand and supply; between the number of food stalls and the number of food traders; ($\bar{R}a - \bar{Q}a$)

Measurements:

The scatterplots produced by the relationships between the number of food stalls and the number of food traders achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.7. page A215. The summary statistics and the numerical-continuua are presented in Table 9.4.7. page A215.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	2	2	2	4	1
Slope of regression	.9269	.5621	0.7125	0.5467	0.7482

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	2	4	1
Slope Score	9.7085	-1.6878	-.4931	-1.7654	0
Efficiency Score	19.417	-3.3756	-.9862	-7.0616	0
Rank	1	3	2	4	

Figure/Table 9.4.7:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Number of Food Stalls and the Number of Food Traders, Predicted by the Alternative and Trend Strategies in the Target Year 2005.

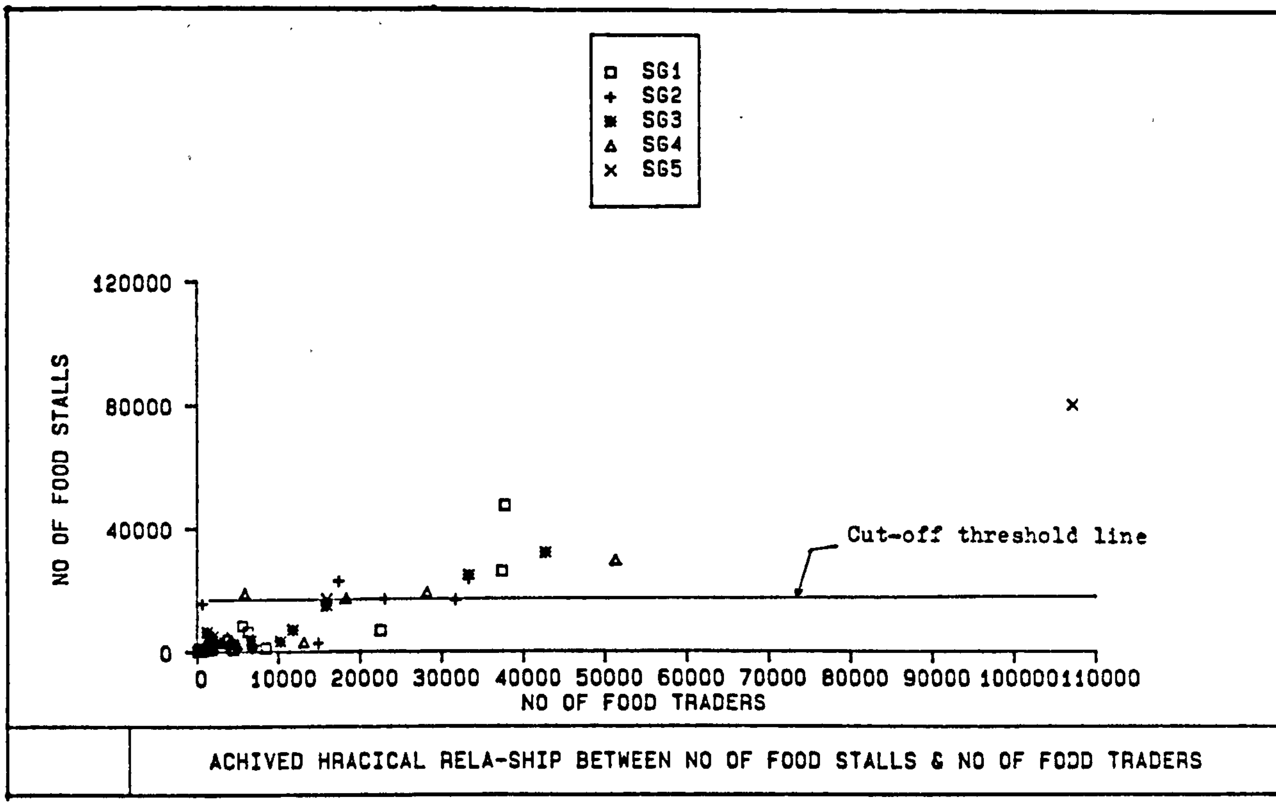


Figure 9.4.7: Multi-Scatterplots.

