PN-AAC-480

URBAN INVESTMENT ANALYSIS

February 1985

Prepared for

The Office of Housing and Urban Programs
U.S. Agency for International Development
Washington, D.C. 20523

Prepared by

Ted Miller
The Urban Institute
2100 M Street
Washington, D.C. 20037

The views and interpretations expressed in this report are those of the authors and should not be interpreted as the official position of the Agency for International Development

APPENDICES

Page

Appendix A: Bibliography

Appendix B: List of People Interviewed and Their Affiliations

Appendix C: Methods for Determining Indicator Values

Appendix D: Ways to Present Information Visually

LIST OF FIGURES

1. NUPS Methodology Overview..... 24

2. Sample of a Scalogram: Settlements in the Bicol River Basin of the Philippines..... 46

LIST OF TABLES

1. Objectives and Indicators Used in Selecting Target Cities for 14 Urban Sector Projects..... 3

2. Average Rate of Return on Infrastructure for Brazilian Towns, by Size of Town..... 19

3. Comparison of Techniques for Selection Based on Economic Development Potential..... 34

GLOSSARY

ICOR Incremental Capital Output Ratio

LP Linear Programming

NHSPS National Human Settlements Policy Study

NUPS National Urban Policy Study

ROI Return on Investment

RUP Rural-Urban Profile

UDA Urban Development Assessment

URFD Urban Functions in Rural Development

TABLE OF CONTENTS

	Page
Executive Summary	i
I. Overview	1
Objectives in Urban Investment Decisionmaking	2
Combining the Objectives	9
Urban Development Assessment Framework	10
Organization of This Paper	11
II. Economic Efficiency and Economic Development Potential	12
Rules of Thumb	12
Comparative Rate of Return on Investment	17
National Urban Policy Study and Its Derivatives	20
National Human Settlements Policy Study: A Modified NUPS Approach	27
A Simple Linear Programming Model	30
Linked Regional Econometric and Input-Output Models	32
Summary Guidance on Method Selection	33
III. Urban Need and Equity	36
Analysis of Unmet Needs	36
Analysis of Service Locations	37
Evaluation of the Cost of Equity	38
Summary Guidance on Method Selection	39
IV. Rural-Urban Linkages	41
Rural-Urban Profiles	42
Urban Functions in Rural Development	44
Summary Guidance on Method Selection	51
V. Administrative and Political Considerations	53
Administrative and Financial Capability	53
Political Considerations	56
Summary Guidance on Method Selection	60
VI. Conclusion	61
Analyses Recommended	61
Decisions Based on Multiple Objectives	64

EXECUTIVE SUMMARY

Urban investment strategies are plans governing how much to invest in each urban center of a region or nation. The objectives underlying urban investment strategy decisions can be grouped into four categories aimed at: (1) realizing urban economic development potential and the resulting efficiency of investment, where the greatest efficiency equates to the lowest cost per job or per dollar of production, (2) meeting basic urban needs or creating a more equitable distribution of resources among cities or regions, (3) strengthening rural-urban economic and service linkages, in order to meet basic rural needs and stimulate rural economic growth, or (4) responding to political realities and administrative and financial capability to successfully carry out investment activities. This paper evaluates the analytic methods available to guide investment decisionmaking based on these objectives.

Countries adopting investment strategies oriented to specific regions, secondary cities, or border towns already have made an implicit decision to reduce national growth in order to meet other objectives. It is important to determine those objectives and assure that potentially less costly non-spatial interventions might not be better ways to achieve them.

A good urban investment decision process almost always should consider economic efficiency, political realities, and administrative and financial capability. Strategies for strengthening rural-urban linkages are designed to meet specific regional needs. The cities in which to invest to better meet basic urban needs may differ from the investment choices to meet regional needs. Thus, a regional investment strategy may have to choose between an

urban equity or a rural-urban linkage objective. Generally, the choice should be based on the region's potential for rural versus urban development over the next 10-15 years.

Whenever possible, investment strategies should aim for full cost recovery. Generally, it also is desirable to introduce an element of self-selection in the investment strategy as a filter for administrative capacity. Cities that are otherwise promising investment candidates but do not apply for funds often are in need of technical assistance on urban management.

Investments to address unmet urban and regional basic needs and politically motivated investments generally create less economic growth than investments geared to job creation. It is desirable to analyze how much growth is sacrificed. Obtaining such a measurement is the primary purpose of the NUPS methodology.

AID's National Urban Policy Study in Egypt developed the NUPS methodology for comparing the cost per job created for alternative urban settlement patterns. Each pattern is intended to create the same number of urban jobs. The NUPS methodology provides a basis for judging how much extra cost is needed to spread urban investments more equitably among regions or accommodate government constraints and political objectives when meeting employment targets.

Although NUPS, or models derived from it, recently have been applied to compare the cost of alternative urban investment strategies in Nepal, Senegal, and Pakistan, the model will continue to be in its research stage throughout 1985. Even after that, the spatial investment strategies that it suggests should be confirmed using some simple indicators of economic development

potential. NUPS is not intended to give precise answers, but rather to inform tradeoff decisions, confirming and refining judgment based on other analysis.

NUPS currently only examines urban economic growth. Thus, it would require modification to compute the loss of economic efficiency inherent in a rural-urban linkage strategy intended to stimulate rural growth. Conceptually, a technique called linear programming could be applied to a simple model of the country's economy, instead, in order to analyze combined impacts of urban and rural development. The linear programming technique has some theoretical superiority to NUPS and should be researched further or tried as part of a large-scale national development policy study. In theory, this technique would be more powerful than NUPS but require about the same data collection effort. As yet, however, its actual capabilities have been explored only in a very preliminary analysis by the World Bank in 1978.

If modelling with NUPS or linear programming seems too complex, costly, or time-consuming, thoughtful rankings of cities on the relevant investment objectives can be combined to determine a reasonably sound investment strategy.

Economic development potential can be ranked based on a combination of several indicators that generally are readily measurable. These indicators, which are discussed in detail at the end of Chapter 2, examine both the presence of factors like plentiful services that make development easier and of advantages in natural resources and labor productivity that create development potential.

