A SYSTEMS MODEL OF RURAL-URBAN MIGRATION IN NIGERIA

by

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ABSTRACT

Rural-urban migration in Nigeria is the cause of a number of problems; the problems of overcrowding and deterioration of the urban environment associated with rapid urban growth; the economic loss resulting from the high unemployment rates in urban areas; and the problem of adverse implications of prolonged periods of frustration among the urban poor. Nigerian governments recognize that rural-urban migration calls for more effective policies than those attempted in the past. In this context new approaches designed to foster greater understanding of the nature of this process and more effective policies should be helpful.

This thesis proceeds on the premise that rural-urban migration is in reality a process within a complex socio-economic system consisting of many interacting components and significant feed-back effects. It is thus held that a General Systems Approach provides an appropriate and useful analytical framework for the study of this process. In addition to bringing a broader perspective to the analysis, a systems framework is a powerful tool for exploratory research and therefore well suited both to the promotion of a greater understanding of the process and for the generation of a number of initial policy considerations.

Relying on material from existing literature and personal experience related to the process in south-eastern Nigeria, a model of rural-urban migration is developed in Chapter 4 (Figures 4.1 and 4.2), and applied in Chapter 5 to derive a series of testable hypotheses related to the migration process. The methodology is demonstrative of a systematic procedure for generating a series of interrelated potential policies for shaping the process.

The main thrust of the work is to develop a conceptual systems model of the rural-urban migration process and thus to lay a foundation for further, substantive research on rural-urban migration in Nigeria. In the concluding chapter, some directions for this future research have been sketched.

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CHAPTER 1

THE PROBLEM, OBJECTIVE, AND METHODOLOGY

1.1 A Statement of the Problem

> To the extent that many newly-arrived migrants are likely to join the growing pools of unemployed and highly underemployed workers, and to the extent that an increasingly large proportion of these migrants represent the more educated segments of society whose productive potential is largely being dissipated, the process of continued rural-urban migration at present levels can no longer be said to represent a desirable economic phenomenon. Until something positive is done to relieve this problem, the African development effort will be only partially successful.
>
> (Todaro, 1971: 391)

Rural-urban migration is a universal process. In most of tropical Africa it is relatively recent, and proceeding at a pace that is a source of concern to its governments.

Unemployment, squatter settlements, overloaded or non-existent municipal services, burgeoning urban populations, rural stagnation, etc., are all problems in some way related to the phenomenon of rural-urban migration. Because they are so closely related to rural-urban migration, in the sense that each one of them is affected by the migration process, the latter has come to be seen as a major policy intervention point in the attempt to come to grips with the related problems. However nobody seems to know whether it is possible to significantly slow rural-urban migration, what instruments are required to do this, and at what cost.

A fairly extensive literature has grown up around the subject of rural-urban migration in Africa. They cover a wide variety of perspectives. A great many of them are of the sociological-anthropological variety; some are political-economic; a few are geographical; and still fewer are

psychological.

Two relevant statements may be made of these writings. Very few of them have been policy-oriented writings (Todaro, 1971; Callaway, 1963). More significantly, even though individual contributions may be excellent, they stand, collectively, as mere fragments of an entity which exists in reality as a "whole". They have therefore failed to impart sufficient knowledge of the essence of the phenomenon to enable decision-makers to move ahead with confidence.

Nevertheless, in the early sixties, the Governments of Eastern and Western Nigeria did generate and implement farm-settlement policies aimed at stemming the rising tide of rural exodus. For a combination of reasons, these policies did not live up to the expectations of those who created them. Probably the most fundamental cause of the disappointments was failure to appreciate the complexity and scale of the problem that was being addressed.

Meanwhile, concern over the problems being created by rural-urban migration continues to mount, and sooner or later, amid the conflicting, competing and partial arguments of the experts, major decisions are going to be taken by Nigerian Governments to try to come to terms with the situation.

This work is founded upon the thesis that rural-urban migration exists as part of a complex system, and subject to complex system behaviour. Only a systems model of the phenomenon is powerful enough to capture the multiple dimensions of the real-world system. It is the aim here to make a contribution, however modest, towards the building of such a systems model, and to show how it may be related to policy.

1.2 Objective of Study

The objective of this study is to build a conceptual systems model of the process of rural-urban migration with particular reference to Nigeria. This model is intended to serve the following purposes:

a) to structure existing knowledge about rural-urban migration in order to sharpen our understanding of, and thinking on, the subject,

b) to isolate testable hypotheses about the process,

c) to generate, systematically, initial policy options pertaining to migration,

d) to provide a data collection framework, and

e) to lay the foundation for extended work in this area of research.

1.3 Methodology

The methodology of this study follows generally the procedure for the development of systems simulation models in the social sciences and planning (Lowry, 1965; Forrester, 1968; Stogdill, 1970; Baxter, 1973).

1.3.1 Function of the Systems Model

> The first stage in the development of the model is to decide, explicitly, the objectives and scope of the model, thereby determining what will be included in the model (and, of equal importance, excluded), what level of detail will be involved, how the model is to be structured, what is to be emphasized ..., and what priorities will be used to guide the process. There is no objective method, no formula, no set of rules, to determine these: they are based on the objectives and interests of the persons building the model and the constraints imposed upon them.
>
> (Baxter, 1973: 4)

The first task of the modelling effort, therefore, is to state, explicitly, the function expected of the systems model of rural-urban migration to perform. This has already been adequately covered in Section 1.2.

1.3.2. Definition of the System

The definition of the system involves the choice of the components to go into the model and their classification, and the designation of functional relationships between such components.

In the selection of the components to go into a model, the builder is fundamentally guided by his own knowledge of the real-world system, and existing studies of the phenomenon by other people. He then attempts to select those significant components that bear on the situation he is interested in and limit the study to them (Parsegian, 1972: 25). The following modelling effort will rely on the author's first-hand knowledge of the process of rural-urban migration in south-eastern Nigeria, and on a number of key descriptive materials on migration and General Systems Theory.

The reason for the classification or grouping of components is that the latter differ at least in terms of their functions within the system. The model of rural-urban migration to be built is intended to reflect the dynamic aspects of the process. Therefore, there are two classes of components that must be recognized - components conceived as "stocks" and those conceived as "flows" or rates (Lowry, 1965). A "stock" is an inventory of items sufficiently homogeneous to be treated as having only the dimension of size, eg., the number of uneducated unemployed people in a rural community. This inventory may change over time, and such changes per unit time are the "flows" or rates.

In addition to the above two classes of components, a third group is recognized, and it consists of all the components which are conceived to be outside the set of specified components of the system. Collectively they are known as the system environment.

Once the components of a model have been chosen and classified, the next tasks are to assign the interrelationships between components and to develop a diagram of the system.

The systems diagram shows all the components of the system and the interrelationships that exist. Two conventions will apply here: first, stocks are shown as rectangular boxes while rates are depicted as hexagons; secondly, directed arrows, which represent interrelationships, do not link two stock components directly without an intervening rate component or process.

The process of model-building does not proceed as neatly as the above discussion implies, however, it is in part a creative process characterized by trial and error, continuous model enrichment or elaboration, and analogy or association (Morris, 1967). The process of continuous enrichment refers to the technique of proceeding from a very simple model far removed from reality to more and more complex and realistic versions. Analogy or association in modelling is the process whereby the model-builder seeks insight in related existing models.

1.3.3 Application of the Systems Model

Because the model to be built here is a conceptual one, not involving the use of any quantitative empirical data, it is not possible to proceed to the third phase of model development: the calibration of the model with real data. However it will be applied here primarily as a basis for isolating a number of testable hypotheses about the real world system,

and for demonstrating a systematic technique for generating a range of initial policy options.

CHAPTER 2

REVIEW OF LITERATURE AND THE NIGERIAN EXPERIENCE

2.1 Review of the Literature on Migration

The literature on RUM in Africa is vast, and to a great extent repetitive. It is hard to refer to all of it, so the bias here will be in favour of those that are particularly relevant in an obvious way to the task at hand.

Perhaps it is fair to assert that the bulk of the writings on RUM in Africa revolves around four issues: characteristics of migrants; processes of RUM; causes; and consequences. It is to the first three of these that we now turn in this section.

2.1.1 Characteristics of Migrants

The area of migrant characteristics is dominated by the work of Caldwell (1969), who did a large-scale, questionnaire survey of migrants in Ghana in the early sixties. This excellent piece of work will be mentioned continuously; but this is not meant to underestimate the valuable contributions of several other authors to the study of RUM in Africa. Together they have provided a fairly comprehensive demographic, educational and economic profile of the migrant.

Demographic Characteristics

Though early studies of RUM correctly indicated a predominant male representation in migration streams, more recent findings point to the fact of an almost equivalent proportion of males and females. In the Ghana case, for instance, Caldwell (1969) observed such a balance in the migrant streams.

With regard to age, the migrant is almost always young. Caldwell (1969) observed that the greatest propensity to migrate was in the 15-19 age category. Rempel (1970) noted a peak for the 20-25 age group in Kenya; while Callaway's (1967) survey of migrant population for Ibadan, Nigeria, showed that the 15-25 age group was the most dominant. There is some evidence to show that beyond the age of 45 the number of returning migrants exceeds the number of out migrants (Caldwell, 1969; Ominde, 1967).

Educational Characteristics

A positive correlation between the educational achievement of a migrant and his propensity to migrate is fairly well established across the world. On the Ghana scene Caldwell (1969) saw this factor as the dominant one in the propensity to migrate, the latter increasing rapidly with the duration of formal education.

Other findings by Rempel (1970) in Kenya and Sabot (1972), in Tanzania lend support to those of Caldwell. And in addition, Sabot's analysis revealed the additional dimension that the selectivity of migrants by their levels of education has increased over time. That is to say, that over time the proportion of people, in migration streams, with higher levels of educational achievement increases relative to the proportion of those with lower qualifications. Thus the proportion of high school graduates increased relative to that of primary school graduates. In Tanzania the evidence points to the fact that primary school graduates are beginning to respond to the diminishing job opportunities in the urban areas by staying in their rural locales while secondary school graduates now form a higher proportion in the urbanward migratory streams (Sabot, 1972).

Sabot's finding seems to suggest that the process of rural-urban migration exhibits a behaviour similar to that of feed-back systems in which present behaviour depends upon the consequences of previous action. In the past primary school graduates were in great demand for work in the urban areas; these graduates responded to this by migrating in large

numbers, clogging the market; again in response, many are staying back in rural areas.

It is reasonable to expect that some such feedback response is operating in the Nigerian situation today, and that not only primary school, but also high school graduates are involved. Tomorrow university graduates may well be involved too.

Economic Characteristics

Findings in this area indicate that migration streams are dominated by school graduates who have had no previous job experiences and therefore no incomes. Both Rempel (1970) in Kenya and Callaway (1967) in Nigeria found that over 50% of their migrant samples were of the school-graduate category. The rest were made up of farmers and self-employed craftsmen. This percentage split may well be an underestimate of the school-graduate component, though the size of the component itself varies with time and place. In the current southern Nigerian situation the proportion of primary and high school graduates in migration streams may well be of the order of over 60 per cent, while a lower figure may be expected in the northern states.

Little data exist on the income status of households from which migrants originate, and there is lack of agreement even within the little that does exist.

Many contributors believe that the heavy out-migration from densely populated rural origins indicate that migrants generally derive from poor households (Elkan, 1960). On the other hand, Caldwell's (1969) Ghana survey turned up evidence that migrants tend to originate from households of above-average means. In line with this, Hill (1969), in a survey of Nigerian primary school graduates, reported that the highest rates of

migration were found to occur among the highest and lowest income households in the rural community investigated. One possible interpretation of this is that well-to-do families are also the ones most capable of giving high school education to their children, which would enhance the latter's propensity to migrate. They are also the ones most likely to have a member of the family already in an urban area to provide a base for other members. While the middle class families find themselves relatively comfortable in the local order of things, the low-income ones, probably with very little land, are more likely to try their luck elsewhere. A basic question that arises here is whether rising rural incomes will have an accelerating influence upon RUM, and consequently whether policies of rural development aimed at discouraging it are only self-defeating.

2.1.2 The Processes of Rural-Urban Migration

The processes of RUM in Africa, as far as can be ascertained from existing literature, may be viewed in terms of a number of sub-processes: urban-rural interaction; chain migration; stepwise migration; distance-decay effects; self-adjusting responses.

Urban-Rural Interaction

A significant aspect of the processes of RUM in most of Africa is the very high degree of interaction between the migrant in the city and his kinsmen in the rural area. In a sense most urbanites have their roots still firmly embedded in the village from which they originated. An urban dweller has two loyalties: one part of him is loyal to the urban centre; the other to his rural place of origin.

The expression of this rural loyalty takes different forms. The

urbanite is in constant contact with his folks back home through letters, and makes personal visits frequently to them, especially on ceremonial occasions.

A great many people from the rural community also pay frequent visits to their kinsmen in the city. Thus the degree of communication and personal contact between the urbanite and his rural kinsmen is very high.

One of the more outstanding roles of the urbanite is to supply information to his relatives in the village about urban conditions, including job opportunities, and to undertake to provide accommodation and food for new migrants from the country. This role is something of a duty for urban dwellers, most of whom would go to the full extent of their financial means to carry it out.

Preoccupation with the welfare of the rural home on the part of urbanites also expresses itself in the formation of ethnic, mutual-aid, organizations (Little, 1965), the express purposes of which are to promote, from the urban end, the interests of their respective rural homes through such rural development projects as water supply, electrification, road, health clinic, hospital and school construction. The provision of shelter, food and jobs for newly-arrived migrants are all part of the concerns of these ethnic organizations.

Most urbanites retire to their village origins after the age of about 45 (Caldwell, 1969). In combination with younger men who could not make it in the urban centres, these senior citizens retiring to their birth places bring about a reverse migration stream - urban-rural migration.

Perhaps one of the more significant aspects of the strong urban-rural linkages is the flow of wealth between urban and rural locations. Rural people send small gifts of farm products on their frequent visits to

urbanites from whom they also receive gifts, especially cash and assortments of manufactured goods. More significantly urbanites make regular remittances to relatives in the rural areas. Though the actual magnitudes of these remittances have not been carefully determined, there is some evidence from Kenya that some 21% of the wage bills of low and middle income groups flow to the rural areas in this form (Johnson and Whitelaw, 1969). It will appear that the above figure is not unrealistic for much of Nigeria, and that a major part of these remittances go to support school fees and consumption.

All this is to underscore the tremendous impact of the urban populations upon their kinsmen back home and the direct implications of this for further out-migration and reverse migration upon retirement.

It must be recognized that a majority of present urban populations is first generation urbanites, that is, they were actually born and brought up in the country. This class of urbanites find that its rural roots are very much a part of its life and find great pleasure in identifying with rural origins. It is fairly clear that the strength of the urban-rural interaction, as described above, will weaken as one generation gives way to another. What is not so clear is how fast this will happen.

Chain Migration

Closely related to the issue of a strong urban-rural interaction is the important sub-process of chain migration.