TABLE 9.4.7: Summary Statistics

Statistic	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
R	.8829	.7358	.9646	.8606	.9979
R square	.7796	.5414	.9304	.7407	.9958
Signif F	.0002	.0049	.0000	.0003	.0000
SE of EST	7233.4	6781.9	2849.3	.5317.2	1717.5
$\bar{C}a$	-1652.6	2454	918.8	2907.89	537.1
$\bar{\alpha}$ / ϵ	.9268	.5621	17125	.5467	.7482
N-Continuum	2	2	2	4	1 - i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.8

Objective 1.5b

To achieve balanced demand and supply; between the number of non-food stalls and the number of non-food traders; ($\bar{R}b$ - $\bar{Q}b$)

Measurements:

The scatterplots produced by the relationships between the number of non-food stalls and the number of non-food traders achievable by the alternatives, SG1, SG2, SG3 and SG4, were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.8, page A216. The summary statistics and the numerical-continuua are presented in Table 9.4.8. page A 217 .

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	1	3	3	2	1
Slope of regression	.3752	.5841	.4647	.3118	0.4036

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	1	3	3	2	1
Slope Score	-.0762	.7277	.1914	-.2236	0
Efficiency Score	-.0762	2.1831	.5742	-.4472	0
Rank	3	1	2	4	

Figure/Table 9.4.8:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Number of Non-Food Stalls and the Number of Non-Food Traders; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

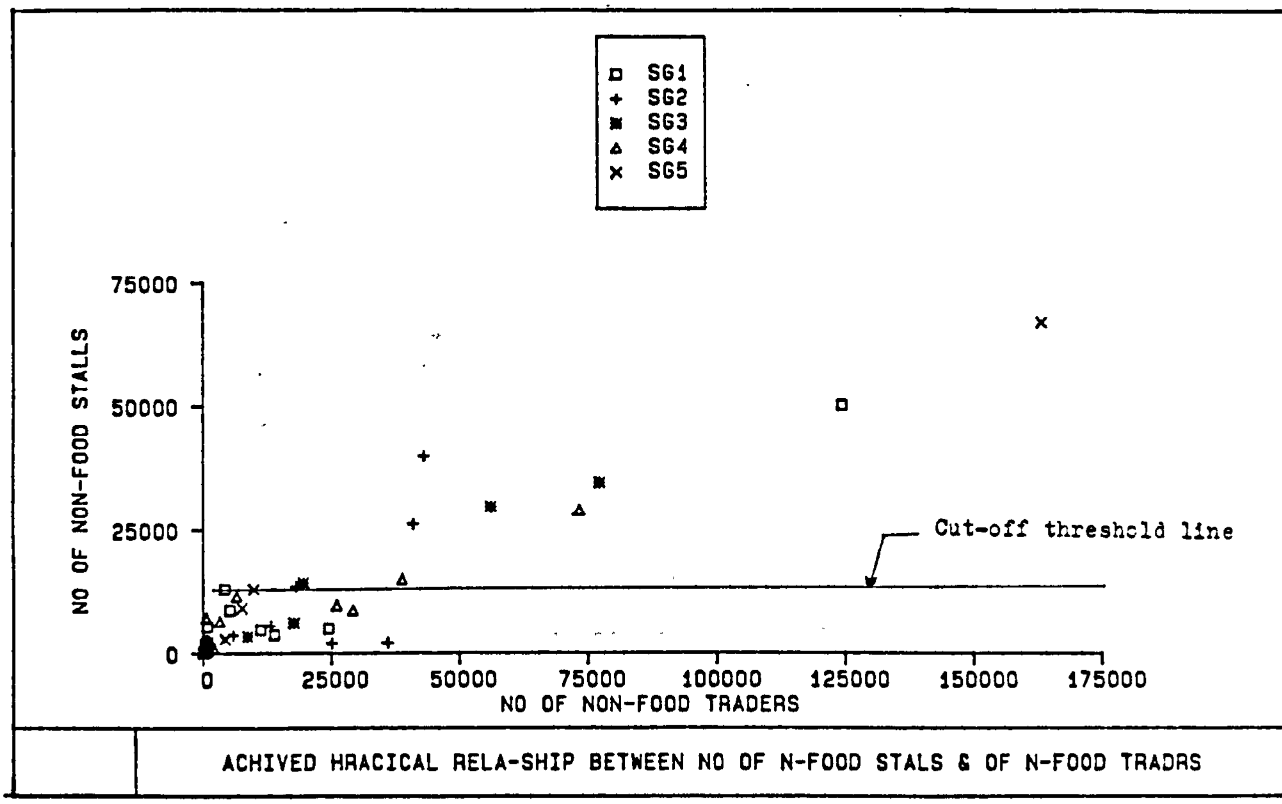


Figure 9.4.8: Multi-Scatterplots.