An alternative way to rank development potential is with project-specific rates of return on a large number of past and proposed projects. An

investment commits a country to front-end costs and future maintenance costs which will be offset by future benefits. Because money has opportunity costs (that is, it can provide a return if invested in something else), the present value of a dollar of benefits varies, even in an inflation-free world, depending on when it will be received. Therefore, to determine whether the benefits of an investment exceed its costs, a discount rate is applied to the future benefits and costs in order to determine their present value. The rate of return on an investment is the interest rate at which the present value of future benefits of an investment equals the present value of its future costs. Obviously, an investment with a high expected rate of return is more desirable from the viewpoint of economic efficiency than one with a low expected rate of return. Cities where rates of return are consistently high are, thus, excellent investment targets. Analysis based on rates of return only is recommended when data are readily available on the return on a large number of past projects. However, computing these data from scratch would be as costly as applying the more powerful NUPS and linear programming techniques.

When meeting basic urban needs or creating a more equitable distribution of resources is an investment objective, two approaches are possible. In one approach the per capita shortfall of existing urban infrastructure from minimum acceptable standards provides a basis for ranking investment priorities. This measure is easy to compute and is the best measure if the objective is to address basic urban needs for water, sanitation, and other infrastructure. If the objective is to address basic urban or regional service needs (e.g., for schools and health care facilities), location-allocation models provide a way to determine where to site the planned

increment in service capacity in order to have the greatest impact on access to services. The location-allocation model approach usually would be used when efficient coverage of the populace, constrained by consistency with existing spatial patterns and political considerations, is the only objective being considered in siting service facilities.

To rank priority locations for investment to strengthen rural-urban linkages, the best approach is to begin by cataloguing existing functions including services, facilities, infrastructure, organizations, and economic activities. This catalog can be applied readily to analyze the hierarchy of urban functions and identify functional gaps using the methods developed by AID in its Rural-Urban Profile and Urban Functions in Rural Development (UFRD) studies. To arrive at a sound investment strategy, this information must be combined with a separate study of which gaps people would be willing and able to pay to fill (that is, of demand) or some normative standards that can be used to identify unmet basic needs at the regional level. These methods never have been combined with UFRD or Rural-Urban Profile results, although an on-going project in Ecuador is making an initial attempt at this. For decision-making, extensions of NUPS or especially linear programming to a regional context might be a more productive approach.

Administrative and financial capability should be incorporated in the analysis both by ranking the candidate investment sites on a set of administrative and financial indicators and by introducing an element of self-selection into the investment decision process. Political considerations serve as constraints on the strategy-making process, not as the analytic driving force. They may require investment in specific cities or just specific regions.

Once investment priorities have been ranked based on each relevant investment objective, the ranks can be combined based on the importance that AID and host country decisionmakers attach to the different objectives. The combined ranks then can be used to allocate the available investment funds.

In summary, determination of an urban investment strategy requires use of a variety of analytic methods. A good strategy can be developed using simple methods to organize information and rank priorities. Confirmation with the NUPS model can support more informed decisionmaking, even though it takes more time and costs more than a less formal approach. Conceptually, a linear programming model offers great potential for guiding urban investment strategy decisions. To date, however, this approach has not reached the operational stage.

So the desirable procedure at this time appears to be to start with simple indicators and methods and to use more complex ones only as necessary complements or for more convincing confirmation. It is important to emphasize, however, that the "simple approach" calls for very careful interpretation of the data compiled. In some ways, therefore, it is more demanding than more sophisticated but more mechanical methods.

CHAPTER I OVERVIEW

In most developing countries, urban populations are growing more rapidly than urban employment, shelter, services, and infrastructure. Growing urban requirements for investment capital compete with the continuing need for rural development support. Increasingly, some urban and rural investments are being considered potentially complementary, which makes investment strategy decisions more complex. Within the context of scarce development resources, this paper examines the analytic methods available to support urban investment strategy decisions. It evaluates these methods in terms of their validity and applicability to different types of situations. These evaluations are intended to assist both analysts examining alternative urban investment strategies and those who must decide how such strategies will be developed and used.

One basis for this paper is a review of existing literature on urban investment strategies, including theoretical and methodological reports, case studies, project appraisal reports prepared by the donor community, plans and strategies developed by host countries, and private-sector location decision methods. Appendix A provides a bibliography of literature searched. A second basis is 24 interviews with researchers and project managers at the U.S. Agency for International Development (AID), The World Bank, academic institutions, and development consulting groups. Appendix B provides a list of the individuals interviewed.

Two principal conclusions emerge from the literature and interviews, namely:

- Urban investment strategies and decisions have been based on a diverse range of investment objectives including economic development

potential/efficiency (as measured, e.g., by return on investment); economic and spatial equity; consistency with political realities and administrative capabilities; maximum support for rural agricultural and resource development efforts; and slowing of the growth in pollution, congestion, and other diseconomies of large urban areas. Analyses almost always explicitly examine only a subset of the possible decision criteria. Often these criteria suggest conflicting strategies.

- Widely accepted or quickly implementable, proven methods do not exist for evaluating strategies with respect to the key criteria of economic efficiency and administrative capability. Furthermore, scientific methods for trading off among the criteria exist but rarely have been applied.

Through its support of Urban Development Assessments, Rural-Urban Profiles, analyses of Urban Functions for Rural Development (UFRD), and the development and use of a National Urban Policy Study (NUPS) method, AID has begun to promote more systematic approaches to urban investment strategy analysis. This paper places particular emphasis on a review of the UFRD and NUPS methods and the utility of all methods from the viewpoint of the broader analytic framework prescribed for an Urban Development Assessment.

A. Objectives in Urban Investment Decisionmaking

For the purposes of this paper, the major objectives used in urban investment decision-making will be grouped into four broad categories aimed at: (1) realizing economic development potential and the resulting efficiency of investment, (2) meeting basic urban needs or creating a more equitable distribution of resources among cities or regions, (3) strengthening rural-urban economic and service linkages, or (4) responding to political realities and administrative capability to successfully carry out investment activities.