When one member of a certain family establishes a foothold in an urban area, the probability that other members of the same family will migrate, and to the same urban centre, increases rapidly. By extension, when a substantial number of migrants leave a particular origin, the act of migrating from that community gradually acquires the force of tradition and

many more people are prepared to follow the steps of their kinsmen gone to the urban centres.

In actual fact this chain process results from the high degree of information flowing from the urban centres to a particular rural family or community; the added guarantee of initial accommodation and food assistance by kinsmen at the urban end works to reinforce the process. Hagerstrand (1957) recognized the importance of positive feedback impulses from destinations in the decision by people to migrate. Some attempt will be made to incorporate something of the chain effect as an aspect of the feedback relationships between urban and rural areas.

Distance-Decay Effect

Many observers have witnessed to the major importance of the distance-decay effect in the process of migration.

Every migrant, in moving from an origin to a distination, has to contend with the friction offered by the intervening distance. This friction may take the form of the money cost of overcoming distance; it may be the time and inconvenience cost of travel. Of equal significance with regard to rural-urban migration, is cultural distance. In the African environment, more than in most others, the further away a migrant travels thelgreater the divergence between his home culture and the new one encountered. Certainly in Nigeria the effect of cultural distance has considerable impact on the travel behaviour of primary school and most high school graduates. Hence, ceteris paribus, a migrant would go to a destination nearer to his original home than one that is farther away.

In terms of information theory, the greater the distance between a prospective migrant and a particular destination, the less the information

he is likely to have about that destination and the less the likelihood that he will move there.

However the distance-decay effect must be looked at in perspective. First it is subject to modification by the operation of the chain effect discussed earlier. The probability that a migrant will go to a given destination bears an inverse relation to the distance and a direct relation to the attractiveness of the destination. One important element in the attractiveness bundle is whether a potential migrant has kinsmen or not in a particular destination.

Distance-decay effect, secondly, has to be seen in terms of the development process of a society. As transportation and communication systems improve, as people become economically stronger to absorb the friction of distance, and as society becomes more open, the distance-decay effect on migration dwindles. So it is another time-dependent variable.

Stepwise Migration

Stepwise migration describes the process in which a migrant, over time, moves up the settlement hierarchy in steps from the small market centre near his village, through intermediate regional or provincial urban centres, to a national metropolis. It is not suggested that all migrants must end up at a national metropolis, but the idea of a progression from the village, the nearest service centre, the provincial urban centre and finally to a metropolis is essential to the concept of stepwise migration.

Some such process was identified by Ashton (1966) in his study of 18th century Britain. The progression in this case was from farms to villages, market towns and finally to the larger industrial centres. It was suggested that in this way a migrant avoided a sudden break in his pattern of living and maintained a continuity.

Collins (1952), Harvey (1968), Riddell (1970) and Riddell and Harvey (1972) indicated that the process of stepwise migration was operating in urbanward migration in Sierra Leone. But the data upon which the conclusion was made could be more solid. Gregory (1971) also reported evidence of the same process in Upper Volta. However, Caldwell (1969) did not find the process significant in Ghana.

However it can be argued that because of the fairly strong effect of chain migration people who move do so with specific destinations in mind, and, if they are successful in obtaining jobs, tend to stay on in such destinations. The tendency to stay on in a place once a job has been secured instead of moving up the urban hierarchy is likely to be strong under conditions of high unemployment. To many a bird in hand is better than ten in the woods. Migrants who fail to obtain jobs, in a reasonable time, in their first urban destinations will have a strong temptation to move up the urban hierarchy, and probably end up at the metropolis. The state of unemployment in Nigeria, particularly among young school graduates suggests that there may be some degree of this kind of stepwise movement. But this will happen not because of some irresistable attractive force of the metropolis but because lower order urban places increasingly fail to satisfy the primary desire of a migrant: the desire for wage employment. This point needs to be made as the issue of decentralization of urban investment as a policy for reducing the unfavourable consequences of rural-urban migration for metropolitan areas is far from settled.

Self Adjusting Responses

It was reported earlier that there was some evidence that migration among primary school graduates in Tanzania was responding to diminishing employment opportunities to this class of labour (Sabot, 1972).

It is probable that some such process is operating in Nigeria and will affect the entire educational hierarchy eventually. A more general way of stating this is that the operation of RUM will respond to existing urban and rural conditions, and that there is no such thing as an automatic emptying of all rural people into urban centres once the process is set into motion.

Among the conditions that will be important in influencing decisions to migrate are the state of urban employment and unemployment, the state of rural employment and unemployment, urban-rural income differential, the state of urban amenities, and the quantity and quality of urban-rural information flows. Attempts will be made to reflect as much of the processes described as possible in the model of RUM.

2.1.3 Causes of Rural-Urban Migration

Most of the literature on RUM in Africa, as indeed elsewhere in the world, are in remarkable agreement that the basic cause of RUM (not including forced migration) is economic (Gugler, 1969; Thomas, 1970; McDonald, 1971). A potential migrant normally decides to leave his rural base when he perceives the possibilities of improving upon his well-being in an urban area. He is always evaluating the rural-urban balance of opportunities to find a basis for taking a decision one way or the other. In the African environment today that balance is overwhelmingly in favour of the urban.

The foregoing paragraph was not intended to give the impression that the economic axis is the only one along which the decision to migrate operates. Mitchell (1959) pointed out how easily rural-urban migration could become part of the normative structure of a rural community. The

act of migrating becomes part of the role of being young, unmarried and educated, even for those who have no apparent economic motive for migrating.

Other researches point out the importance which migrants attach to the opportunity of escaping the set social structure of the rural community, a condition that is almost always frustrating to the ambitious and the underprivileged. To such migrants the urban environment offers relative freedom and opens new doors for personal betterment (Banton, 1957).

However it is often very hard to draw a clear distinction between economic and non-economic causes of RUM. Consider the case of a youth fresh from school, with well-to-do parents who have considerable land for different purposes. This youth departs for an urban area, remains jobless for some time, say a couple of years, during which time he partly lives on remittances from his parents back home. Eventually he obtains a job as a clerk in a Government agency. Was his decision to migrate economic or socio-psychological in nature?

Prima facie, the decision would appear to be more socio-psychological than economic as the move was, to him and his family, socially desirable as a logical extension of the student role. On the other hand, it can be argued with considerable force that the decision to move was based, not on current expected wage of a clerk, but on an optimistic future flow of incomes as he rises from the position of a clerk. So what weighed heavily in the mind of the youth was not necessarily the present state of affairs but expected future economic advantages.

Gugler (1969) in summarizing the situation for Sub-Sahara Africa observed that economic factors have been the major cause of labour migration and that they largely determine its rate. But while there is general agreement about the predominance of economic forces in the decision to

migrate, the isolation of the relevant economic variables in the decision process remains a problem (Byerlee, 1972).

However, the urban-rural income gap is regarded as an important variable. Studies which have attempted to evaluate urban-rural income differentials in the tropical African environment have generally turned up substantial, and in most cases rising, differentials, even though these studies overlooked the fact that many migrants enter the lower-wage urban small-scale sectors and not the high-wage modern sectors used in the studies (Lewis, 1967; Diejomaoh and Orimalade, 1971; Rourke and Sakyi-Gyinae, 1972; Todaro, 1971).

Apart from urban-rural income differential, empirical studies have found the rate of growth of non-agricultural jobs, the rate of unemployment (Johnson, 1971), and job opportunities in urban areas (Lee, 1972) to be significant determinants of out-migration from agriculture.

2.1.4 Attempts at Modelling RUM

Three kinds of quantitative modelling techniques have been applied to the study of RUM in tropical Africa. The first are multiple regression models; the second are mathematical (analytic-solution) models; and the third are systems models.

Multiple Regression Models

Probably the first attempt at quantitative modelling of migration in this environment was that by Beals, Levy and Moses (1967) in Ghana. The study was not specifically directed to RUM but inter-regional migration, a major component of which is, however, RUM.

The authors sought to "estimate the effects of income and other variables on the pattern of inter-regional labour migration in Ghana"

using a model of the form

$$M_{ij}/P_i = f(d_{ij}, Y_i, Y_j, P_i, P_j, E_i, E_j, U_i, U_j, \text{random errors})$$

where

M_{ij} = number of males, age 15-54, born in region i and enumerated[1] in region j;

d_{ij} = road distance in miles between major cities of region i and region j;

Y_i = average African labour income in origin region;

Y_j = average African labour income in destination region;

P_i = number of Ghanaian males, age 15-54 born in origin region;

P_j = number of Ghanaian males, age 15-54 born in destination region;

E_i = per cent males, age 15 or more, enumerated in origin region, who have attended school;

E_j = per cent males, age 15 or more, enumerated in destination region who have attended school;

U_i = per cent of population of origin region residing in cities of 5,000 or more;

U_j = per cent of population of destination region residing in cities of 5,000 or more.

The regression study shows that regional income differentials and distance strongly affect inter-regional migration in Ghana. Also important is the degree of urbanization in either the region of origin or destination, but education does not seem to affect inter-regional migration.

The regression model recognizes the multiple nature of the forces underlying the operation of inter-regional migration. However, the structure of the model assumes that the direction of causal relationship between the dependent variable and an independent variable is a simple one, i.e.,

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[1] Data for the study was derived from Ghana 1960 Census records.

that only the independent variable exerts an influence upon the dependent variable and not the other way around. This assumption is not valid, as in reality, the rate of migration into or out of a given area is bound to have an influence on variables like income, education, etc., in that region. A dynamic, feedback, model is most suited to handle such a situation.

A major drawback of the multiple regression model is its inability to present a sequential order of relationships, so that variables that have direct influence upon the dependent variable are separated from those that have only indirect effects. To make this point concrete, let us take the case of a multiple regression model that gave a high coefficient of multiple determination for the relationship between rate of in-migration to a city as dependent variable, and number of housing starts, number of new jobs in the industrial sector, etc., as the independent variables. A systems formulation of the same situation will show how expansion in the basic industrial sector creates jobs which then attract in-migrants who make new demands upon the housing and construction industry. So, creation of new jobs in the industrial sector can be clearly seen as a direct cause of in-migration and that housing starts is at least in part a consequence of in-migration. This kind of incisiveness is beyond multiple-regression analysis. It is more adequately handled by a systems model.

Another drawback of the multiple regression approach is that very often the model deals with what in systems language are called stock variables (variables that describe the state of the system at any point in time, such as average income, number of males born in origin and per cent of population of origin region residing in cities of 5,000 or more). Where it uses rate variables (those that determine changes in the stock

variables) it does not explicitly show what rates affect what levels, a matter that is of some significance in policy intervention.

Mabogunje's (1970) study of inter-regional migration in Nigeria uses the same general approach as Beals et al. Also Ridell (1970) in his study of migration to Freetown, Sierra Leone, adopted a combination of the multiple regression and factor analytic approaches.

Analytic Solution Approaches

Three contributions are most relevant as far as the tropical African environment is concerned - Todaro (1969), Harris and Todaro (1970) and Johnson (1971). But only the last mentioned one will be reviewed here since it is the latest among those adopting the same general approach and contains the essential elements of its predecessors.

The basic hypothesis of the Johnson model, as for those of Todaro and Harris and Todaro, is that the rate of rural to urban migration is a function of

a) the difference between expected streams of rural and urban incomes, and

b) the probability of obtaining an urban job.

Modifications introduced by Johnson are only refinements of this basic hypothesis. One is that part of the income of the urban worker is subject to sharing in an extended-family cultural set-up, a refinement taken into account for evaluating a) above. The other is that urban jobs are far from permanent and that there is a large turnover in employment especially for the unskilled. This factor is taken into account when calculating b) above.

Two implicit assumptions of the Johnson model need to be stated:

a) There are two sectors: one rural and the other urban. Each sector is homogeneous with respect to labour and income.

b) There is no agricultural labour surplus in the rural sector, i.e., the agricultural marginal product is always positive and inversely related to the size of rural labour force.

On the basis of the hypothesis Johnson proceeds to develop mathematical equations which can be used to solve for the variable(s) of interest. Thus he obtains the relationship:

$$\Delta = (Vu - Va)/Va = nR[\alpha + (1 - \alpha)(g + \psi)/(r(1 - n) + gn + \psi)]-rM/Wa - 1$$

where:

Δ = the proportionate long-run expected income advantage of migrating to the urban sector versus remaining in rural employment;

Va = present value of expected income if the individual remains in the rural sector;

Vu = present value of expected income if the individual moves to the urban sector;

n = urban employment rate;

R = urban-rural relative wage;

α = the fraction of employed workers' incomes subject to sharing;

g = the rate of growth of urban employment;

ψ = index of labour turnover;

M = migration cost;

Wa = agricultural wage, and;

r = the discount rate.

The way Johnson proceeds beyond this point is to assume that Δ is a linear function of the fraction of rural work force that migrates to urban areas at any point in time, f. Thus

$f = \beta\Delta$

where:

β is an empirically determined coefficient.

A number of criticisms may be levelled against the mathematical solution approach to the study of rural-urban migration.

First, the nature of the approach is such that the number of sectors to be treated must be kept to an absolute minimum. Indeed with three and more sectors the mathematical problems presented become extremely complicated (Reynolds, 1969). Thus Johnson was forced to deal with only two sectors - rural and urban - each of which is homogeneous with respect to labour and income. However the real-world system is not that simple. A systems simulation approach offers a possibility of overcoming this artificial constraint.

The analytic solution technique, like the multiple regression approach, may be effective in making predictions of volumes of migration over a narrow time span. It is not quite suitable in situations where the interests include exploring the interactions between the elements that impinge upon rural-urban migration, and the dynamic behaviour of the process. Feedback effects, which are strong in RUM, play an important role in generating dynamic behaviour, and systems simulation techniques appear to be a more effective way of dealing with such situations.

However important the question of rural-urban income differential may be to the decision to migrate it is recognized that there are other kinds of factors at work (factors related to the whole process of economic development and modernization, such as education, health and its effect on population changes, etc.). It appears that explicit treatment of these many forces that impinge upon the process of rural-urban migration will

yield much better understanding and widen the perspectives for policy generation and planning.

Systems Approach

Presumably, it was in a spirit of trying to get away from the restrictions of regression and analytic solution approaches that Mabogunje (1970) made a case for the application of the systems approach to the study of rural-urban migration, and Byerlee (1971) constructed a macro-economic simulation model for Nigeria.

Mabogunje proposed a general systems scheme for a theory of rural-urban migration composed of:

a) a rural sector, the elements of which are the potential migrant, rural control subsystem, and rural adjustment mechanisms;

b) an urban sector, the elements of which are the urbanite, urban control subsystem, and the urban adjustment mechanism;

c) migration channels;

d) feedback channels; and

e) an environment of government policies, economic conditions, technology, etc.

The scheme presented by Mabogunje is a very useful framework for organizing knowledge, structuring research and raising stimulating questions in the area of rural-urban migration. A model can only be judged on the basis of what it is intended to do, and apparently, the aim of Mabogunje was to generate interest in the application of the systems approach in the study of rural-urban migration. The present work is one response to this plea.

But this work differs from Mabogunje's in two ways. First, the model

to be presented here is at a lower level of abstraction than Mabogunje's. Thus it is composed of stock and rate variables; and data and a computer program may be developed for it. Secondly, the present work is framed in policy terms and therefore should have a greater appeal to planners.