TABLE 9.4.8: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.9542	.7397	.9843	.9206	.9888
R square	.9105	.5471	.9688	.8475	.9778
Signif F	.0000	.0072	.0000	.0001	.0000
SE of EST	4527.8	9622.9	2385.5	3367.9	3125.3
Cb	2158.1	-1397.0	855.9	3699.8	1677.3
$\bar{\beta} / \hat{\beta}$	.3752	.5847	.4647	.3118	.4036
N-Continuum	1	3	3	2	1

- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.9

Objective 1.6a

To achieve balanced demand and supply; between the shoppers food-trips and the number of food traders; ($\bar{T}a$ - $\bar{Q}a$)

Measurements:

The scatterplots produced by the relationships between the shoppers food-trips and the number of food traders achievable by the alternatives, SG1, SG2, SG3 and SG4, were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.9. page A219 . The summary statistics and the numerical-continuua are presented in Table 9.4.9. page A219 .

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	2	2	3	4	1
Slope of regression	7.0151	4.3424	4.4581	4.3492	5.4082

Improved Balancing. Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	2	2	3	4	1
Slope Score	-.0606	.0724	.0624	.0718	0
Efficiency Score	-.1212	.1448	.1872	.2872	0
Rank	4	3	2	1	

Figure/Table 9.4.9:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shoppers Food-trips and the Number of Food Traders; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

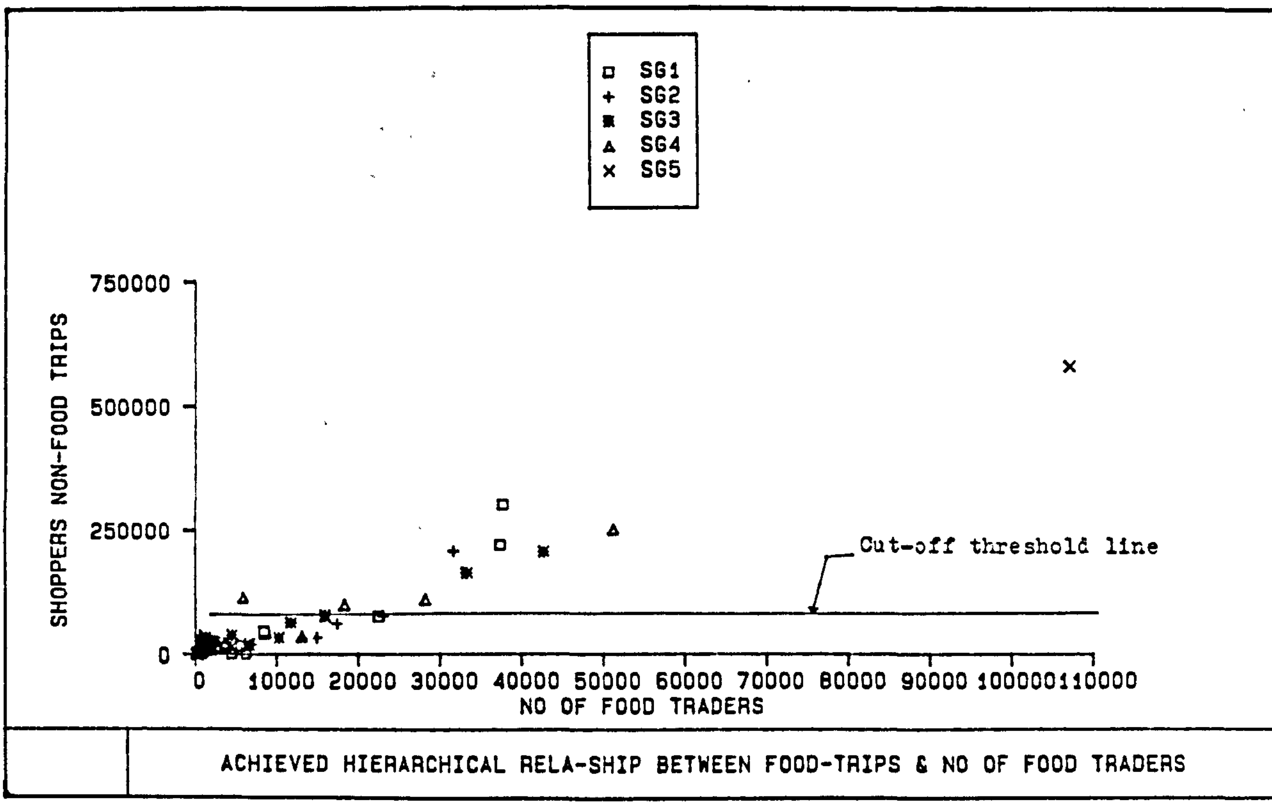


Figure 9.4.9: Multi-Scatterplots.