Table 1 provides information on how frequently each of these objectives was used in a sampling of recent urban investment studies involving World Bank or AID funding.[1] The first page of Table 1 shows indicators for objectives

TABLE 1

OBJECTIVES AND INDICATORS USED IN SELECTING
TARGET CITIES FOR 14 URBAN SECTOR PROJECTS

Country/Study	Economic Development Potential	Urban Need/Equity
Brazil Parana Market Towns, 1983	Income growth from 1970 to 1980, City size	6 subregions proportional to population
Brazil Medium-Sized Cities, 1979	Population growth rate, Physical capacity, History of promoting economic growth or coping with population growth	------
Colombia Urban, 1978	------	Highest concentration of the poor, Poor environmental conditions, Little infrastructure available
Indonesia Fifth Urban, 1984	Top 10 in population (provincial capitals, growth centers)	Not served sufficiently in prior programs
Ivory Coast Secondary Cities HG, 1980	Regional value added and agricultural production, Family income, % immigrants, % native to city, Male/female ratio, Strength of secondary and tertiary sectors, Tax base	Population growth rate, Net population change, Must serve more than 1 or 2 regions
Kenya Secondary Towns, 1980	Major urban service infrastructure components and local building resources available	Household formation rate, Condition of existing stock, Community facilities needed
Korea Jeonju Regional, 1984	Proximity to existing, fully occupied industrial estates, Access, Topography	Poor region, Poor sub-regions
Mali Rural-Urban, 1984	Concentration of development projects, Economic diversity and growth, Resource base, Accessibility, In and out migration rates	------
Mexico Second Urban and Regional, 1981	Regions with growth potential, Well endowed with natural resources, Population growth	Infrastructure deficiency assessments
Nepal, UDA, 1984	% industrial employment, Population growth rate, Quality of transport links, Availability of adequate and reliable power by 1990, Cost per job created, Topographic constraints	Equity in cost/job created
Peru Urban, 1976	------	Government priorities for meeting needs
Phillipines Regional Cities, 1983	Economic potential as key regional centers,* Population growing faster than national average or major development investment occurring	Large slum-dwelling population
Zimbabwe Housing, Undated	Growth, Prominence among secondary cities, Central locations, Site availability	Housing demand, Backlog

* No more specific description was provided in the source document.

All selections also considered political factors.

TABLE 1 (continued)

Country/Study	Rural-Urban Linkages	Administrative Capability
Brazil Parana Market Towns, 1983	------	------
Brazil Medium-Sized Cities, 1979	Cities with significant influence on hinterlands*	Institutional capability,* Project plans ready, History of promoting economic growth or coping with population growth, Local political commitment
Columbia Urban, 1978	------	------
Indonesia Fifth Urban, 1984	Not served sufficiently in prior programs	------
Ivory Coast Secondary Cities HG, 1980	Services provided to region, Role in agroprocessing	Existence of plans/studies, Potential for cost recovery, Field assessment of capability
Kenya Secondary Towns, 1980	------	Economic, financial, and administrative capacity, Preliminary identification of priorities
Korea Jeonju Regional, 1984	------	Local nomination of projects
Mali Rural-Urban, 1984	Services provided to rural population	------
Mexico Second Urban and Regional, 1981	Poor regions, Regions with low backward and forward linkages*	------
Nepal UDA, 1984	------	------
Peru Urban, 1976	------	Institutional capability,* Project plans ready
Phillipines Regional Cities, 1983	Economy not well-developed given relatively rich hinterland*	------
Zimbabwe Housing, Undated	------	Support of local political structure

TABLE 1 (Continued)

STUDIES CITED

Government of Zimbabwe and The U.S. Centre for Human Settlements. Undated. Proposal for two experimental low-cost housing projects and community develoment programmes, with attendant financial and thrift-generating solutions for lower income groups.

Prindle, Deborah Zubow for USAID. May 1984. Mali Rural-Urban Profile.

U.S. Agency for International Development. 1980. Ivory Coast Secondary Cities Project Paper.

U.S. Agency for International Development. June 1980. Kenya Secondary Towns Shelter and Community Facilities Project Study.

U.S. Agency for International Development. February 1984. Nepal Urban Development Assessment. Prepared by PADCO, Inc.

World Bank. April 10, 1978. Appraisal of Columbia Urban Development Project, Report No. 1681a-CO.

World Bank. May 24, 1976. Appraisal of the Urban Sites and Services Development Project Peru, Report No. 1065a-PE.

World Bank. May 21, 1979. Brazil Medium-Sized Cities Project: Staff Appraisal Report, Report No. LN-1720-BR.

World Bank. April 24, 1981. Mexico Second Urban and Regional Development Project: Staff Appraisal Report, Report No. 2937-ME.

World Bank. May 4, 1983. Staff Appraisal Report: Brazil Parana Market Towns Improvement Project, Report No. 4403a-BR.

World Bank. April 12, 1984. Staff Appraisal Report: Indonesia Fifth Urban Development Project, Report No. 4887-IND.

World Bank. February 23, 1984. Staff Appraisal Report: Korea Jeonju Regional Development Project, Report No. 4719-KO.

World Bank. March 10, 1983. Staff Appraisal Report: Phillipines Regional Market Towns, Report No. 4094-PH.

related to economic development potential and urban need/equity. The second page shows indicators related to rural-urban linkages and administrative capability. The third page lists the studies cited in the table. Political considerations are omitted from this table because they presumably influence the nature of all urban investment strategies. Table 1 shows that economic development potential and equity were considered in 12 of the 14 reports reviewed. The objectives of strengthening rural-urban linkages and assuring adequate administrative capability each were considered six times. Although urban investment strategy decisions almost all derive from consideration of the same few objectives, Table 1 shows that the indicators used to evaluate city investment potential in terms of these objectives are quite diverse. Furthermore, they sometimes are very broadly stated indicators that cannot be measured quantitatively. The diversity and informality of the indicators used reflects the lack of well-established methodologies for making urban investment strategy decisions. **This paper's purpose is to promote the use of more uniform approaches modelled after the best past practices.**

Although past urban investment studies have used different investment objectives and applied them in varying ways, the four objectives listed earlier do seem to cover the principal issues involved in setting an investment strategy.