Byerlee's (1971) model is a macro-economic, computerized simulation model of the Nigerian economy consisting of three sectors - large-scale non-agriculture, small-scale non-agriculture and agriculture - and designed to test the aggregate impact of certain agricultural development policies (export expansion policy, food expansion policy, food price inflation to reduce real wages, wage restraint policy, and government hiring program) upon income distribution, employment and migration.

The model indicated that, under assumptions of elastic migration (i.e., migration behaviour which is sensitive to changes in ratio of urban to rural incomes) export expansion, food expansion and government hiring policies increased migration out of agriculture, while food price inflation and wage restraint had the opposite effect.

The significance of Byerlee's work lies not so much in the particular results he obtained, but in the fact that his approach was looking at migration within the broad context of the various interactions within an entire economy, that he was looking at a dynamic picture of the situation, and that it allowed for experimentation. This is of great value in getting a sense of the kind of results to expect from, sometimes, costly policies, before embarking on them.

The data demands of systems simulation models are high and because of severe data conditions such models for Nigeria will of necessity be crude. Their usefulness will therefore lie in developing data, performing experiments and organizing empirical research.

2.2 The Nigerian Experience

Problems Created by Rural-Urban Migration

A great deal of concern has been expressed, especially in United Nations Agency circles, about the negative consequences of RUM in less developed countries. Nigeria is no exception to this category of countries. Here it is the intention to look at these consequences broadly and with particular reference to Nigeria.

There are three related areas of concern regarding the impact of RUM. First, there is the concern over the environmental issue of overcrowding which leads to the deterioration of the urban physical plant and the straining of urban administrative and fiscal capacity (U.N., 1962; U.N., 1971; Mabogunje, 1968; Laquian, 1971; Milone and Green, 1971). Secondly, and this is closely related to the first, there is the basic concern over the implications of RUM for the broad issues of national economic development (Hoselitz, 1957; Todaro, 1971; Callaway, 1963; McGee, 1971). And, thirdly, there is the concern about the socio-political implications of prolonged frustration among the urban poor (Gutkind, 1969).

Let us elaborate a little more on the implications of RUM to the issue of economic development in Nigeria. As of now the level of urbanization may be less than 20% [See Table 2]. That is to say that over 80% of the Nigerian people still live in the rural areas. Of those that are urban there is a high incidence of unemployment.

> "... there is evidence to suggest that unemployment in Lagos in 1966 was 4.7% of the total Lagos population, 8.6% of the potential labour force and 10.4% of the actual labour force (ie., the potential labour force less those in full-time schooling and training as well as the aged). One unemployment survey conducted in 1963 even reported average unemployment in twenty-seven towns of 14%. There is no doubt that this unsatisfactory position has since worsened given the large output of primary and secondary schools since 1966 and the general disruptions caused by the war."
>
> (Diejomaoh and Orimalada, 1971: 134)

TABLE 2.1

POPULATION ESTIMATES, TROPICAL AFRICA, 1970

Country	Total Population (millions)	Urban Population (millions)	% Urban
TOTAL	242.3	26.2	11
WEST AFRICA	111.9	15.8	14
CENTRAL AFRICA	35.5	3.9	11
EAST AFRICA	94.9	6.5	7
WEST AFRICA	111.9	15.8	14
Nigeria	66.1	10.1	15
Ghana	9.0	1.6	18
Upper Volta	5.3	0.2	4
Mali	5.1	0.4	8
Ivory Coast	4.3	0.8	19
Guinea	3.9	0.4	10
Senegal	3.9	1.1	26
Niger	3.8	0.2	5
Dahomey	2.7	0.3	11
Sierra Leone	2.6	0.4	13
Togo	1.8	0.2	11
Liberia	1.2	0.2	17
Mauritania	1.2	0.02	2
Portuguese Guinea	.6	0.02	3
Gambia	.4	0.03	7

Source: Demography and Social Statistics Section, Economic Commission for Africa (data from ECA worksheets)

Urban refers to settlements of 20,000 or more.

Admittedly migration is the mechanism whereby the labour force of a country is able to deploy itself at the points of greatest advantage. In Nigeria what we have is a situation in which labour flows out of the rural areas, on the basis of rational individual calculations, to create collectively a situation which in public welfare terms is a great loss to the country (Harris and Todaro, 1970: 135-137). A legitimate question to raise here is how many more idle people can the country afford to support? The concern of this writer as far as consequences of RUM goes springs more from this consideration than from the other two general areas of concern.

Land is the basic resource of the country; but its labour is apparently about to turn its back to this basic resource in its search for some goal which is as yet out of reach: massive urban-industrial complexes providing jobs for over 70% of the labour force. The goal is not unattainable; but it is still some way off. It may be perilous to everyone for the country to turn its back, at this stage of its development, to its most enduring resource: the farm lands.

The Economic Commission for Africa, ECA, estimates the 1970 population of Nigeria to be about 66 million (Table 2.1). This rather large population is also growing at the high annual rate of 2.8-3 per cent. There has to be some way of feeding all these mouths. Whatever the solution, it will not be an easy one. But one definite requirement of the solution is innovative labour and the application of this innovation to the resources that it has of which the land is chief. At the moment the effect of RUM is to transform many innovative people into urban idlers and failures. Those who migrate become frustrated; those who are left behind are demoralized because the best among them have drifted away.

Urban centres are supposed to be important in the process of economic development as generators and transmitters of development impulses. Can urban centres confounded by very high rates of unemployment really fulfill these crucial roles? It is doubtful.

Urban Development: A Colonial Legacy

Urban development in its modern form is essentially part of the colonial legacy of Nigeria. The precolonial urban traditions of the Yoruba-speaking peoples of Nigeria and Moslem parts of Northern Nigeria are well documented (Mabogunje, 1968; Lloyd et. al., 1967). However the newer patterns of colonial and post colonial urbanization overwhelmingly dominate the present picture.

It is not the intention to go into any detail about the history of urban development in Nigeria. Suffice it to say that towns grew up in response to the needs of the colonial power for the export of primary products, import of manufactured goods, and for administration. For this reason the urban centres that emerged were ports, mining towns, transportation nodes, administrative centres, or combinations of them.

The growth of these urban centres was slow because of several restrictions: they epitomized the abode of the colonial master and the masses of the people were much more comfortable in their villages than in the urban areas; the commercial and service operations carried on in the centres needed only a limited number of people; etc.

Post-Independence Urban Growth

Since the end of the Second World War, especially since the attainment of political independence in 1960, urban growth has been surging forward at an unprecedented rate.

Between 1953 and 1963 the Lagos Metropolitan area was growing at a

rate of 11% per annum (8.6% in the inner core and 19.2% in the fringe areas) (Green and Milone, 1972: 6). This area is the largest urban agglomeration in Nigeria, combining the capital function with the port function.

The second major urban agglomeration is in Northern Nigeria and consists of three urban centres (Kaduna, Zaria and Kano). They were growing at a combined rate of 7.6% per annum during 1953-63 (Green and Milone, 1972: 7).

A third urban core (consisting of Enugu, Onitsha, Port Harcourt and Aba) is in South-Eastern Nigeria. The combined rate of growth of these urban centres in the 1953-63 period was 8.2% per annum. There was some evidence to show that these rates were accelerating as the seventies arrived.

Green and Milore (1972), apparently relying on Mabogunje (1968) saw a three-tier organization of urban centres in terms of rates of growth. At the pinnacle of this hierarchy is the Lagos Metropolitan area, growing at a rate about four times the overall rate of growth of the total population (2.8 - 3% per annum). At the intermediate level are the urban core areas of Northern Nigeria and South-Eastern Nigeria with urban populations expanding at a rate about three times that of the national population. And at the bottom of the hierarchy are the provincial capitals and locally important towns. Their populations are growing at a rate about twice that of the national population. Demographers estimate that these phenomenal rates of growth are mostly attributable to RUM (Caldwell and Okonjo, 1968).

> "For the urban areas in African countries during 1950-60, the contribution to the growth of the population by migration is estimated to be over 60 per cent, and for cities over 75 per cent."
>
> (Breese, 1969: 144)

Rural-Urban Population Balance

In 1953 the population of Nigeria was about 32 million. It grew to about 56 million in 1963 and to about 66 million in 1970. Of the 66 million in 1970 about 15% was urban, leaving an overwhelming 85 per cent rural (Rosser, 1972). Nigeria is still basically rural and for a long time to come there will be no lack of people to keep up the rural-urban migration streams.

Education Sector

No discussion of the issues related to RUM in Nigeria would be complete without a reference to the events that have occurred in the education system since 1960.

The Ashby Commission on Education was set up by the Federal Government to study the needs for education in post-independent Nigeria and to make recommendations. The Report of the Commission appeared in 1960, just prior to independence, with recommendations that the commission itself considered ambitious.

> "We propose a rate of investment in education which far outstrips the probable growth of Nigeria's economy by 1970.
>
> We propose almost to double the number of primary school pupils, almost to quadruple the number of students in secondary schools, and to multiply by more than five the present number of university students in Nigerian Institutions.
>
> (Federal Ministry of Education, Lagos. 1960)

The Federal Government was more ambitious than the Commission and accepted the Report as a minimum basis for building education in Nigeria in the 1960-70 decade. The people of Nigeria were even more enthusiastic about education than either Ashby or the Federal Government because formal education was perceived as a sure avenue (and to a large extent the only way) to a "life more abundant". And to the average student and parent in

Nigeria this life more abundant meant a local variation of North American middle-class, urban based life style. Essentially then the road to the schools also led on to the urban area.

Table 2.2 shows the growth of enrolment in all levels of educational institutions in the sixties, while Table 2.3 reflects the high proportion of public expenditure devoted to education. The present policy of the Federal Government is to launch a national free primary education program in 1975. It is estimated that this program will boost primary school enrolment from below 4 million today to 19 million in the next ten years (West Africa, March 25, 1974).

There are two points relating to the education sector that need to be made: the system was essentially single-track, academic and oriented to white-collar jobs in the small modern economic sector; the modern economic sector was not growing fast enough to take up the output of the education system. The slack represents a major problem of Nigeria today: school-graduate unemployment.

The Rural-Agricultural Sector

With some 80% of the population of Nigeria still living in the rural area, the country is predominantly agricultural. Up until the sixties, when petroleum became prominent, agriculture provided the engine of growth of the economy. Today it is still vital to the life of Nigeria if only because that is what supports a majority of the people.

Each major part of Nigeria is noted for some export crops (cocoa in Western Nigeria; palm produce in Eastern Nigeria; cotton and peanuts in Northern Nigeria; rubber in Mid-Western Nigeria); but it is fair to say that plantation agriculture is not significant in Nigeria. In addition to export crops, subsistence crop production is also important. Small-scale,

TABLE 2.2

GROWTH OF EDUCATION IN NIGERIA (1962-68)
(Annual Enrolments)

Level of Education	Year			% Change 1962-68
	1962	1966	1968	
Primary	2,800,000	3,000,000	3,100,000	10.7
Secondary	195,000	210,000	215,000	10.3
Technical & Vocational	6,000	10,000	12,000	100.0
University	3,600	-	8,600*	138.8

Source: The Federal Government of Nigeria. Second National Development Plan 1970-74, pp. 235-236.

* Not including the University of Nigeria which was not operating at this time.

TABLE 2.3

PLANNED PUBLIC EXPENDITURE ON EDUCATION 1970-74
(PERCENTAGE OF TOTAL PUBLIC EXPENDITURE)

Government	% Expenditure
All Governments	13.5
Federal Government	8.8
All State Gov'ts.	19.1
Western	28.7
North-Western	24.6
North-Central	24.3
Benue-Plateau	19.8
Mid-Western	17.6
Rivers	16.4
East-Central	15.7
Kano	15.6
South-Eastern	14.2
Lagos	14.0
North-Eastern	12.3
Kwara	11.4

Source: The Federal Gov't. of Nigeria. Second National Development Plan 1970-74, pp. 274.

subsistence-cum-export crop farming on small, usually scattered, holdings is the dominant form of agriculture.

This form of agriculture has sustained the country all along and, in the face of failures of several government-sponsored, large-scale farming projects, there are some who think that it is probably the only way to absorb the tremendous amounts of labour the country is generating (Eicher and Liedholm, 1970).

One fact about the agricultural scene is that for a great majority of the farmers the returns for their efforts are not very much. The little they get they mostly divide between current consumption and education of the children in the hope that such children will not return to the land. So a parent will frown upon a suggestion that the son he had put through school should stay with him on the land under the present terms.

The Urban Sector

The urban sector can be looked at in terms of three sub-sectors: a modern sector; a traditional, largely small-scale sector; and the unemployed pool.

The modern sector consists of the government services, large-scale industries, large-scale commercial, including banking and insurance. This sector is small, accounting for less than 10% of the urban labour force, and has been growing at no more than 3% per annum (Eicher, et al, 1970). Wages in this sector are often many times higher than in the small-scale sector and are fixed not by market forces but institutionally.

The small-scale, traditional sector consists of all gradations of petty trading, crafts, and personal service. Most are one-man operations and competition is acute. Wages here are dictated by market forces, and are much lower than in the modern sector. The size of this sector may be

about 60% of the urban labour force (Frank, 1971). This is growing fast as more and more people join the urban labour force, but some initial capital is needed in order to break into aspects of it (petty trading, for instance).

The unemployed pool, made up of the hardcore unemployed and recent migrants completed the picture. The size of this pool may be as great as 10-20% of the urban labour force and increasing (Diejomaoh and Orimalade, 1971; Falae, 1971).

CHAPTER 3

GENERAL SYSTEMS THEORY

This chapter contains two parts. One reviews those aspects of General Systems Theory that are considered germane to the study of RUM. The other tries to show how the characteristics of RUM justify the application of the systems approach in studying it.

3.1 Relevant Literature Review

System

"... 'systems', i.e. complexes of elements standing in interaction"(Bertalanffy, 1968: 33).

A number of definitions of the term system exists in the literature, and the one quoted above, credited to an outstanding name in General Systems Theory, von Bertalanffy, is but one of them. We can elaborate here by way of underscoring the essential ingredients of a system.

First a system must contain a number of parts, elements or components. Secondly there must be interrelationships between the elements binding them into a "whole". The totality of these relationships gives the system, as a whole, its characteristic behaviour; a behaviour which is distinct from that of any one of the subsets of the system's elements.

The particular nature of system elements - physical, biological, socio-economic, material, non-material - is inconsequential as long as the elements possess what have been described above as the essential ingredients or properties. The existence of general system properties or isomorphism, irrespective of the subject matter or discipline involved, has

led to the development, of a new discipline, General Systems Theory, which is concerned with the formulation and derivation of principles valid for all systems in general. A great many scholars from a wide spectrum of disciplines have become involved in the investigation of the possibilities and applications of the concept of systems as a new paradigm.

> "An extremely useful and perhaps revolutionary idea that has emerged from modern natural sciences and is gradually pervading the social sciences is the concept of "systems". Indeed, the "systems approach" to problem definition and solution may well culminate in the reversal of the historic trend towards specialization and isolation of academic disciplines to their convergence in a number of interdisciplinary fields of investigation.
>
> (Davis and Rees, 1974: 1)

Open and Closed Systems

There is no agreement in the literature about the use of the terms "open system" and "closed system". However the approach adopted here is that credited to von Bertalanffy.