TABLE 9.4.9: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5
R	.9551	.87701	.9801	.9196	.9998
R square	.9122	.7692	.9606	.8457	.9995
Signif F	.0000	.0004	.0000	.0001	.0000
SE of EST	33307.0	32690.4	13544.5	32035.9	4542.4
Ca	-221100	11861.8	10337.2	13289.5	-2969.1
α / $\hat{\alpha}$	7.0151	4.3424	4.4581	4.3492	5.4082
N-Continuum	2	2	3	4	1

\- i.e. no. of market places above the cut-off threshold line

APPENDIX 9.4.10

Objective 1.6b

To achieve balanced demand and supply; between the shoppers non-food-trips and the number of non-food traders; ($\bar{T}b$ - $\bar{Q}b$)

Measurements:

The scatterplots produced by the relationships between the shoppers non-food-trips and the number of non-food traders achievable by the alternatives, SG1, SG2, SG3 and SG4 were superimposed on that promised by the trend strategy, SG5. The five graphs are shown in Figure 9.4.10 , page A221 . The summary statistics and the numerical-continuua are presented in Table 9.4.10 , page A221.

Balancing Statistics:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Number of market places introduced	4	3	3	3	1
Slope of regression	4.4856	6.6597	5.8162	7.4929	5.9475

Improved Balancing Score:

	Alternative Strategies				Trend Strategy
	SG1	SG2	SG3	SG4	SG5
Continuum Score	4	3	3	3	1
Slope Score	.0848	-.0254	.0055	-.0481	0
Efficiency Score	.3392	-.0762	.0165	-.1443	0
Rank	1	3	2	4	

Figure/Table 9.4.10:

Scatterplots and Summary Statistics of the Hierarchical Relationship Between the Shoppers Non-Food-Trips and the Number of Non-Food Traders; Predicted by the Alternative and Trend Strategies in the Target Year 2005.