1. Economic Development Potential and Investment Efficiency

Virtually all countries face financial constraints in designing their investment strategies. In developing countries, both the donor community and the host nation are aware that resources are not limitless. Consequently, they usually are interested in investing in those locations that will make the greatest contribution to economic growth. These locations are the ones with

the greatest economic potential; that is, locations where investments will be economically efficient in that they will yield the greatest returns. Investment decisions too often are driven by a vision of future economic potential without any analysis of the cost of realizing that potential. Marginal additions of infrastructure will not change growth patterns.

2. Urban Needs and Equity

Except in the most developed or populous Third World countries--Brazil, China, India, Korea--an urban investment strategy driven strictly by considerations of economic efficiency generally will dictate concentration of all urban investments in perhaps one to four cities. However, other cities have very real needs that must be met too. In Latin America, for example, shanty towns of 100,000 - 500,000 people may lack potable water and a basic sanitation system. In designing an urban investment strategy, therefore, some portion of the investment funds is allocated to improving conditions in urban areas where investment is not economically most efficient. A helpful step in making such equity-oriented allocations is to establish realistic minimum acceptable living standards. The difference between current conditions and these standards measures the basic needs of the communities, which is a helpful input in trading off concerns for equity and efficiency. The NUPS model--described in Chapter II--is designed to guide such trade-off decisions. Considerations of fairness and equity would suggest making some investment in each region, each large city, or cities that were not served by prior investment programs. In Latin American and other countries at a medium stage of development, decisions about spatial equity may be made prior to analyzing the investment opportunities. Thus, an AID report may consider only the southern portion of Peru or secondary cities in Kenya.

3. Rural-Urban Linkages

In many countries, the greatest potential for economic growth and the greatest service deficiencies are in rural areas. Frequently, one objective of an urban investment strategy is to build up the urban linkages that support rural development and fill rural service needs. This effort is distinct the largely unsuccessful attempts to create "growth poles" in the 1960s. Rather than large scale manufacturing, the stress is on service, distribution, commercial, marketing, and agro-processing functions. Consequently, strategy formation around this objective relies heavily on analysis of linkages and ways to maximize service accessibility for a fixed level of investment. AID's Urban Functions in Rural Development (UFRD) and Rural-Urban Profile methodologies focus on service gaps, but little work has been done on how to match these gaps against demand to obtain an investment strategy.

4. Political Considerations

Political considerations can be important determinants of an investment strategy. They might include a desire to strengthen urban areas near the country's border, a requirement to spread investment among a pre-identified group of cities, or a preclusion on investment in an area of unrest.

A frequent political constraint restricts the analysis to an urban assessment of secondary cities. Often such a constraint is imposed out of a desire to slow the growth of a primate city that is becoming too congested, too polluted, or overly sudsidized. Alternatively, this constraint can derive from a concern with meeting basic needs, a perception that the primate city has already received its fair share of public investment, or a desire to support rural development. If the purpose of restricting a project to secondary cities is to make alternatives to the primate city more attractive,

some observers (e.g., Richardson, 1981; Scott, 1982) recommend focussing on relatively large cities at least 100 to 200 kilometers from the primate city. Locations in closer proximity are unlikely to escape the competitive pull of the central city or are too easily absorbed into the metropolitan economy. The closer locations, however, do benefit from some of the primate city's competitive advantages. Chonburi, for example, has one of the strongest manufacturing sectors in Thailand, yet it is only 87 Km from Bangkok. Korea has both thriving suburbs accessible to Seoul and truly independent cities like Pusan and Gwan-ju.

5. Administrative and Financial Capability

Administrative and financial capability also can be an important constraint on the likely outcome of investment strategies, especially if the local government will play a major role in implementing the investment program. In some countries, both AID and the World Bank recently have experimented with competitive application among cities wishing to participate in housing guaranty and urban sector loans. In Kenya and the Ivory Coast, for example, AID emphasized that the locality must have the administrative capability to assemble the application and project plans and the revenue generation capacity to recover the project costs. Effectively, this approach recognizes that quality of leadership is an important, potentially key element in the success of an urban area.

B. Combining the Objectives

A crucial concern for the donor community is whether the objectives underlying an investment strategy are sensible ones. When economic efficiency and market feasibility have been ignored as considerations, investment strategies based on thoughtful analysis merely may produce underutilized

infrastructure. The equity-driven decision to place industrial estates in the backward regions of India beginning in 1961, for example, led to a vacancy rate in rural industrial estates of 45 percent by 1974.

Even when the investment objectives used are intelligently selected, what theory and indicators to use to make a selection based on these objectives may not be obvious. Ironically, the locations to target to achieve the key objective of realizing economic development potential are less clear than where to invest to achieve lesser objectives like strengthening linkages (based on gaps, without concern for their economic development implications) or increasing equity of resource allocation among places. Thus, potential errors in developing an investment strategy can result from misestimation of development potentials or overly heavy reliance on less important, but more easily measured objectives. Indeed, host country political decisions with respect to some objectives readily can dominate the strategy since scientific ways to judge the economic implications of these decisions are at best embryonic. Furthermore, even if the strategy makes economic sense, it is almost impossible to avoid some risk that the administrative capability to implement it is lacking.

C. Urban Development Assessment Framework

The Urban Development Assessment (UDA) provides a useful framework to assure that the crucial investment criteria are carefully considered when developing an investment strategy. This framework requires (Office of Housing and Urban Programs, AID, 1984):

- A detailed description and brief evaluation of the effectiveness of the urban planning and management institutions.
- A brief review of the nature and effectiveness of existing urban and spatial development strategies, including implicit political constraints.

- Documentation of the existing pattern of urban development and investment, job creation costs, and the general physical condition of the principal urban areas (with particular emphasis on the situation of the poor).