A closed system is one which is self-contained. It has no exchange of either matter or energy with the environment external to it. Therefore it does not affect, nor is it affected by, that environment. Such systems are not common in nature because very few things really exist in isolation.

Open systems, on the other hand, are those that exchange matter, energy or information with their external environments. In the course of such exchanges a system and its environment mutually affect themselves. Given the hierarchical order in nature where a system is composed of several sub-systems, and is itself a sub-system of a larger system, it is perhaps not surprising that most systems in nature are of the open variety. The point that bears repeating with respect to open systems is that they interact with their environments and are affected by them.

Adaptive Behaviour, Feedback and Equilibrium

> "... and you cannot conceive of a living organism, not to speak of behaviour and human society, without taking into account what variously and rather loosely is called adaptiveness, purposiveness, goal-seeking and the like."
>
> (von Bertalanffy, 1968: 45)

An aeroplane is a system built to fly; a refinery is a system constructed for the purpose of making gasoline out of crude oil; a human body is a system that works towards its own self-maintenance; a community is a system created for promoting collective interests. Most complex systems operate in order to perform some function or achieve some goal, and the structures of such systems, and the interrelationships between system elements, are keyed to the special needs of performing the specific functions or achieving the specific goals concerned (Parsegian, 1972: 22).

There exists a subset of complex systems that do not only have a "goal" but are capable of adaptive behaviour, that is to say, such systems respond to changes in their internal and external condition in a manner that allows them to continue towards their goals.

A fundamental concept in the understanding of adaptive behaviour is that of feedback.

> "So a great variety of systems in technology and in living nature follow the feedback scheme, and it is well-known that a new discipline, called Cybernetics, was introduced by Norbert Wiener to deal with these phenomena."
>
> (von Bertalanffy, 1968: 44)

Feedback exists in a system when the chain of cause and effect relationships loops back upon itself. Two kinds of feedback loops are recognized in systems literature: positive and negative.

A positive feedback loop always operates to increase the corresponding level in the system. It is therefore internally self-amplifying and results in exponential growth. The idea of positive feedback is vividly

illustrated by that of money deposited in a bank at compound interest. Each year the principal is augmented and raised to a higher level, which will yield a greater absolute interest payment to increase the principal still further, and so on. If the deposit is not withdrawn, the deposit will grow at an ever-increasing absolute rate, i.e., exponentially.

Negative feedback loops operate in a manner to oppose the direction of the change that produced it. It is thus growth-counteracting. If, with reference to the previous illustration, the depositor withdraws a fixed sum of money from the deposit each year, the effect is to depress the principal and the absolute rate it regenerates itself. To maintain the principal at the same level each year both positive and negative feedback loops are necessary. This means that the "existence of the negative feedback loop is a necessary but not a sufficient condition for stability" (Davis and Rees, 1974: 6).

Most complex systems contain both positive and negative feedback loops as means of maintaining their relationships to their environments, carrying out their functions or maintaining stability. A system containing only positive or negative feedback loops moves towards a state of maximum disorder or self-destruction. To illustrate, assume an animal population with limited resources to live on. Assume further that mortality which operates as a negative feedback loop is non-existent. The population will grow exponentially, and, even if given the effect of technology upon resources, it is difficult to conceive of infinite growth and survival for it; there has to be a point of no return, of self-destruction. Conversely a population that has only the negative feedback process of mortality and no natality will sooner or later cease to exist.

Feedback loops are not only responsible for maintaining stability in a system; they are also responsible for giving a system its characteristic

behaviour. And so a major task in the analyses of complex systems is the identification of feedback loops.

The concept of stability is empty without reference to another concept: equilibrium. The state of equilibrium can be conceptualized as the goal or final state which the system operates to achieve. Two kinds of system equilibrium may be identified: stable or steady state, and unstable or dynamic equilibrium.

A steady state is a "time-independent state where the system remains constant as a whole, and in its phases, though there is a continuous flow of the component materials" (von Bertalanffy, in Emery, 1969: 71).

On the other hand dynamic equilibrium is the unstable state which is bound to give way to a succession of other unstable states as the system attempts to absorb internal and external perturbations. The idea of dynamic equilibrium is more appropriate in dealing with socio-economic systems than that of steady state, since such systems are generally open systems that are subject to considerable perturbations from their environments.

Hierarchy in Open Systems

The nature of open systems is such that a given system, A, is composed of a number of subsystems, B_i ($i = 1, 2, 3, \ldots$), and is itself a subsystem of the next larger system, C. Theoretically the environment of A therefore extends to the outer reaches of the universe (Parsegian, 1972: 23).

A logical question that arises here is how to define the boundary of the system of interest since, as shown above, everything seems to be related to everything else? "The answer is that while it is not possible to take into account every influence or interrelationship that bears on a particular situation or subsystem, one can often identify the

significant factors that bear on a situation and limit the study to those factors (Parsegian, 1972: 25).

The above is an appeal to the judgement and intuitive power of the investigator, and a number of implications flow from this.

First, there is no possibility of getting the same model of a phenomenon from two different investigators since their definitions of the system will not be identical. Secondly there can be no completely correct or incorrect model of a system. Thirdly, the nature of the model produced for a system depends to a great extent upon the motives of the modeller, i.e., the purpose the model will serve.

Characteristics of Complex Systems

Some of the characteristics of complex systems which may be of interest in the latter parts of this work have been most eloquently summarized by Goldberg and Holling (1970: 3).

> "Four properties seem to be shared by all complex systems. By responding not just to present events but to past ones as well they show a historical quality. By responding to events at more than one point in space they show a spatial interlocking property. By encompassing many components with complex feedback interactions between them, they show a systems property. And through the common appearance of lags, thresholds, and limits they present distinctive structural properties.

The systems property has been the preoccupation in this section so far; but more will be said about the spatial interlocking and historical qualities of the rural-urban migration-related system in the next section.

3.2 Relevance of Systems Theory to RUM

In the first part of this chapter two ingredients were identified as essential to the concept of a system: a number of constituent parts or components; the interrelationships between these parts. Here an attempt will be made to show that RUM satisfies the conditions for classification as a system.

The important point about a component in a system is that it possesses some characteristics that distinguish it from other components, characteristics which also relate to the behaviour of the system.

Two kinds of components can be recognized in the system of which RUM is a part. The first type are those representing human groups. Such a group may be educated or uneducated, employed or unemployed, located in a rural or an urban area. Each of these groups behaves in a distinctive way and together they give the system its characteristic behaviour. This class of components are the stock variables of Chapter 4.

The second type of components are those that represent processes within the system. Thus there is the education process, employment generation, labour transformation, urban-rural interaction, and, of course, the migration processes. The model to be presented in the next chapter contains altogether twenty components, eight belonging to the first category and twelve to the second.

The components are bound together into a "whole" by a network of interrelationships through which a component affects other components and is in turn affected by them. Some of the interrelationships involve the transfer of people or other material goods; others involve the transfer of non-material impulses such as information. The interrelationship between the

rural education component and rural educated unemployed involves the transfer of school graduates from the one to the other. On the other hand one of the relationships between the urban uneducated unemployed and rural-urban migration component involves the transfer of information. The elaboration of these relationships is part of the concern of Chapter 4.

The point to be made here is that RUM is part of a complex system containing many components and interrelationships, and that any realistic effort to understand it must take into account not just the components in isolation but also the interrelationships within the whole system. It is not for a moment being suggested that this is an easy task; the suggestion rather is that the systems approach may be the path to greater understanding.

RUM Within An Open System

The system of which RUM is a part is an open one; therefore, there is mutual interaction between it and its environment. Theoretically this environment includes everything that does not fall within the boundary of the system. But certain components within this generalized environment can be seen to be more directly related to the system than others.

The demographic process is one important element in the environment that greatly affects the RUM system. A country that has a high rate of population growth is also likely to have a more serious rural-urban migration problem. Changes in the demographic process cannot but be reflected on the rural-urban migration situation.

Government activities and its powers to make policies form another significant component of the environment - probably the most significant. Other influential components are the process of economic development; technological development, especially in the fields of transport and

communication; and international relations. These components of the environments are spelt out in greater detail in Section 4.1.7.

However, the point has to be made that this environment is a dynamic one, and that changes in it have direct implications for RUM. Therefore in seeking to understand the behaviour of the RUM system, this environment cannot be overlooked.

RUM, Adaptive Behaviour, Feedback and Equilibrium

The previous part discussed the nature of adaptive or self-regulating behaviour and the importance of feedback loops in helping to achieve adaptive behaviour.

A logical question to raise at this stage is whether the RUM system can be conceptualized as an adaptive system. To answer this question it is necessary to posit that human nature is such that when a person is faced with a choice between alternatives he opts for that alternative which he judges to be most likely to give him the greatest net benefit. If the choice in question is a locational one then he will opt for that location which he judges brings him the greatest net benefit.

RUM involves the choices of people between rural and urban living, and the system has an identifiable "goal" towards which it is always moving: to redistribute people between rural and urban locations such that all rural people feel that they are better off not moving to an urban area. Whenever such a state of redistribution is reached, an equilibrium is achieved and RUM ceases in the manner of a thermostat.

This state of equilibrium is only temporary, for changes are always taking place both within the system and in its environment - changes which make people re-evaluate their relative positions, and set RUM into motion once more. Over time, therefore, one equilibrium condition gives way to

another, and so on to the indefinite future.

From the foregoing the RUM system may be characterized as a self-regulating or adaptive, complex system, the "goal" of which is to bring about a certain distribution of population between rural and urban areas.

As pointed out in the first section, one of the more important means of achieving adaptive behaviour is the feedback loop. There are many such loops in the RUM system. Together they work to control the rates at which rural-urban migration proceeds. However the identification of the specific loops must await the next chapter.

Characteristics of Complex Systems and RUM System

Goldberg and Holling (1970) point out that complex systems are characterized by a systems quality, a historical quality, spatial interlocking and structural properties.

What has been said so far in this section relates to the systems quality of the RUM system, which also exhibits the other properties of a complex system. The following will try to show that at least the historical and spatial interlocking properties are identifiable in the RUM system.

One of the components considered to be significant in the decision to migrate to an urban area is the size of the urban unemployed pool, because this certainly has a direct bearing on the probability of a migrant to obtain an urban job in a reasonable time. But the present size of the component is the result of past rural-urban migrations, so that the influence it exerts today is partly a reflection of the history of past migrations. Otherwise stated, what is going on in the system today is not independent of the history of processes in it.

The process of rural-urban migration is, among other things, a spatial one involving both urban and rural locations. There may be several urban and rural locations in a particular system, but the important point is that events that occur in one part of the spatial system do affect other parts. The location of new industrial complexes in one of the urban locations has implications for the rate of migration to that location and to other locations in the system. This quality of events taking place in one location having implications for other locations within the same spatial system is the essence of "the spatial interlocking property" of systems.

In summary, the phenomenon of rural-urban migration has received a great deal of attention from all shades of social scientists. Unfortunately there is very little to show in the way of successes in dealing with it anywhere in the world. One plausible conclusion to draw from this is that to try to stem rural-urban migration is attempting the impossible. Another, equally plausible one, is that we have not yet been able to fully understand the real nature of the process and that new tools and new perspectives are desirable. In this regard an appeal to the principles of General Systems Theory for greater insight will appear to be a perfectly legitimate procedure.

CHAPTER 4

THE SYSTEMS MODEL OF RUM

4.1 Description of the Basic Model

4.1.1 Assumptions Underlying the Model

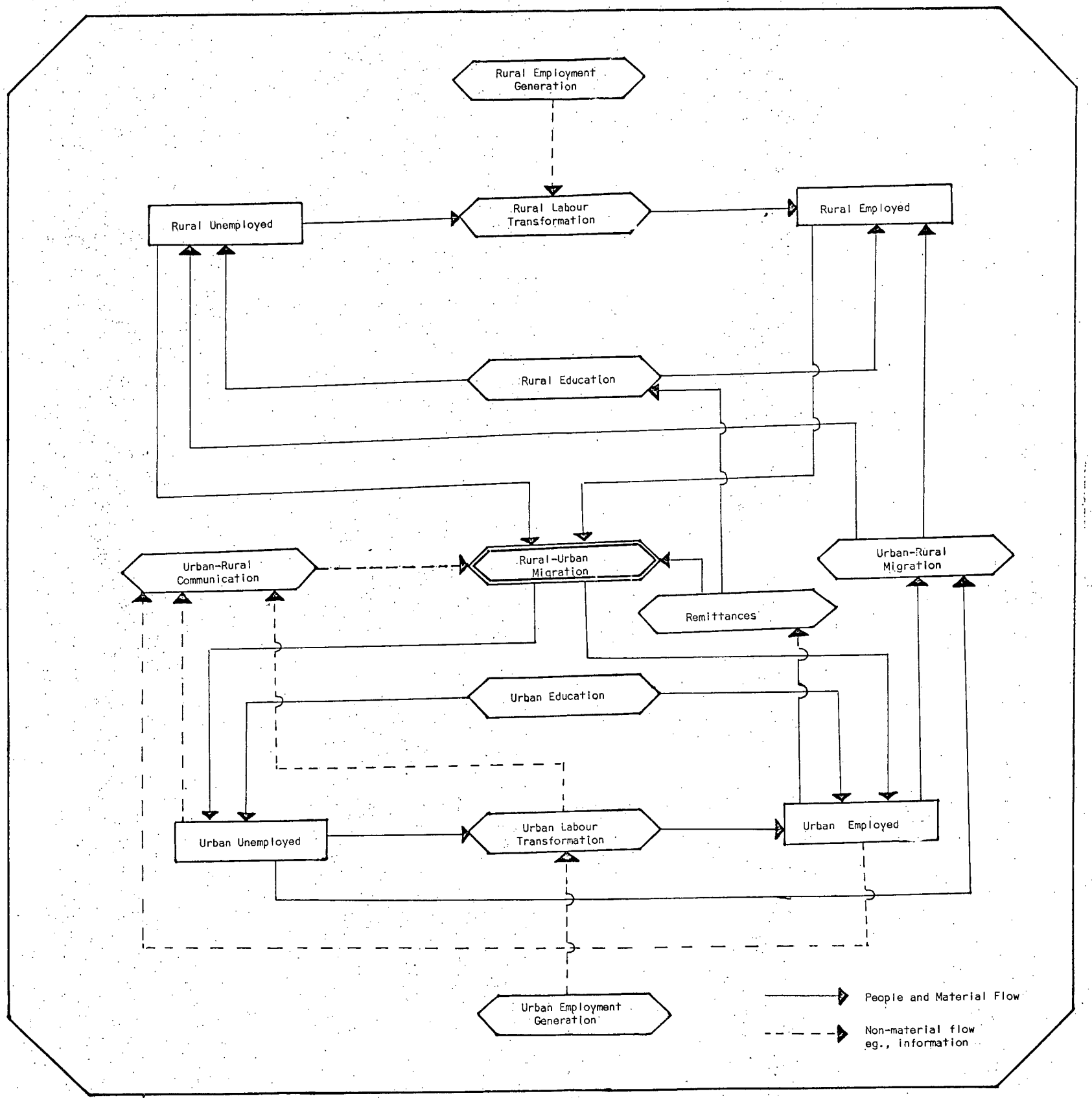
Eight assumptions are isolated here as most crucial in understanding the basic model.