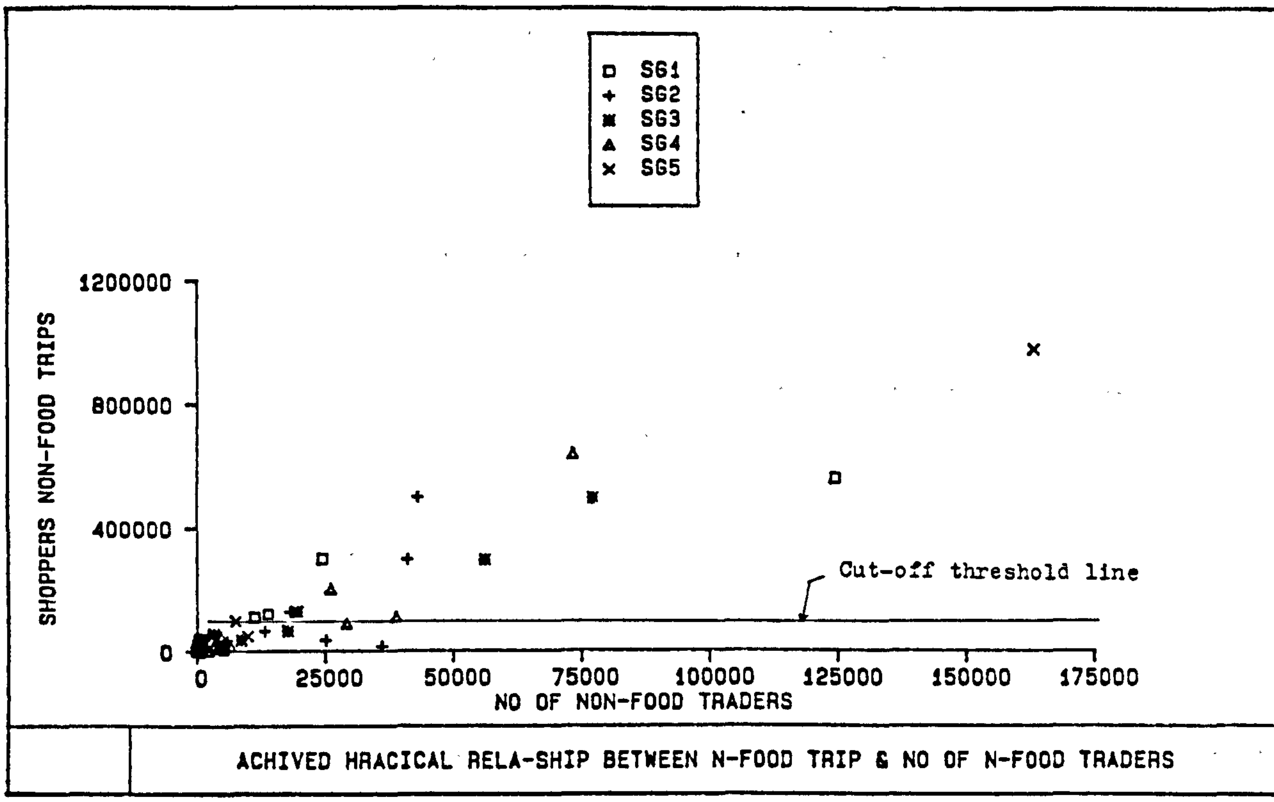


Figure 9.4.10: Multi-Scatterplots.

TABLE 9.4.10: Summary Statistics

Statistic	Alternative Strategies SG1	SG2	SG3	SG4	Trend Strategy SG5	
R	.9407	.7014	.9823	.9169	.9984	
R square	.8850	.4919	.9648	.8407	.9967	
Signif F	.0000	.0119	.0000	.0001	.0000	
SE of EST	65231.5	120937.4	3158	82125.7	18489.8	
Cb	33470.1	-6842.4	9054.5	-21932.9	6234.1	
$\bar{\beta}/\hat{\beta}$	4.4856	6.6597	5.8162	7.4929	5.9475	
N-Continuum	4	3	3	3	1	- ie. no. of market places above the cut-off threshold line

APPENDIX 9.4A FEBRUARY, 1984.

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

I am undertaking a postgraduate research programme at the University of Strathclyde, Glasgow, United Kingdom. My area of study is Urban and Regional Planning and your assistance is needed in answering the attached questionnaire on:

"RANKING OF DEVELOPMENT PLANNING SOLUTIONS TO THE CONGESTED KADUNA CENTRAL MARKET PLACE"

Your views will be treated in strictest confidence and will be used for academic purposes only.

Thank you for your co-operation and valuable help.

Yours sincerely,

UCHE O. NKWOGU

Serial no. ....

REF.	OCCUPATION OF RESPONDENT	MALE RESPONDENT	FEMALE RESPONDENT
01	ADMINISTRATOR		
02	POLITICIAN		
03	ACADEMICS		
04	FINANCIER		
05	CIVIL ENGINEER		
06	QUANTITY SURVEYOR		
07	ESTATE SURVEYOR		
08	TOWN PLANNER		
09	ARCHITECT		
10	LAWYER		
11	MEDICAL OFFICER		
12	ECONOMIST		
13	SOCIOLOGIST		
14	TRADER/BUSINESSMAN		
15	SHOPPERS		
	ANY OTHER OCCUPATION		

1. To facilitate GROWTH AND CHANGE in the congested KADUNA CENTRAL MARKET PLACE, the following DEVELOPMENT PLANNING SOLUTIONS have been proposed. You are requested to rank them in order of usefulness from your own point of view. The most useful is ranked 1st, whilst the least useful is ranked 8th.