- Analysis of the cost implications of varying physical standards for urban development projects.

- Identification of priority cities for investment based on economic development potential tempered by a concern for geographic equity. Note, however, that the identification is informed by prior collection of information on the existing performance on both criteria. This method implies a preference for preselected interventions as opposed to incentives such as subsidies that encourage people to relocate to areas where minimal services are more readily available.

At AID's option, the UDA also may examine:

- The degree to which a decentralization strategy can be pursued "without causing an unacceptable decline in national economic growth."

- The potential for promoting rural development through urban investment in supportive economic and service facilities.

The UDA framework supports urban investment strategy decisions with data on all four urban investment objectives listed earlier. The data collection would have to extend beyond the normal UDA framework, however, to choose between (1) decentralization, and (2) better control of primate city diseconomies through infrastructure investments with full cost recovery, pollution control, and land use planning/zoning.

D. Organization of This Paper

Each of the next four sections of this paper describes methods and indicators that can be used to evaluate alternative urban investment strategies in terms of one of the four investment objectives. A closing section describes methods that can be used to make trade-offs between investment objectives and provides a summary of the meritorious approaches.

CHAPTER II ECONOMIC EFFICIENCY AND ECONOMIC DEVELOPMENT POTENTIAL

The economic efficiency of an urban investment strategy is difficult to measure. In most cases, past studies have taken an approach blending judgment and indicators. A more scientific evaluation was deemed either too difficult or too costly and time-consuming. If the host country already has done a city selection study, the first step is to perform a peer review of it. The study may be adequate. If not, both simple and sophisticated methods are available to guide formulation of an investment strategy.

This section begins by describing simple, generally judgmental decision methods and the analytic and indicator approaches available to support them. A discussion follows of the few formal models that have been used to evaluate the economic efficiency of alternative urban development strategies.

A. Rules of Thumb

1. Recommendations

Host country decisionmakers must have input to decisions on an investment strategy. When no more than 15 localities are serious candidates for investment, rules of thumb are a "quick-and-dirty" way to provide enough information to guide the first round of host country input or check on the rationality of input provided before the analysis begins. More sophisticated methods are justified only if the host country input provided does not seem economically efficient and administratively feasible when tested with rules of thumb.

A wide variety of indicators of economic development potential can be used, depending on the data available in a comparable form for all of the localities under consideration. Some examine the existence of facilitating

factors like existing supportive development and public services, while others more directly examine the potential for development. If several valid indicators are readily available, it is better to consider them all rather than just focusing on one or two.

2. Purpose

Rules of thumb can be used to quickly identify which localities are economically desirable investment choices, provided that the number of localities that are serious investment candidates is small (at most 12 to 15). Rules of thumb generally are most appropriate: (1) when time or data are very scarce, (2) to get a preliminary picture of the situation before undertaking a detailed analysis, or (3) to get some confirming evidence for a hunch or a recommendation based on another method. Quite often, rules of thumb are the only analytic basis for city selection in existing studies.

3. Prior Use

Table 1 in Section I summarized the rules of thumb related to economic development potential that were used for city selection in 13 AID and World Bank assessments of urban investment priorities. This table reveals that most projects consider development potential. The indicators used, however, are quite varied, not necessarily appropriate, and may be so vaguely defined that they are not useful for decisionmaking.

4. Data Required

When applying rules of thumb, indicator selection is largely determined by data availability. It is desirable to select indicators on which comparable data (e.g., collected by the same method, covering the same time period) are available for all of the localities under consideration.

5. Method

In a systematic analysis of indicators to use in establishing urban investment strategies, Harry Richardson (1981, p. 280) identifies a dozen potentially appropriate indicators of economic development potential. Some of these are difficult to measure quantitatively or are discussed herein under other objectives. Among the remaining indicators, the following measure the presence of facilitating factors for development:

a. The degree of agglomeration economies, which can be crudely measured by the population size of the city and its hinterland, or the percent of area employment that is engaged in mining, manufacturing, and construction.

b. The quality and level of public services (most importantly, an existing or nearby electric grid provides more growth potential than diesel generation of power, and growth in some areas is restricted by limits on water supply and waste disposal potential). This factor should be used in determining constraints on growth in areas that are otherwise attractive for development.

c. The size of the social development elite as measured, for example, by the number of college graduates in the population or the number/percent of administrative, professional, and technical personnel in the labor force. Industrial location theory suggests that larger firms hesitate to put offices or plants requiring many technically proficient employees in areas with few other social development elite.

Other indicators address the potential for development directly. These include:

d. The depth of the regional resource base as measured, for example, by the presence of significant agricultural production and productivity or of unusual resources like a substantial mineral deposit. This factor is useful for adjusting the priorities derived using other factors.

e. Attraction for migrants (as distinct from refugees), on the assumption that people go where they think that jobs are available. An appropriate measure would be the ratio of migrants to population for the area divided by the national ratio of migrants to population. This measure is cruder than the measures that follow and should only be used if economic data are unavailable.

f. The rate of growth of regional gross urban product or similar measures of economic growth like area income or employment growth rates.

g. Industrial development potential, as measured by the outcome of past investment.

h. Economic structure, including measures of the sectoral distribution of output or employment.

To the second group of indicators should be added:

i. Labor productivity, as measured, for example, by value added per capita or per employee.

Two important issues are: (1) how to systematically determine comparable values across cities for indicators of economic structure and industrial development potential, and (2) how to set investment priorities using the available indicator values. The latter issue is the more difficult as it requires understanding what urban growth potential the indicator values imply.

1. How to Determine Indicator Values. Several analytic methods exist that can be used to provide systematic insight into the values and implications of the indicators of industrial development potential and economic structure. These are: (1) **shift-share (or mix and share) analysis**, which can be used to analyze which cities or areas are capturing disproportionate shares of industrial employment growth, (2) **location quotients**, which can be used to determine the relative comparative advantage of areas for specific industries (a measure of economic structure and potential), (3) **measures of distribution and association**, which can be used to provide a picture of the economic structure and growth pattern, (4) **economic base theory**, which can be used to project how much supportive development

will result from a given amount of growth in "base" industries, (5) **the incremental capital output ratio (ICOR)**, which measures relative efficiency of investment by area and sector, and (6) **the ratio of private investment to past public investment**, which indicates the relative willingness of the private sector to invest in different areas. These methods all are straight-forward and have modest data requirements. They are described in Appendix C.