1. The literature on rural-urban migration in Nigeria is limited for the purposes of this work. The assumption that conditions in other parts of tropical Africa approximate closely those of Nigeria has been made to make it possible to draw from the experiences of these other countries in building the model.
2. The first-hand experience of the author is limited to south-eastern Nigeria. It has however been assumed that this experience is broadly representative of the entire country.
3. Rural-urban migration exists as part of a complex socio-economic system; a systems model of it is the most effective technique for capturing the multiple dimensions of the real-world system.
4. Most rural people migrate to urban areas basically for economic reasons, the most important of which is to obtain wage employment.
5. The literate or illiterate status of a ruralite is significant in his migratory behaviour.
6. It is assumed that there is no difference between primary school, high school, and college graduates in terms of their rural-urban migratory behaviours.
7. Ruralites behave as rational economic individuals in their decisions to migrate: they will go to urban areas as long as their expected income flows will be increased by so doing.

ENVIRONMENT

International Relations

Modernization



ENVIRONMENT:

Government Activity

Government Policy-Making Powers

ENVIRONMENT:

Demographic Conditions

Economic Development

Figure 4.1
A SYSTEMS MODEL OF RURAL-URBAN MIGRATION
IN NIGERIA (SIMPLIFIED)

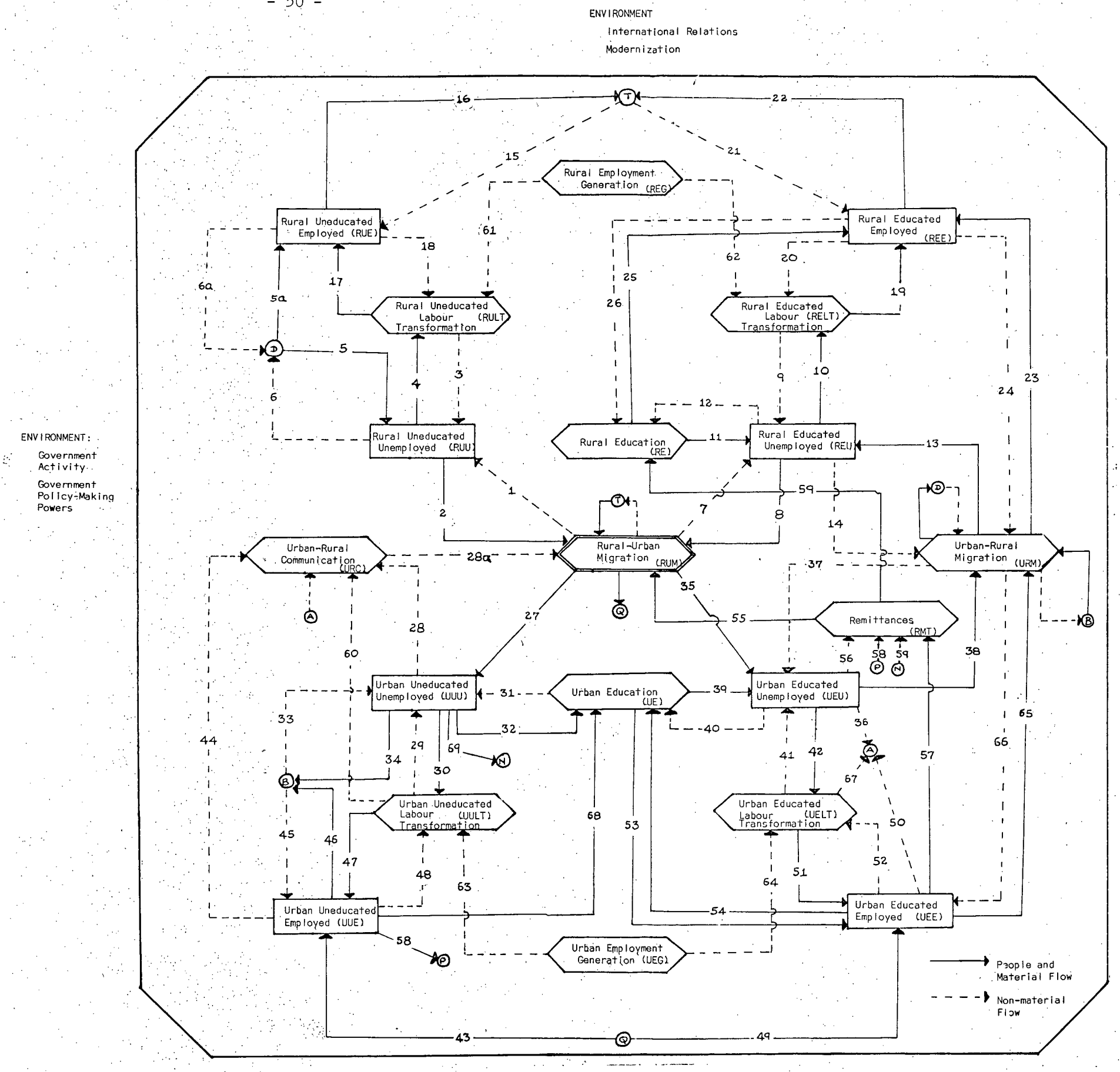


Figure 4.2
A SYSTEMS MODEL OF RURAL-URBAN MIGRATION IN NIGERIA

8. Substantial urban-rural feedback effects are in operation, and they have a major impact on the migratory behaviour of rural people.

4.1.2 Definition of the Model

Two separate diagrams of the model have been prepared. One is a simplified version (Figure 4.1) intended to emphasize the basic structure of the model, and to lead the reader up to the second, more elaborate version (Figure 4.2).

In broad outline the model is made up of a number of stock variables and rate variables linked together by actual or hypothesized relationships. These components together define the boundaries of the system. Beyond these boundaries lies the system environment.

There are eight stock variables in the systems model. They describe the condition of the system at any particular time, and accumulate the results of processes taking place within it (Forrester, 1968).

Rate variables, on the other hand, determine the change per unit time in the stock variables. Levels of stocks depend upon the rate variables, and desired levels may be brought about by regulating the rates of flow in the system. There are altogether twelve rate variables in the model.

The interrelationships (directed arrows) between stocks and rates are mostly hypothesized as representative of reality and are elaborated upon in the body of this chapter.

Four components have been identified as major in the system environment: government activity and policy-making powers; the demographic situation; economic development and modernization; and international relations. A more detailed treatment of each of the groups of system components follows.

4.1.3 Stock Variables

Three criteria have been applied in the choice of stock variables of the model. First, the phenomenon of rural-urban migration is an aspect of interaction between rural and urban areas. It is not possible to analyze it realistically without taking into account the conditions that exist in both rural and urban areas. Therefore the stock variables are of two kinds; rural and urban.

Secondly, as soon as one begins to consider the question of rural-urban migration in less developed countries he will quickly come to the realization that the process is intimately tied up with the issue of employment and unemployment. Investigation of the employment-unemployment condition of the real-world system is truly an integral element in the understanding of behaviour within it.

Lastly, there is ample evidence in the literature to support the view that there is a strong relationship between the education of a rural person and his propensity to migrate (Caldwell, 1969; Rempel, 1970; Sabot, 1972). There has been an attempt therefore to incorporate explicitly the education element into the model. The breakdown of stock variables used in the model is presented in Table 4.1.

TABLE 4.1

STOCK VARIABLES

CLASS OF VARIABLE	NAME OF VARIABLE	ABBREVIATION
RURAL	Rural Uneducated Unemployed	RUU
	Rural Educated Unemployed	REU
	Rural Uneducated Employed	RUE
	Rural Educated Employed	REE
URBAN	Urban Uneducated Unemployed	UUU
	Urban Educated Unemployed	UEU
	Urban Uneducated Employed	UUE
	Urban Educated Employed	UEE

a) Rural Unemployment Stock Variables

i) Rural Uneducated Unemployed (RUU): This stock may be defined as the accumulation of rural people who are both uneducated and unemployed. An adult of 15 years and over who has never gone to school, or who is a primary school drop-out, is considered to be uneducated. Again an adult of 15 years and over who is not involved in sufficient gainful work to be able to support himself (and his dependents, if any) is also placed in the unemployed classification within the model. Thus a youth who is 15 years old, not in school, and supported by his parents is categorized as unemployed.

The reason for isolating this stock as a distinctive element is that the people in this category usually exhibit migration behaviour traits different from those of the educated. They will normally have relatively low aspirations and income expectations; and will be more likely to engage in agricultrual pursuits at low returns. The so-called "urban-pull" affects this group less strongly than its educated counterpart, and when its members do migrate to the city their destinations are predominantly the low-wage, traditional sector.

The stock is directly affected by three rate variables: rural-urban migration rate (arrow #1); rural uneducated labour transformation (3); and reverse migration (5). The rates of these variables determine the level of rural uneducated unemployed at any point in time. Certain exogenous variables, not shown in the model also affect this stock. These are rural birth and death rates and the percentage of rural children that goes to school.

Thus we can state, in shorthand form, that

$$RUU = f(RUM, RULT, URM)$$

ii) Rural Educated Unemployed (REU): This stock may be defined as the accumulation of rural, educated people who are also unemployed. The reason for treating it as a distinctive stock has been mentioned earlier: the acquisition of education does influence the migratory propensity of rural people. In the Nigerian situation it is likely that this stock yields well over 50% of those who migrate from rural to urban areas (Callaway, 1967).

This stock is directly affected by four system variables: rural-urban migration (7); rural educated labour transformation (9); rural education (11); and urban-rural migration (13). The rate at which rural-urban migration is proceeding will have a negative affect upon the stock, i.e., a high rate of RUM will normally mean a low level of REU and vice versa. In the case of output of the rural school system there is a positive relationship with REU. A high rate of school graduate output implies a high level of REU. A positive relationship also applies in the case of URM-REU relationship.

In compact form we have

$$REU = f(RUM, RELT, URM, RE)$$

The probable behaviour of this stock over time and in the face of diminishing urban opportunities for each stratum of educated rural people raises some relevant questions. Does a higher proportion of school graduates stay back in rural areas each year as urban opportunities diminish? Is this the case for both primary and high school graduates? Is the growing, adverse urban condition reflected in the magnitude of reverse migration? Do return migrants, as a result of the frustrations they experience in the urban area, become seriously involved in eking out a living in the rural area, or do they temporarily retire to live off other people while waiting for more positive signals

from the urban area? How valid is the claim that existing rural schools only prepare students for urban, white-collar jobs?

b) Rural Employment Stock Variables

i) Rural Uneducated Employed (RUE): This stock is defined as the accumulation of the rural uneducated who are also employed. Because a member of this stock is employed and able to support himself in the rural area he is more likely to take a close look at alternatives that await him at the urban area before abandoning his rural employment than is his unemployed counterpart. However, he is always on the alert for that positive signal to leave the rural area.

Employment here refers to a large extent, to those in small-scale subsistence agriculture; export agriculture is of secondary, but increasing, importance. There is a great danger in making too clear-cut a categorization of employment in the Nigerian environment, for many who work as farmers are also traders and craftsmen. Hence the definition of employment given in section a) i) above.

This stock is affected by three variables: rural-urban migration (15); rural uneducated labour transformation (17); and reverse migration (5a).

Other things equal, the greater the rate of rural uneducated labour transformation (17) the larger the size of RUE and the smaller will be the size of RUU. Most people employed in the rural areas will normally abandon their work for urban employment if they receive strong and positive information from the urban sector. But if the feedback is consistently negative in character the desire to migrate will be greatly diminished. It seems reasonable to argue that anyone who has tired of waiting for an urban job, and who has mustered enough courage to return

to his rural origin, will become much more determined to find employment in the rural area. In this way, URM may have a positive effect (5a) upon RUE. High rates of rural-urban migration should have a negative effect (15) on RUE.

In functional form, we have

RUE = f(RUM, RULT, URM)

ii) Rural Educated Employed (REE): This is the accumulation of educated, employed rural people. The stock is likely to be a small one compared to RUE because most educated people will not be engaged in agriculture, the predominant activity in the rural sector. The form of employment taken by educated people in the rural area is usually non-farm (teaching, trading, public service, transport, handicrafts, etc.) and is in short supply in the rural sector.

REE, like REU, is a significant source of rural-urban migrants because people in the category often abandon their rural jobs when they perceive that their chances in the urban sector have improved.

REE is a function of rural education, RE(25). The more educated people there are, the more they will try to squeeze themselves into rural employment. This stock is also a function of rural educated labour transformation (19) which, in turn, is dependent on REU and rural employment generation. URM or return migration (23) will appear to have an effect upon REE because of the presumed determination of return migrants to succeed in the rural area. High rates of RUM will have a negative effect upon REE (21).

Thus

REE = f(RE, RELT, RUM, URM)

c) Urban Unemployment Stock Variables

i) Urban Uneducated Unemployed (UUU): This is the accumulation of the uneducated and unemployed in the urban sector. It will consist of recent rural-urban migrants as well as those who migrated many years before. It will also contain uneducated, unemployed people actually born in the urban area.

The influence exerted by this stock on RUM (28) is considerable and it is achieved through urban-rural feedback channels. On the other hand, RUM itself influences UUU (27) and so the relationship between them constitutes a simple feedback loop. Details of this relationship will be given in section 4.1.6 (e).

Other variables that directly affect UUU are the urban uneducated labour transformation (29), urban education process (31) and urban-rural migration (33).

The labour transformation variable should have a negative effect upon UUU because higher rates of transformation mean more unemployed out of the stock. However, given the possibility of induced migration, the process whereby one new urban job attracts several rural-urban migrants, the net effect may well be positive.

The urban education process affects UUU in two ways: 1) by providing night school facilities for uneducated adults; and 2) by taking up young primary school graduates who proceed to high school because they are unable to find employment.

Urban-rural migration has a negative effect upon UUU because high migration rates mean departure of large numbers of people from the stock.

Urban birth and death rates may also have significant effects upon UUU.

ii) Urban Educated Unemployed (UEU): This stock may be defined as the accumulation of educated, unemployed persons derived from both urban and rural sources. A high percentage of the members of this stock are young people who are poured out of the education system each year to take their places in the long line of people waiting to get urban jobs. "Unemployment among school leavers [graduates] is perhaps the most serious long-run socio-political problem facing African countries" (Callaway; 1963: 371).

This stock mirrors the youth unemployment problem in Nigeria.

Four variables impinge directly upon this stock: rural-urban migration (35), urban education (39), urban educated labour transformation (41), and reverse migration (37).

It is reasonable to expect that the greater the rate of migration of rural educated youth, the greater will be the size of this stock. Also the greater the annual output of the urban school system, the greater the size of UEU. The urban educated labour transformation rate variable is negatively related to UEU; the greater the rate of labour transformation, the smaller the size of UEU, cateris paribus, and vice versa. Finally, high rates of reverse migration mean a correspondingly rapid decrease in the size of UEU.