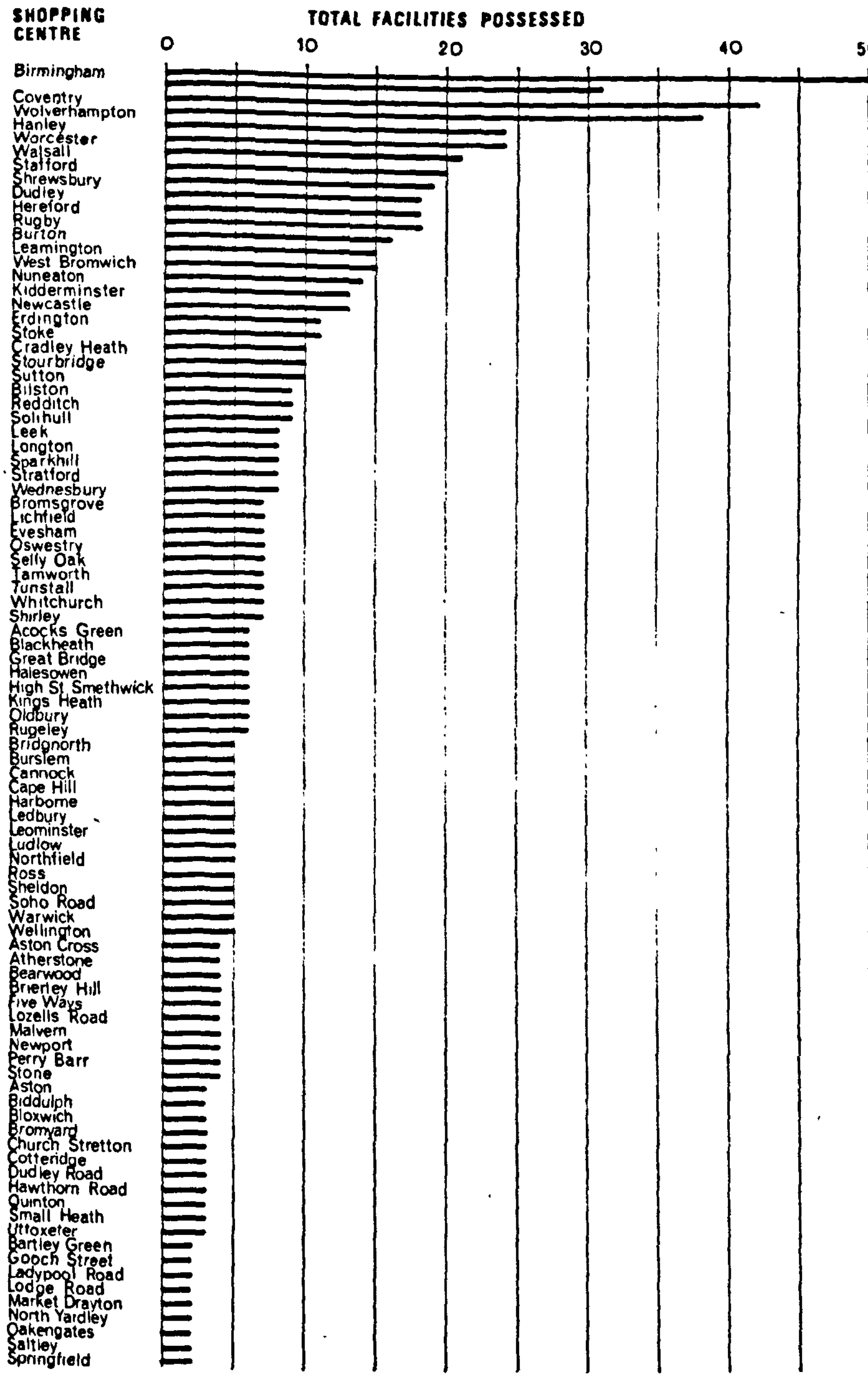
REF.	POSSIBLE DEVELOPMENT PLANNING SOLUTIONS	Your ranking
A	DISPERSAL OF SOME OF THE CENTRAL MARKET PLACE ACTIVITIES	---
B	RELOCATION OF THE CENTRAL MARKET PLACE	---
C	HORIZONTAL EXPANSION OF THE CENTRAL MARKET PLACE	---
D	VERTICAL EXPANSION OF THE CENTRAL MARKET PLACE	---
E	CENTRAL MARKET PLACE CONTROL USING PRICING TECHNIQUE	---
F	CENTRAL MARKET PLACE CONTROL BY FREE MARKET COMPETITION I.E. NO PLANNING POLICY AT ALL	---
G-H	CENTRAL MARKET PLACE CONTROL THROUGH URBAN MANAGEMENT AND DEVELOPMENT CONTROL	---
I	DECENTRALIZATION OF THE CENTRAL MARKET PLACE	---

If further information is required, my contact address is:

c/o DR. (MRS.) FLORENCE U. NKWOGU,
GUINNESS EYE UNIT,
A.B.U. TEACHING HOSPITAL,
KADUNA, NIGERIA. Tel. 62 213 855 Ext. 2.

2. Please could you define "the City Central Market Place" or in other words could you explain what "the City Central Market Place" means to you. Please write your definition or explanation of the City Central Market Place below on this page.

Appendix 9.4.11: Static Concept of Hierarchical-Continuum of Shopping Centres.



Total Facilities for each Centre

Source: Report on the Study of Three Northamptonshire Towns by the Shopping Research Group (RTPI, West Midlands Branch, 1967)

Plate 9.3: Method of Display and Marketing of Fresh Meat in the Market Places.

Plate 9.4: Method of Display and Marketing of Grains and Flours in the Market Places.