2. How to Set Investment Priorities. By rank ordering the cities based on their values for each available indicator, then summing the ranks across indicators, one arrives at combined rankings that roughly measure the cities' investment priorities.[2]

The problem with the ranking approach is that one still must decide on some other basis, probably judgment combined with a knowledge of the total investment budget and priority concerns based on other investment criteria like equity and administrative capacity, both:

- How much to invest in which city.
- How far down the list to go -- what rank marks the point below which investment by the donor community and central government is not warranted.

The literature contains no ready solution to these problems, although it is apparent that indicator 2 (on public service availability) will impose constraints on how much growth can be stimulated in some locations without major cost increases and indicator 4 (on the depth of the resource base) can identify areas where development should offer particularly high returns in terms of economic growth. Beyond this, the decisions are largely judgmental and should be made in the context of all the relevant investment objectives, not just economic development potential. This issue is discussed further in the last section of this paper, which proposes some possible methods.

B. Comparative Rate of Return on Investment

1. Recommendations

If data are readily available on the rate of return from a large number of investments, the rate of return approach is a better way to identify economically efficient places to invest than a rule of thumb approach. Such data rarely are available, however; better methods are available if the situation warrants spending the $50,000 and 3 to 4 months needed to compute them.

2. Purpose

An investment commits a country to front-end costs and future maintenance costs which will be offset by future benefits. Because money has opportunity costs (that is, it can provide a return if invested in something else), a dollar's present value varies, even in an inflation-free world, depending on when it will be received. Therefore, to determine whether the benefits of an investment exceed its costs, a discount rate is applied to the future benefits and costs in order to determine their present value. The higher the discount rate, the lower the present value of future benefits will be. The rate of return on an investment is the interest rate at which the present value of future benefits of an investment equals the present value of its future costs. An investment with a high expected rate of return is more desirable from the viewpoint of economic efficiency than one with a low expected rate of return.

3. Prior Use

The World Bank's staff appraisal reports for urban development projects generally compute expected city-specific returns on physical infrastructure investments. Surprisingly, although it provides a way to compare expected

economic growth resulting from alternative investments, relative return on investment (ROI) never has been used as a criterion for city selection in any of the literature reviewed. Perhaps the reason is the project-specific orientation of rate of return analysis.

4. Method and Data Requirements

Rate of return analysis has the potential to be used in a broader context, as illustrated most vividly in a 1983 World Bank Staff Appraisal Report on a Parana Market Towns Improvement Project in Brazil. To prepare this report, detailed land value records were analyzed for 120 towns with populations ranging from well under 2,500 to 50,000 Using these records, the impact on imputed lot rental values was computed for paving projects in the market towns and for a package of urban infrastructure, including paving, sidewalks, drainage, and public lighting at standards appropriate for the size of town, in all towns. Table 2 summarizes the results of this effort. It is readily apparent from Table 2 that in a resource-constrained situation, economic efficiency would suggest not funding broad infrastructure packages in Parana market towns under 2,500 population. If rate of return estimates were available for at least three projects in each town, average town-specific rates of return on past projects appropriately could be used to further target investment to towns with high returns.[3]

An allocation of investment funds based on rate of return is not only economically efficient but also conducive to full cost recovery. This assertion, of course, assumes that estimated rates of return actually will be realized. Sometimes, however, most notably in hydroelectric and water supply projects, the World Bank's estimated rates of return have not been very successful in reproducing the returns actually achieved. Overestimation is

TABLE 2

AVERAGE RATE OF RETURN ON INFRASTRUCTURE FOR BRAZILIAN TOWNS, BY SIZE OF TOWN

Town Size	Return on Street Paving	Return on Infrastructure Package
2,500	24	18
2,500-5,000	24	23
5,001-10,000	-	26
10,001-20,000	-	27
20,001-50,000	-	27

Note: Rates for street paving alone were not computed for larger towns.

Source: World Bank. May 4, 1983. Staff Appraisal Report: Brazil Parana Market Towns Improvement Project, Report No. 4403a-BR.

especially common when the rate of return is based on the expected tariffs for water or electricity rather than existing lower tariffs that it subsequently proves infeasible to raise.

To use rate of return analysis to guide city selection for an urban investment strategy, one would assemble available data on the audited rate of return on past urban investments and estimated rate of return on investments that were not made or have not been audited. If this search yielded multiple rate of return estimates for most of the cities and towns being considered as investment targets, the approach would be practical. For a few localities without rate of return data, it would be possible to apply a uniform procedure, most probably the procedure used by The World Bank (see, for example, Ray, 1984) and evaluate the rate of return on a typical package of infrastructure investments built to suitable standards. The investment market basket probably should emphasize industrially-oriented investments and the other investments that their success will induce. This approach would be sufficiently costly and time-consuming that it would not be worth pursuing

unless rate of return information for most localities already exists. The cost of computing this information from scratch would be at least as large as the cost of data collection and analysis for the more powerful methods described in the rest of this chapter.

5. Limitations

The principal problems with an analysis based on rate of return are:

- If no one has successfully modelled the relative development potential of different cities, the rate of return on industrial infrastructure in different cities probably cannot be estimated accurately. It is unclear whether the investment will induce the desired private investment at the targeted price. Nevertheless, if the number of cities under consideration is modest, it might be possible to structure and evaluate a few projects in each city (the donor community does so routinely) and gain insight into the relative attractiveness of the different cities. Before undertaking such an effort, however, it would be advisable to carefully assess the time and resources needed to complete it.

- If existing rate of return estimates will be used, estimates that have not been audited after completion of development will need to be checked to assure their accuracy.