Summarizing the above we have

$$UEU = f(RUM, UE, UELT, URM)$$

d) Urban Employment Stock Variables

i) Urban Uneducated Employed (UUE): This stock may be defined as the accumulation of the uneducated employed in the urban sector. It is almost coincident with those employed in the traditional sector of the urban

economy. The most common form of activity is petty trading where no serious educational barriers exist and where the market approaches the ideal of perfect competition (Frankman and Charle, 1973). Other important forms of employment are personal services (domestic work, hair-cutting, laundry services, shoe-shining), manual jobs in construction and transportation, etc.

Probably the most important variable that affects this stock is the urban uneducated labour transformation, UULT. In addition, rural-urban migration (43), and reverse migration (45) also affect the stock directly.

The relationship between UUE and the uneducated labour transformation is a negative one; a high rate of labour transformation means a low rate of increase for UUE and vice versa, i.e., the former operates to diminish the latter. Also the relationship between UEE and reverse migration is also a negative one; while that with rural-urban migration seems to be a positive one.

Briefly then, we have

$$UUE = f(UULT, RUM, URM)$$

ii) Urban Educated Employed (UEE): This stock may be defined as the accumulation of the educated employed in the urban area. Employment here is mainly in the modern sector (government service, large-scale industry, commerce, finance, urban utilities, transport and communication).

Like UUE, this stock has powerful feedback effects which are exerted through RMT, URM and URC. The members of this stock represent, in the eyes of the rural people, the ideal towards which most young people aspire: to be educated; to be in the city; and to be employed.

The variable itself is directly affected by four others: the urban

educated labour transformation (51); urban education (53); rural-urban migration (49), and reverse migration, i.e., those retiring to the rural area (66). The stock is positively related to the labour transformation, rural-urban migration, and the urban education variables. But, its relationship with reverse migration is a negative one.

Summarizing, then

$$UEE = f(UELT, UE, RUM, URM)$$

4.1.4 Rate Variables

Rate variables in the systems model fall into four classes: education; employment generation; labour transformation; and urban-rural interaction. The breakdown of the variables is presented in Table 4.2.

Every one of the rate variables is a policy intervention point. That is to say that in the systems model herein there are twelve different potential intervention points. Some are more sensitive to policy intervention than others, but the explicit treatment of such points is one of the attractions of this approach.

a) Education Variables

i) Rural Education: This variable may be defined as the annual rate of output of graduates from rural education establishments: primary, secondary and post-secondary.

The choice of this variable is dictated by the fact that education is considered to be an important link in the chain of events that impels a rural person to migrate to an urban area.

The crucial relationship between education and rural-urban migration can be summed up in one word: modernization. This is a magic word in

TABLE 4.2

RATE VARIABLES

CLASS OF VARIABLE	NAME OF VARIABLE	ABBREVIATION
Education	Rural Education	RE
	Urban Education	UE
Employment Generation	Rural Employment Generation	REG
	Urban Employment Generation	UEG
Labour Transformation	Rural Uneducated Labour Transformation	RULT
	Rural Educated Labour Transformation	RELT
	Urban Uneducated Labour Transformation	UULT
	Urban Educated Labour Transformation	UELT
Urban-Rural Interaction	Rural-Urban Migration	RUM
	Urban-Rural Communication	URC
	Urban-Rural Remittance	RMT
	Urban-Rural Migration	URM

most less developed countries today. It stands for a bundle of many different elements - all that is non-traditional; urban rather than rural; a new lifestyle; work in factories and government offices rather than in small family farms; cash incomes large enough to permit ample consumption of the steady flow of attractive, often foreign, manufactured goods; getting away from the restrictions of the rural environment to a bright new world full of possibilities. The schools are perceived as the certain gateway to this glittering world of modernity. To pupils, their teachers, and parents, there is no mistaking this fact.

> "For the youth, becoming modern persons means acquiring education, migrating to the city, finding a job in some non-traditional sphere, becoming trained for an occupation in the modern sphere of society and taking the values and lifestyles representing modernity. The most important instrumental goals for modern status involve education and occupational aspirations."
>
> (McQueen, 1969: 447)

> "...only a few parents - most of whom are farmers - want their school children to become farmers. Compared with the possibilities that education can lead to, farming - however necessary - is downgraded. The village school is more often thought of as a symbol of the means of freeing the younger generation from the drudgery of farming. These parents pay the modest school fees - often a considerable amount of the income that comes from local sales of surplus produce - with the hopes that their children later on will gain jobs that provide financial rewards and prestige."
>
> (Callaway, 1963: 354)

The above passages vividly illustrate the link between rural education and rural-urban migration and the justification for treating education as a distinct variable in the systems model.

The rural education variable is directly affected within the model by the stock of rural educated employed (26); the size of the rural educated unemployed pool (12); and the amount of remittances flowing in from urban sources (59).

The greater the number of educated people employed locally the stronger

the school system will be and the greater will be the number of annual graduates. Educated people tend to be strong supporters of their children's education. On the other hand, a high level of unemployment among rural educated people reduces the ability to support children's education; it may also have the effect of dampening the enthusiasm of parents and pupils regarding schooling. Thirdly, it appears that a major fraction of remittances from urban areas go into rural school fees. So, the greater the amount of remittances, the greater the number of people who go through school.

Thus,

$$RE = f(REE, REU, RMT)$$

ii) Urban Education: This variable is the annual rate of output of graduates by urban educational institutions.

The urban education variable is a function of four system variables: urban uneducated unemployed (32), urban educated unemployed (40), urban educated employed (54) and urban uneducated employed (68).

Urban areas in Nigeria are known for their adult education programs which attract many rural people. One therefore expects a positive relationship between the education variable and urban uneducated unemployed. The effect of urban educated unemployed on urban education will be a negative one since a large unemployed educated pool will mean less education expenditure. On the other hand, a large educated employed pool means more revenue for the education system and greater annual output of graduates. The effect of urban uneducated employed on the education variable is also a positive one.

There are some exogenous variables that affect the urban education variable, and these are urban birth and death rates and public

expenditure on urban education.

In brief then, within the model

UE = f(UUU, UEU, UEE, UUE)

b) Employment Generation Variables

i) Rural Employment Generation (REG): This variable may be defined as the annual rate of generation of new employment in the rural sector.

The variable is a function of several factors: land/population ratio; land tenure system; quality of agricultural land; technological sophistication; prices of farm products; marketing facilities; public investment in rural areas; etc. However, all these variables that impinge upon REG are exogenous to the system (Figure 4.2).

Directly or indirectly, REG has a powerful influence on each of the rural stock variables, and this emphasizes its key position as a potential policy intervention point.

Using those variables considered most influential in rural employment generation we may say that

REG = f(Rural Investment, Rural Technology, Foreign and Domestic Demand for Rural Products, Land/Population Ratio, Accessibility to Markets)

ii) Urban Employment Generation (UEG): This variable is the urban counterpart of REG. It may be defined as the annual rate of generation of urban employment of various categories.

Again, UEG, like REG, is a function of several factors. Chief among these are urban savings and investment. Also important are the demand for urban goods and services originating from domestic public and private sectors as well as foreign sources, and technology which in turn affects investment. All these variables are however exogenous to the

system (Figure 4.2).

UEG has a direct positive impact upon the urban labour transformation variables, and, through them, exerts an influence upon each of the urban stock variables. It is thus a key variable for policy intervention.

From the foregoing it may be stated that

UEG = f(Urban Investment, Demand for Urban Goods, Technology)

c) Labour Transformation Variables

i) Rural Uneducated Labour Transformation (RULT)
Rural Educated Labour Transformation (RELT): These variables may be defined as the annual rates at which rural labour moves from a state of unemployment to one of employment. Because at any one time there will be movement in both directions it is better to view these rates as net rates.

Three system variables impinge directly upon rural uneducated labour transformation, RULT: rural employment generation (61); rural uneducated unemployed (4); and rural uneducated employed (18). Rural employment generation has a positive effect upon RULT. Also, rural uneducated unemployed will appear to have a positive effect upon RULT; and the larger RUE grows the stronger the local economy and the faster the transformation process.

Thus we have

RULT = f(REG, RUU, RUE)

Rural educated labour transformation is directly affected by three variables: rural employment generation (62); rural educated unemployed (10); and rural educated employed (20). All three variables are deemed to have a positive influence upon RELT.

Thus we have

RELT = f(REG, REU, REE)

ii) Urban Uneducated Labour Transformation (UULT)
Urban Educated Labour Transformation (UELT): Urban labour transformation variables are the urban counterparts of rural labour transformation variables, and they may be defined as the annual rates at which urban labour moves from a state of unemployment to one of employment.

The urban uneducated labour transformation variable is a function of three system variables: urban employment generation (63); urban uneducated unemployed (30); and urban uneducated employed (48). The greater the rate of urban job creation, the greater the rate of uneducated labour transformation. The greater the size of the urban uneducated unemployed the greater the pressure on the employment agencies to provide jobs for more people. Also the greater the size of the urban uneducated employed, the greater the demand for goods and the more labour it is possible to transform.

The urban educated labour transformation is also a function of three system variables: urban employment generation (64); urban educated unemployed (42); and urban educated employed (52). All three variables are judged to have a positive effect upon UELT.

Thus we have

UULT = f(UEG, UUU, UUE)

UELT = f(UEG, UEU, UEE)

4.1.5 Urban-Rural Feedback Rate Variables

a) Remittances (RMT)

This is the annual amount of money flowing from urbanites to support rural relatives or activities.

A high proportion of urban incomes flow to rural areas annually in this form. Evidence from Kenya and Tanzania indicate that some 21% of the wage bills of middle- and low-income urbanites are involved in this transfer (Johnson and Whitelaw, 1969). No evaluation of the situation in Nigeria has been reported, but it is quite likely that this figure is a realistic representation of the Nigerian experience.

Remittances form part of an important feedback loop linking urban with rural areas. People from rural areas migrate to the urban sector, become employed, and send part of their earnings back to their rural origins to reinforce the same processes that brought them to the city (such as education of younger relatives). This way the urban employment variables send positive feedback impulses (in this case money) to rural areas to influence the education variable and RUM from which the loop returns to the urban sector (Figure 4.3).

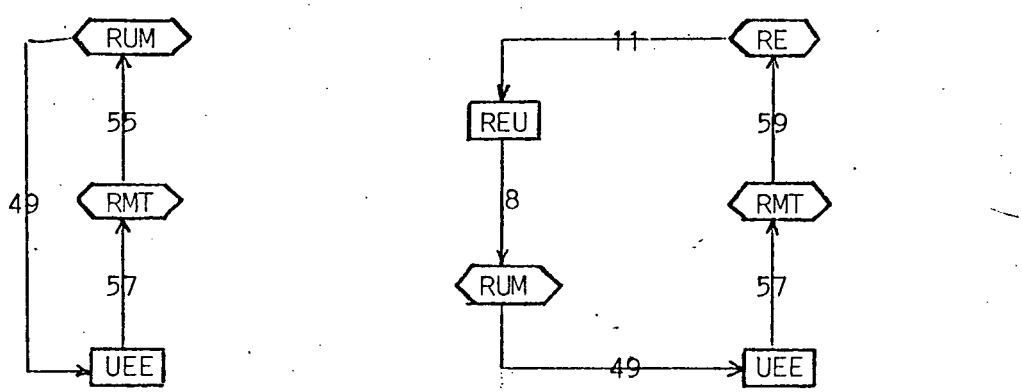


Figure 4.3
URBAN-RURAL FEEDBACK LOOPS: REMITTANCES

Not all the effects of RMT are such as to promote rural-urban migration. In some cases they operate as a form of subsidy to rural people to keep them from joining relatives in the urban sector and thereby depressing total family earnings at least for some time.

There are also situations in which the impact of remittances on the rural sector is hard to assign. Few will contest the claim that remittances have been a major factor in community development efforts in many parts of Nigeria. Reference has earlier been made to the role of urban ethnic associations in promoting the welfare of their rural origins (Little, 1965). Such promotional activities often take the form of creating some urban services in the rural areas. They make major contributions in terms of financial support and leadership in such projects as rural water supply, rural electrification, housing, road construction, market, school and health clinic developments, etc. Thus remittances play a part in making rural areas more attractive places in which to live. But, it is not clear whether this kind of effort promotes rural-urban migration by giving a large number of people some foretaste of urban life, or retards it by making rural areas more attractive living places. This is a subject that will bear some careful empirical investigation. Presumably, at the initial stages rural development promotes out-migration, but as urban characteristics become more established the opposite effect may prove to be the case.

One last point that should be made here is that it appears reasonable to expect that with inflation, falling real values of urban incomes, and rising costs of urban living, there will be a serious erosion of the impact of remittances on rural areas. This will leave a vacuum which may require policy intervention to fill.

RMT itself is a function of four system variables: urban educated

employed (57); urban uneducated employed (58); urban uneducated unemployed (69); and urban educated unemployed (56). The two urban employed stock variables have a positive influence upon RMT; but the two unemployed stocks have a negative effect since urban relatives have to contribute to the upkeep of the unemployed. Thus

$$RMT = f(UUU, UEU, UUE, UEE)$$

b) Urban-Rural Communication (URC)

This variable may be defined as the rate of information transfer from urban to rural areas. Information about the conditions in the urban sector is a vital input in the decision of a rural person to migrate or remain.

In the Nigerian environment such information is transmitted through several means: the mass media (radio, newspapers and magazines); personal visits from and to urban areas; correspondence; and trading contacts.

Two dimensions to information may be recognized. The first is the quantity of information being transmitted, which is a function of the level of development of the means of transmission (eg., newspaper circulation, and the number of visits by urbanites per annum). Presumably the greater the quantity of information about urban conditions reaching rural people, the more will their migratory behaviour be consistently related to the reality of the urban sector and vice versa.

The second dimension of information is quality which refers to the content of the information being transmitted. It can be negative or positive information. Rural people are rational people; they will respond appropriately to both positive and negative urban signals.

> "If the information from a particular city dwells at length on the negative side of urban life, on the difficulties of getting jobs, of finding a place to live, and on the general hostility of people,

> the effect of this negative feedback will slow down further migration from the village to this city. By contrast, favourable or positive feedback will encourage migration and will produce situations of almost organized migratory flows from particular villages to particular cities ..."
>
> (Mabogunje, 1970: 12-13)

It is this qualitative aspect of information that is a function of the urban system variables: urban uneducated unemployed (28); urban uneducated employed (44); urban uneducated labour transformation (60); urban educated unemployed (36); urban educated employed (50); and urban educated labour transformation (67).

Functionally, we have

URC = f(UUU, UEU, UUE, UEE, UULT, UELT)

c) Urban-Rural Migration or Reverse Migration (URM)

This variable may be defined as the annual rate of "reverse" migration. At the present very little is known, or written, about the nature of reverse migration in tropical Africa. It is not known, for instance how large the flow is, what its composition is, or what effects it has. In these circumstances one can only postulate on the basis of intuition and a sense of the reasonable.

Return migration stream is made up of retiring urban people and perhaps a larger and growing number of people who failed to establish a foothold in the city. So the variable is a function of all four urban stock variables: urban uneducated unemployed (34); urban uneducated employed (46); urban educated unemployed (38); and urban educated employed (65). Each of them has a positive effect upon URM.