C. National Urban Policy Study and Its Derivatives

1. Recommendations

The National Urban Policy Study (NUPS) is a model originally developed in Egypt and subsequently applied successfully in Nepal and Senegal. NUPS is intended primarily as a confirmatory tool or a way of guiding decisions. Its results are not be-all and end-all optimal solutions. The principal focus of NUPS is on the cost per urban job associated with different settlement patterns. NUPS has been accused of having primate city bias, although it did not recommend primate city involvement in Nepal. NUPS also requires customizing two sets of data--representing differences in construction costs between cities and in growth management costs--for the country where it is applied. NUPS is not perfect, but it is the best tool currently available

when an AID mission wants to confirm someone's informed judgement or to quantify the cost of constraints on city selection that the host country wishes to impose.

2. Purpose and Key Requirements

The National Urban Policy Study in Egypt developed a methodology for comparatively evaluating the cost per job created for alternative urban settlement patterns. Each pattern is structured to create the same number of jobs in the overall economy.

The key requirements of the NUPS methodology are: a macroeconomic model that can predict future national urban employment, city-specific employment data, and national data on urban infrastructure standards and costs. The Planning and Development Collaborative (PADCO) has computerized the NUPS methodology and applied it in support of UDAs in Nepal and Senegal, so a microcomputer with floppy disk drives would be helpful. These requirements generally can be met in a project with constrained time and resources.

3. Prior Use

As noted, NUPS has been applied to analyze alternative urban investment strategies in Egypt, Nepal, and Senegal. A substantially modified version of NUPS (discussed separately below) was applied to Pakistan.[4] In Senegal, NUPS showed that investment in the primate city was by far the most cost-effective way to

create the urban jobs that are needed. In Egypt, NUPS favored investment in the primate city and the largest secondary cities over a decentralization strategy or a more diffuse investment strategy. In Nepal, NUPS showed that investment in the terai (lowland) cities would be more cost-effective than investment in the primate city and other prestigous, but topographically

constrained, cities of the highlands. The Pakistan model, called NHSPS, suggested that secondary city investment would be more cost-effective than investment in Karachi and especially Lahore unless the infrastructure standards were reduced in these two cities. The results of the three NUPS studies generally have confirmed the prior impressions of the study teams, while the findings of the NHSPS model in Pakistan have proven very controversial.

4. Method

The NUPS methodology computes the "least cost" allocation of total urban employment growth (this growth will have been projected previously using a macroeconomic model) as that allocation for which the marginal cost per job (that is the cost of adding one more job), including growth management costs, is equal in all cities. Once the employment growth by city is known, the cost of job creation, including growth management costs, can be computed. To obtain the total cost of job creation based on the given urban settlement pattern, the job creation cost estimate must be added to an infrastructure cost estimate. Infrastructure cost is computed as the product of the number of jobs created in each city, the number of urban residents per urban job, and the city-specific infrastructure standards per capita.

To evaluate the cost of other alternatives with NUPS, one assumes a fixed population for some areas, solves for equal marginal job creation costs in the remaining areas, allocates the remaining jobs accordingly, computes the corresponding infrastructure costs (raising the standards if an area was constrained to create more jobs than it would without constraints), and sums the costs to obtain the total cost of the alternative.

5. Data Required

As the overview in Figure 1 indicates, the NUPS methodology is relatively complex. For the PADCO model, the data required are:

a. Total employment and aggregate employment in mining, manufacturing and construction for the base year (generally the year before the analysis is conducted), by city.

b. Target increments in urban employment growth for future time periods (to be allocated across cities).

c. National investment in services and an aggregate of mining, manufacturing and construction, for the base year and projected future time periods (from a macroeconomic model).

d. Population for the base year, by city.

e. Policy constraints on growth rates of individual cities.

f. City-specific per capita standards and cost for shelter, water supply, sanitation, roads, intra-urban transport, electrical power, communications, education, health facilities, and other physical and social infrastructure. Both standards of infrastructure for new populations and requirements for infrastructure rehabilitation should be included.

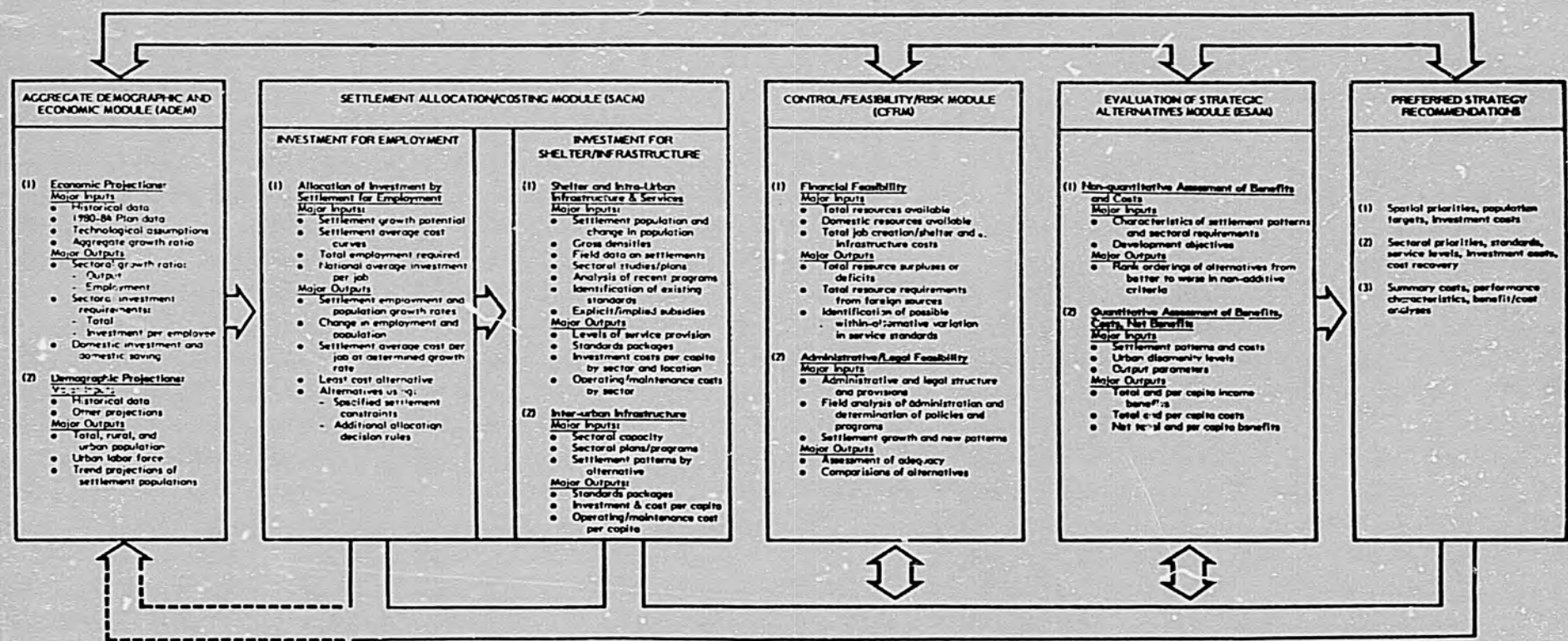
g. Operations and maintenance costs per capita for each level of standards.