From the rural side, all four stock variables affect reverse migration: rural uneducated unemployed (6); rural uneducated employed (6a); rural educated unemployed (14); and rural educated employed (24). The

unemployment variables will have negative effects upon URM, while the employment variables will have a positive one. If more people are being employed in the rural area there will not be much point in remaining unemployed for too long in the urban area.

URM exerts two kinds of influences on the rural sector. One is the effect on the rate of change of rural stock variables. The other is an information effect which operates through URC.

People who retire to the rural area after a successful urban working life spend much of their leisure time selling city lifestyles to rural people, singing the praise of the city. This can result in the creation of a favourable image of urban life in the minds of young people who are potential migrants.

An opposite effect is created by those who failed in the city. This group may have very few positive impressions about urban life to convey. They stand as constant reminders to rural people that the decision to migrate carries with it the risk of failure. The rate of rural-urban migration may, to that extent, be diminished.

Summarizing then,

$$URM = f(UUU, UUE, UEU, UEE, RUU, RUE, REU, REE)$$

4.1.6 Rural-Urban Migration as Rate Variable

RUM is a rate variable, just like any of the other rate variables in the system, and may be defined as the annual rate of movement of rural people to urban areas for the purpose of permanent residence. Since it is the variable of major concern here, this section will be devoted to a more extended discussion of its relationships and behaviour in the system.

Discussion in this chapter so far shows that

RUM = f(RUU, REU, RUE, REE, RMT, URC)

That is to say that in the system RUM is a function of six variables: rural uneducated unemployed (2); rural educated unemployed (8); rural uneducated employed (16); rural educated employed (22); remittances (55); and urban-rural communication (28a).

One deduction which may be made from this observation is that a single-variable policy intervention to control RUM is unlikely to make a decisive impression, and that what is more likely to succeed is a multiple-variable policy involving the most sensitive policy intervention points.

a) RUM and Rural Unemployment Variables

The two stock variables involved here are RUU and REU. Both variables have positive effects upon RUM, i.e., the greater the accumulation of rural unemployed the greater the rate of migration. The reason is that the greater the pool of the unemployed, the greater the pressure on rural opportunities, and therefore, the greater the number of people who will elect to try their luck elsewhere.

Of course the above is a rather simplistic presentation of what actually happens. How much positive impact these unemployment stock variables will have on RUM depends on conditions in the urban sector. The urban sector is not a kind of bottomless reservoir forever receiving more and more migrants. Rather it has the capacity of transmitting feedback impulses (URC) that put a check on RUM and the effectiveness of rural unemployment variables to influence RUM.

b) RUM and Rural Employment Stock Variables

The two variables involved here, Rural Uneducated Employed and Rural

Educated Employed grow by taking up rural unemployed people who otherwise would probably have ended up as rural-urban migrants. They therefore should have a negative effect upon RUM. In other words, the larger RUE and REE become relative to RUU and REU the lower RUM becomes and vice versa.

In many parts of Nigeria today it is quite probable that the sizes of RUE and REE are declining and that RUM is to that extent on the increase.

c) RUM and Rural Employment Generation Variables

It appears intuitively obvious that, ceteris paribus, the three variables REG, RULT and RELT have a negative relationship with RUM. The larger the number of jobs created and taken up in the rural areas, the smaller the rate of rural-urban migration, RUM. As noted elsewhere these rural employment generation variables are very influential policy intervention points because their operation touches on all rural stock variables and RUM.

d) Rural Education Variable

Rural education does not affect RUM directly but only indirectly. It exerts its powerful influence through affecting the levels of the two rural educated stock variables, REU and REE, both of which play a part in the decision to migrate to the city.

However the fact that education affects RUM indirectly should not detract from the importance of the modernization-education- rural-urban migration syndrome described in section 4.1.4. In the socio-political environment of Nigeria the acquisition of formal education is seen as the most important and most direct avenue to modern living; and modern living is almost synonymous with urban living. In an important way, going to

school is part of the preparation for going to the city.

e) RUM and Urban Unemployment Stock Variables

The relationship between RUM and the urban unemployment stock variables is a clear case of feedback loop. RUM directly affects the levels of these stock variables; then information about the levels of the stocks is relayed back to RUM through URC, and RUM is thereby affected. One of the loops is shown in Figure 4.4.

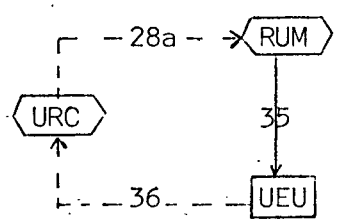


Figure 4.4
RUM-URBAN UNEMPLOYMENT FEEDBACK LOOP

Thus the effect of urban unemployment stocks upon RUM is in the form of feedback messages which may be positive or negative.

In the Nigerian situation today it appears that the feedback messages are becoming increasingly negative particularly for primary-school graduates, and there is no reason to expect that, if present trends continue, high school and university graduates will not be affected as well.

Three kinds of responses to these high unemployment conditions may be identified. Many more people decide to stay on in the rural areas rather than go for long periods of unemployment in the urban area. Among those who do migrate, most of them scale down their occupational expectations when confronted with prolonged unemployment.

> "Long-term unemployment has had a pronounced effect upon occupational career preferences, being moderatly associated with lower status choices among primary school-leavers and more strongly associated with such choices among secondary school leavers. Presumably the longer these youths were unemployed the more they perceived their opportunities to achieve their occupational goals as diminishing."
>
> (McQueen, 1969: 452)

Even after scaling down their occupational preferences, some still do not find any takers. They are the urban failures: some return to the rural area; the majority however, do not have the desire or courage to do so.

From the above it is probably fair to deduce that most returning migrants will be more receptive of rural standards of living, more perceptive of rural possibilities, and also more determined to eke out an existence in the rural sector. If this is correct it may well be that return migration will create an appropriate environment in which to launch a major rural development program.

Having looked at the effect of urban unemployment variables on RUM, let us turn to the effect of RUM on these same variables. The problems stemming from accelerating urban growth in less developed countries is now fully documented. A large proportion of this phenomenal growth is attributable to RUM and it is mainly through its effect upon the urban unemployment stock variables that RUM brings this growth about. Perhaps this systems approach to a familiar problem allows one to look at it in a new, and broader, perspective.

f) RUM and Urban Employment Stock Variables

Once again the influence of employment variables here on RUM is exerted through feedback loops. Harris and Todaro (1969) referred to the phenomenon of "induced" rural-urban migration, which describes a situation where every

additional urban industrial job attracts more than one migrant to the city. But how much inducement an additional urban job creates at the present is unknown. What seems clear is that information about the creation of additional urban jobs has a positive effect on RUM. So one should expect to find a positive relationship between RUM and the rate of change of urban employment variables.

There are some people who are hired in rural areas to take up urban jobs without going through a period of unemployment. This makes it possible for RUM to affect the urban employment stocks directly. This is becoming increasingly unusual. Most new migrants in Nigeria today will pass through a lengthening period of unemployment, so that RUM exerts its influence upon employment stock variables by way of the operation of the urban employment generation variable and urban labour transformation variables.

g) RUM and Urban Feedback Effects

From the standpoint of the systems approach adopted here, this relationship represents one of the more fascinating aspects of the study of rural-urban migration. However the relationship has previously been discussed in section 4.1.5.

4.1.7 The Environment of the System

a) Government Activity and Policy-Making Powers

The question of rural-urban migration and what can be done to control it is very much in the area of public policy. This is even more so in less-developed countries where governments play a large role in almost all aspects of national life.

The system of which RUM is a part is sensitive to a wide range of

government activity in the areas of agriculture, industry, transport and communication, education, etc. These activities therefore form part of the environment within which the system operates.

In looking at the future what is perhaps more significant than the fact that government carries out activities that impinge upon the system is the power of government to design policies specifically directed towards bringing about desired change within it. If there is genuine commitment on the part of decision-makers in Nigeria to do something to influence the rate of rural-urban migration there is probably a chance to achieve a measure of success. If, however, the authorities are only interested in rhetoric, there will be very little chance of coming to grips with this very complex matter.

b) The Demographic Situation

Nigeria has a population of over 60 million which is growing at an annual rate of 2-3%. Opinion is divided as to whether the population, a very young population, presents any major problem in coming to grips with rural-urban migration and mass urban unemployment.

> "Populations of the new African nations are becoming younger - with 35 to 40 per cent now under the age of 15. ... Can economic development more than keep abreast of the rising population of, say, two per cent every year? And related to this, can the administrative ability be developed ... to provide the opportunities for training and constructive work so eagerly sought by the younger generation?
>
> (Callaway, 1963: 353)

> "... in Africa, the existing rate of population growth and the density of population per square mile do not, in the words of the Nigerian Federal Government, 'call for emergency or panic action'. The continent can succeed in buying time to ward off undue population pressure. The redistribution and movements of Africa's population, which reflect relative economic opportunities, offered for example by economic association or integration, are probably much more important in the short run, as well as in the long run,

than the aggregate size of the population in the continent."
(Aluko, 1971: 561-75)

It would appear that Aluko is too optimistic about the problems population growth can present in dealing with issues such as mass unemployment and rural-urban migration. There are clear advantages in population growth control: the scale of human problems to be confronted becomes more manageable; additionally, there is reduction in unwanted births. A long-term solution to the problem of rural-urban migration and the associated youth unemployment cannot afford to neglect these demographic factors.

c) Economic Development and Modernization

Most of Nigeria was completely rural before the presence of European peoples. Upon arrival, these colonizing powers initiated urban settlements, establishing administration and trade, building roads, railways, churches and schools, hospitals and setting into motion the forces of economic development and modernization.

These forces in turn set into motion the process of migration from rural, isolated communities to urban areas. Upon the achievement of political independence, the new leaders pushed ahead the same kind of policies of economic development and modernization (eg., the expansion in the sixties of industrial activities in several urban centres, notably Lagos, Port Harcourt, Onitsha and Kano; or the universal primary education policies of the governments of eastern and western Nigeria), and the migration streams from rural to urban areas have become stronger and well established. It will appear that these forces are a major influence upon the rural-urban migration process and should be recognized as an important element of the system environment.

d) International Relations

Three aspects of the relations between Nigeria and the outside world may be identified as a significant part of the environment of the RUM-related system.

i) International boundaries and their effects in encouraging or discouraging migration, through their impact on urban and rural unemployment stock variables.

ii) International trade and demand for rural products and manufactured goods.

iii) International flow of wealth and ideas (foreign investment capital; exchange of experiences in dealing with similar problems; diffusion of foreign lifestyles, etc.).

4.2 Advantages of the Systems Approach

4.2.1 A Holistic Viewpoint

The systems approach adopted in this study has attempted to pull together some of the different partial viewpoints that is characteristic of most contributions in rural-urban migration literature.

One of the more common models in rural-urban migration is what may be described as the urban-rural income differential model which is founded upon the hypothesis that the most important explanatory factor in rural-urban migration behaviour is the higher average income of the urban area (Harris and Todaro, 1970; Todaro, 1971; Johnson, 1971).

Let us consider a hypothetical region where over time a few wealthy people have bought out a large number of smaller farmers and have adopted a highly mechanized form of agriculture. A few people will be employed on

these farms at fairly high wages and the rest of the people presumably will migrate to urban areas. The income differential type of model cannot adequately deal with a situation such as this, but a systems approach can. In our own particular model such a situation will be reflected by the rural labour transformation variables.

Another class of models is that which puts heavy emphasis upon the effect of distance or friction (in its various forms) on migratory behaviour, again presenting only a partial picture of the real-world system. The question of distance can be treated as part of the relationship between rural unemployment stock variables and RUM when the flows between particular origins and destinations are under consideration. In the model the effect of distance (or friction) is subsumed in the RUM process.

RUM is part of a complex real-world system and cannot be properly understood or dealt with in terms of partial analyses. A systems approach, such as is adopted here, attempts to present a more holistic view.

4.2.2 Treatment of System Feedback Effects

The explicit treatment of feedback relationships is another major advantage of the systems approach. The role of feedback impulses in conditioning behaviour within a system is a vital one particularly if the dynamic aspects of the behaviour are to be understood. The incorporation of feedback relationships in a systems model recognizes the importance of the need to understand the dynamics of rural-urban migration as a basis for more realistic policies.

4.2.3 Policy Generation

Planners are not just concerned with an understanding of rural-urban

migration behaviour for its own sake; they look to such understanding as a basis for policy and action.

The systems approach has the potential to present a wide range of policy intervention points which is of considerable use in the formation of policy alternatives. This systematic approach to the generation of policies is held by the author to be considerably superior to the use of intuition alone.

4.2.4 Research Tool

One of the more intriguing aspects of using the systems approach in dealing with a phenomenon like rural-urban migration is its ability, once a model has been constructed, to raise a great number of questions that are not usually thought of when using other approaches. For instance, it is quite rare for a writer on rural-urban migration to consider reverse migration. However, the adoption of a systems approach, in which feedback loops play a prominent role, easily allows and even promotes the consideration of reverse migration. Because it is being looked at not just as a flow of people back to the rural sector but as a feedback flow the consequences of that flow in the rural sector immediately attract the analyst's attention. The systems model has the capacity to raise such important, otherwise easily overlooked, phenomena.

In addition to the above, a systems model provides a useful framework for carrying out a great deal of research without loss of a sense of direction.

The model presented here, for instance, contains a large number of relationships which are only hypothesized to be representative of reality. A great deal of follow-up investigation can be done to test the relationships.

It is the model that provides the organizing framework necessary in carrying out such a large volume of research.

4.2.5 Some Weaknesses of the Systems Approach

A useful point of departure in discussing the weaknesses of the systems approach is a recent paper by Douglas Lee, Jr. (1973). This paper was really addressed to the large-scale urban simulation models that have been very much in evidence in planning circles since the early sixties. In a sense the RUM model of this chapter can be seen as a large-scale urban model, and so some of his criticisms of them apply here.

Lee identifies what he describes as the "seven sins of large-scale models": hypercomprehensiveness; grossness, hungriness; wrongheadedness; complicatedness; mechanicalness; and expensiveness. A few remarks about some of the "sins" are in place.

The attempt in large-scale model building to replicate too complex a system all in one model, and its logical consequence of trying to incorporate too many purposes and expectations, are the hallmarks of comprehensiveness. Of course this proves fatal, for to try to do too many things all at a time results in confusion and in doing all poorly.

Large-scale models require an enormous amount of data to be operational (hungriness). The collection of such data can easily become a gigantic operation by itself, and often it cannot be accomplished adequately. This results in weakness in input data and poor model performance.

A major source of difficulty in large-scale models is the general weakness of the theoretical bases of such large models. Perhaps the reason for grave concern here is not so much that there are theoretical weaknesses but that, having constructed the model, an analyst may start treating it as

if the weaknesses had thereby disappeared. So, instead of using the models for the validation of the assumed structural relationships, and help to strengthen the theory, the analyst preoccupies himself with using the model to solve planning problems.

It is clear to anyone with some familiarity with a large-scale model that a great many assumptions go into its development. Keeping track of these assumptions and being able to see the final model always in the context of the assumptions is not easy. This can be a real source of confusion for both modeller and those trying to communicate with him.

Above and beyond the relationships specified for a large-scale model are other implicit ones; the implications of these are not often easy to perceive. A case in point is the application of the gravity model in trip generation at the neighbourhood scale where it has no statistical explanatory power. This kind of problem is insidious and to that extent dangerous.

Large-scale modelling can be a drawback to the promotion of knowledge in a particular area where the analyst uses it to create complexity where none existed in the first place. The virtue of simplicity over complexity cannot be overemphasized in this regard.

And, finally, a systems model, though it may be valuable, is not the real-world system that it represents. The temptation of treating it as one by the analyst exists, and must be resisted.

CHAPTER 5

APPLICATION OF THE SYSTEMS MODEL

There are two major ways in which the RUM systems model may be applied. First it may be used as a means for a systematic generation of a range of policy intervention suggestions. Secondly, it may be applied for the generation of hypotheses relevant to the validation of the assumed relationships within the model itself.

.1 Systematic Generation of Policy Intervention Suggestions

The point has previously been made in section 4.1.4 that every one of the processes represented by rate variables in the systems model is a potential policy intervention point. This implies that by intervening in the operation of any one of the processes some change in the rate of urban-rural migration may be brought about. However the various points differ, in terms of the degree to which changes in them affect RUM and the extent to which intervening in their operations is politically or economically feasible. There is thus some merit in examining a range of policy intervention suggestions before making policy recommendations.

A systems model of a real-world system is a convenient means of seeing at a glance the different policy intervention points; and by considering the policy options for each point it is possible to systematically derive a range of options. The alternative to this systematic approach, a partial approach, is what dominates the literature on rural-urban migration, i.e., many writers make policy recommendations without demonstrating awareness of the range of alternatives, and complementary actions, through other

policy intervention points, that is possible. The contributions of Okurume (1971) and Madavo (1971) will illustrate this point.

In this section a few policy intervention suggestions will be derived by reference to some of the policy intervention points of the systems model. These suggestions, it must be stressed, are not presented as policy recommendations for the control of rural-urban migration; rather the idea is to demonstrate how one may systematically proceed from the model to a range of policy intervention suggestions.

Three points need to be made in this regard. The policy suggestions to be derived are not necessarily original ideas and will not be new to those familiar with the literature on rural-urban migration. What may be new is that there is a systematic way of deriving policy suggestions to deal with a real-world system so that the process of arriving at such suggestions is not entirely arbitrary.

Secondly, the systems model dramatizes the point that in working out a strategy for intervention, a policy that directs all its efforts to only one intervention point, to the neglect of all the others, may prove to be futile, and that a bundle of policies directed simultaneously at different intervention points may be more realistic. For instance, a policy of small-town development to promote marketing facilities and to stimulate some urban-related activities is legitimate; but if this is not combined with an incomes policy to give young people the necessary incentive to remain and farm in the rural areas, it will not work. This is not to suggest, however, that only an incomes policy is required for success.

Thirdly, in a complex social system such as the one with which we are concerned a useful way to proceed may well be to combine a systematic approach to policy selections and pilot projects designed to test the

effectiveness of proposed policies in the real world.

Table 5.1 is a presentation of some possible policy suggestions related to several selected policy intervention points.

5.2 Systematic Generation of Hypotheses

In chapter 3, some eighteen functional relationships were derived from Figure 3.2 as follows:

1. RUU = f(RUM, URM, RULT)
2. REU = f(RE, URM, RELT, RUM)
3. RUE = f(RUM, RULT, URM)
4. REE = f(RE, RELT, URM, RUM)
5. UUU = f(RUM, UULT, UE)
6. UEU = f(RUM, UELT, UE, URM)
7. UUE = f(RUM, UULT, URM)
8. UEE = f(RUM, UE, UELT, URM)
9. RE = f(RMT, REU, REE)
10. UE = f(UUU, UEU, UEE)
11. RULT = f(REG, RUU, RUE)
12. RELT = f(REG, REU, REE)
13. UULT = f(UEG, UUU, UUE)
14. UELT = f(UEG, UEU, UEE)
15. RMT = f(UUE, UEE)
16. URC = f(UUU, UUE, UEU, UEE, UULT, UELT)
17. URM = f(UEU, UUU, UEE, UUE, REU, REE, RUU, RUE)
18. RUM = f(RUU, RUE, REU, REE, URC, RMT)

Each of the above equations represents a testable hypothesis.

Thus a systems model is a basis for generating a large number of

TABLE 5.1

SOME POSSIBLE POLICY INTERVENTIONS

Policy Intervention Variable	Possible Policy Intervention	Comments
1. Rural Employment Generation	a) agricultural development	a) To demonstrate how a farmer can get as much returns for his efforts as most people in the urban areas.
	b) incomes	b) The gap between urban and rural incomes is great and widening. This sub-policy is to try to narrow the gap (Marketing Board practices; holding line on urban incomes; rural dev. tax).
	c) market centre	c) These market centres will be low-order urban areas which will combine marketing facilities with some urban-related activities for the benefit of farmers.
	d) urban decentralization	d) The aim here will be to decentralize urban investment as a means of stimulating local demand for farm products in the urban hinterland. This will also offer alternative destinations to migrants and relieve overcrowding.
	e) land ownership	e) Putting all land into public hands will remove restrictions on farm labour mobility and eliminate landlessness.

continued ..

Policy Intervention Variable	Possible Policy Intervention	Comments
2. Urban Employment Generation	a) incomes (same as 1b above)	a) Continuous rising of urban wages and slowly rising rural income is a major spur to migration. This policy will check this.
	b) service sector expansion sub-policy	b) Modern industrial manufacturing complexes take up a lot of capital and employ a few people. This policy will concentrate attention on the development of the labour-intensive service sector.
3. Rural and Urban Education	a) family planning	a) This will reduce the magnitude of the problem and make it more tractable. Long-run solution.
	b) curriculum reform	b) The main thrust of the reform will be to put the emphasis on teaching of skills needed in the environment, not ones needed for admission to the next higher level of education. Present educational system is very short on self-reliance and initiative.
	c) cost of education	c) This policy will aim at making more selective investments in education and shift greater burdens on to parents. This will reduce school intake, dampen migration, and release public funds for other forms of investment.

continued ..

	Policy Intervention Variable	Possible Policy Intervention	Comments
4.	Reverse Migration	Repatriation	If this can be implemented it will diminish rural-urban migration. But it may be hard to do it well; cost may also be prohibitive.
5.	Urban-Rural Communication	Propaganda	This policy will aim at providing realistic pictures of unemployment in urban areas and less urban-biased news coverage. It will promote a self-help, rural-development movement through information. No doubt the degree of success will depend on progress in other sub-policies.

explicitly interrelated, testable hypotheses about the real-world system. A test of the value of a model in this regard is to try to do the same thing without the aid of one. The result, in my opinion would be a smaller number of, largely, unrelated hypotheses.

The remainder of this chapter will present four policy intervention points in the RUM systems model and make one possible policy intervention suggestion for each of them. It will then be shown how such policy suggestions lead to the generation of testable hypotheses. Finally, data requirements for the testing of these hypotheses will be discussed.

Rural Employment Generation, REG

One of the more important threads that run through most discussions of the causes of rural-urban migration is that the income differential between rural and urban areas is the most powerful motive force behind the process. Often, therefore, policies aimed at narrowing this differential have been advocated. They range from suggestions to locate new industries in rural areas to outright rural income subsidy.

A policy which has been suggested before as a way of closing the income gap is that of decentralization of urban investment to provincial and lower-order centres. This policy, the argument goes, will make it possible for all farmers to have access to urban centres for the purpose of marketing their products and such an effective marketing link will increase farm revenues. A second supporting viewpoint is that urban centres are the points from which innovative ideas are diffused to rural areas and presumably over the long run these innovative influences will have a beneficial effect upon rural income.

In considering such a policy a question that arises is this: what,

empirically, have been the effects of existing provincial and lower-order urban centres on the migratory behaviour of neighbouring rural people? A hypothesis may be stated as follows: farm incomes decrease, and rates of migration increase, with distance from provincial and lower-order centres.

The data for testing this hypothesis could be derived from a sample of rural communities located at varying distances from provincial and lower-order centres. For each rural community, data on farm income and the rate of rural-urban migration will be needed for a simple correlation analysis.

Rural Education, RE

Education is desirable not only for preparing an individual for a career but also for other, non-occupational purposes. In its Second National Development Plan (1970-74), the Federal Government of Nigeria stated as follows:

> "One major focus of educational policy in Nigeria has been the ultimate provision of formal education to every child of school going age to at least primary school level, on the ground that universal education is very vital in improving people's receptiveness to new ideas. The other objective of educational policy is the creation of an adequate stock of skills needed in the process of social and economic development."

Given this objective, any migration policy suggestion that will have the effect of reducing the opportunities for education may not be politically feasible.

A more fertile area of intervention may be that of curriculum reform aimed at producing school graduates capable of making more creative use of the opportunities presented within the rural environment. The related question to raise here is whether there are any differences in migratory behaviour between the inhabitants of rural communities where pupils are

exposed to a high degree of participation in rural work and those in areas where their participation is low. From this question the following hypothesis may be generated: there is a negative correlation between the amount of skill in doing rural work possessed by pupils in a given community and the rate of rural-urban migration from there (especially under conditions of high urban unemployment).

Cross-sectional data for the verification of this hypothesis may be obtained by taking a sample of rural schools, and testing pupils for their skills in carrying out different tasks related to making a living in rural areas (farming, rural crafts, etc.). With this and the rates of rural-urban migration for all communities, a correlation analysis can be performed to test the hypothesis and buttress or weaken the case for curriculum reform as a policy for influencing rural-urban migration.

Urban-Rural Communication, URC

One of the hypothesized relationships in the systems model is that information about high urban unemployment has the effect of discouraging the decision to migrate to the urban area.

Arising from this is a policy suggestion for a public-sponsored rural information programme, aimed at creating a certain image of the urban employment market to ruralites.

Relevant to such a suggestion is the question: does information about urban unemployment have any impact on the migration of rural people to urban areas? A related hypothesis is this: the rate of rural-urban migration from a given rural community is negatively related to the amount of information (about urban unemployment) reaching that community.

The technique for obtaining data to test this hypothesis is to interview potential migrants in a sample of rural communities to try to assess the

level of their awareness of urban unemployment conditions. A correlation analysis will be possible as in the previous cases.

Remittances, RMT

The systems model implicitly incorporates the hypothesis that a large portion of the remittances sent into rural areas from urban sources go to the support of education, which, in turn, increases the propensity among rural people to migrate.

A policy in this area aimed at exhorting urban people not to send remittances to rural relatives may be infeasible on the ground that kinship ties are still very strong. On the other hand a policy of urban taxation for rural development can be instituted. By taxing away part of the disposable incomes of urbanites, the government reduces their capacities to send remittances. The revenues can be used in running a rural development bank for the sole purpose of promoting non-educational, but employment creating, investment in rural areas.

But is the rate of rural-urban migration at a rural location a function of the amount of remittances received there? The related hypothesis to this question is this: the rate of rural-urban migration from a rural community is positively related to the total amount of remittances received.

An intensive interview of a sample of rural heads of families, who have urban connections, will yield information on the amount of remittances entering the particular community. This, with the rate of migration, collected for a sample of rural communities will allow a verification of the hypothesis.

In summary, this chapter has attempted to show how the RUM systems model can aid a systematic derivation of a range of policy intervention suggestions and hypotheses.

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 Review

Concern over the problems of high rates of rural-urban migration in Nigeria, as indeed in most of the third world, centres around three main issues. First there is the concern over the environmental issue of overcrowding in the metropolitan areas resulting from rapid urban growth. The urban physical environment rapidly deteriorates in such a circumstance and enormous strains are placed upon municipal administrative and fiscal resources.

Secondly, there is concern arising from the fact that the swelling pool of urban unemployed, sustained by rural-urban migration streams, can no longer represent a desirable economic phenomenon, but a constraint on economic development.

Thirdly, there is concern over the adverse socio-political implications of prolonged frustration among the urban poor.

To the governments of Nigeria, therefore, rural-urban migration is a problem that must be thoroughly understood, in order to allow realistic policies to be generated. This work aims at making a modest contribution towards such an understanding.

Traditional disciplinary approaches have so far not succeeded in making any significant headway toward a solution to the problem of rural-urban migration, and it is argued here that the major cause of failure may well be that the approaches have been partial in nature.

Proceeding on the premise that rural-urban migration is in reality a process within a complex socio-economic system consisting of many interacting components and significant feedback effects, general systems theory

was considered a useful analytical framework for its investigation. As well as providing a broader perspective, a systems framework is a powerful tool for exploratory research and well-suited to the problem under investigation.

By relying on material from existing literature and personal experience of the process in south-eastern Nigeria it was possible to construct a twenty-component model of rural-urban migration for Nigeria. Eight of the components are stock variables; twelve are rate variables (Figure 4.2).

Most of the interrelationships depicted in the model are only hypothesized to be representative of reality. Thus a logical application of the model is the generation of a large number of related, testable hypotheses whose verifications should make a significant addition to the understanding of the process of rural-urban migration in this part of the world.

Each of the rate variables in the systems model represents a policy intervention point because all are processes whose operations change other rate variables, the stock variables, and, thus, the conditions of the system. A systematic way to generate a whole range of potential policies for influencing the rate of rural-urban migration is to consider the possibilities for intervention for each of the rate variables. In this way, the generation of potential policies is not handicapped by arbitrariness or incomplete coverage. This application of the model was demonstrated herein.

6.2 Directions for Future Research

The main thrust of this study is to lay the groundwork for further, substantive research on rural-urban migration in tropical Africa. There are two main directions along which to proceed beyond this point: the modification of the conceptual structure of the systems model to incorporate

several other important aspects of the process of RUM; and the testing of the validity of hypotheses arising from the model through the development of primary data.

After the construction of the present model, it became clear that the roles of social amenities in rural and urban areas were important elements in migration decisions and should be incorporated in the model. Such an enrichment will make the model more realistic.

Secondly, the treatment of rural employment in the present model is not quite satisfactory. Farm and non-farm employment ought to be disaggregated because the existence or non-existence of non-farm jobs in a rural location may well be a critical element in migratory behaviour.

The modifications suggested above will allow the generation and testing of hypotheses regarding additional basic policy questions about rural-urban migration. The first question concerns the kind of trade-off functions, if any, that govern the behaviour of potential migrants and the urban unemployed, ie., what are they prepared to consider as a minimum inducement package not to migrate (in the case of potential migrants) and to leave the urban area (in the case of the urban unemployed)? Successful investigation of these questions will yield information of considerable importance in fashioning migration policy.

The second basic question that has to be raised and answered is this: how does one define and measure 'rural development', and in what way is it related to rural-urban migration? Of all the concepts one encounters in the rural-urban migration literature very few surpass that of rural development in both popularity of usage and imprecision. A clarification of this concept and its role in the rural urban migration process would be a significant contribution.

Apart from the modification of the conceptual structure of the model, the area of verification of hypothesized relations within the model, through the development of primary data, is an obvious direction for future research.

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