6. Assumptions

The NUPS approach is based on three major assumptions. First, and quite reasonably, "it was assumed that the causal sequence runs from employment and output growth to personal income increase and then to demands for industrial, business and residential infrastructure and services" (Garn, 1984). In the future, this assumption may need to be tempered somewhat to allow the pre-existing allocation of investments and services to have some influence on location decisions. Current research (see, for example, Lee, 1983; Mera, 1982; Mohan, 1984), however, suggests that the adjustment for prior allocations probably would not dominate the growth-driven impacts.

FIGURE 1

NUPS METHODOLOGY OVERVIEW



A second, country-specific assumption generally is required on how costs vary between places. In Egypt, sufficiently detailed, city-level data were not available to estimate cost variations due to spatial differences in the input mix (the amount and type of labor, capital, and resources) used to produce goods of a given type. To estimate cost variations by settlement, it was assumed that agglomeration economies (that is, savings resulting from differences in the size of the initial industrial base in different cities) and the rate of growth would determine the cost differences for job creation between cities. Specifically, cities with larger shares of employment in mining, manufacturing, and construction were assumed to have low capital and operating costs per unit of output because they presumably have more industrial infrastructure, business services, and labor force skills. This assumption is reasonable for Egypt, although the cost variation equation designed to implement it is somewhat arbitrary.[5] In Nepal, a relatively arbitrary cost variation equation also was used; it focused on transportation cost. In Senegal, actual data on differences in construction costs between settlements were used as measures of cost variations.

A third major assumption was that the average, city-specific cost per job resulting from the second assumption could be adjusted for growth management costs by multiplying it times the ratio of the city's employment growth rate to the national non-agricultural employment growth rate raised to the fourth power, that is by: $(g\ city/g\ nation)^4$. As Garn (1984, pp. 14-15) states:

> This was a considered choice; but is nevertheless an arguable assumption. On one hand, the case could be made that the exponent (the NUPS analysis having used a constant exponent of 4) should be positively associated with size on the grounds that more rapid growth rates in places which are already large would add disproportionately to costs because of congestion and

> other diseconomies of size. The other side of the coin is, however, that larger places have both more and more adaptable labor forces and business-related infrastructure and services and could, therefore, more easily accommodate additional investment projects. These factors would suggest the possibility that the exponent would decline as size increases. While it is true that a large growth rate in a place with a small employment base implies a relatively small absolute increase, achieving even this increase may result in at least temporary cost-increases . . . . Smaller places may have less flexibility and adaptability to change. To the extent this is true, the advantage of having to adapt to a smaller absolute increment for a given growth rate may well be eroded by the necessity of overcoming the problems of inflexibility. The judgment used in the NUPS analysis was that the argument for scaling the exponent to city size was not persuasive either way so a constant exponent was used. The subsequent analysis, using city-specific average cost curves, could accommodate an assumption of a scaled exponent without modification of the procedures although it would affect, of course, the allocation by settlement. One of the major areas for additional research suggested by the NUPS analysis is to explicitly investigate such relationships between growth rates, average and marginal costs. The relationships assumed in NUPS, while plausible, were not grounded in extensive empirical analysis of this relationship.

While the assumed growth management cost adjustment was a considered choice <u>for Egypt</u> (indeed, it resulted in part from experimentation with different functional forms), it was incorporated into PADCO's NUPS model and applied in other countries without further consideration, a seemingly dangerous practice.

7. <u>Assessment and Directions for Future Research</u>

If one accepts the assumptions underlying it, the NUPS methodology is a credible way to allocate employment growth among cities and evaluate the costs of alternative development strategies. In the future, it would be desirable to compute the costs of continued growth under the existing urban growth pattern, in addition to the costs under the "least cost" urban growth pattern and other patterns of interest. Even more important, as Garn (1984) points out, would be to obtain city-level data on value added per worker (defined as

the value of goods and services produced minus the value of the resource, capital, and labor inputs) and find the solution that maximizes value added across all cities for a given level of investment. This "output-maximizing" solution, not the "least-cost" solution, is the economically efficient solution, as it maximizes national economic growth. In Egypt, the necessary data on value added were not available at the city level.

D. National Human Settlements Policy Study: A Modified NUPS Approach

1. Recommendations

The National Human Settlements Policy Study (NHSPS) is an adaptation of NUPS that was tried in Pakistan. In terms of appropriate applications, methodology, and data requirements, NHSPS is not really distinct from NUPS, but merely a new name for a slightly revised product. It makes a useful advance that should be included in NUPS models whenever possible, the inclusion of a measure of value added. It also proposes an alternative but still arbitrary way of estimating growth management data. NHSPS made some other changes in the NUPS model in an attempt to correct its primate city bias. Those changes went too far, causing it to arrive at results that most analysts find counter-intuitive.

2. Differences from NUPS

In the National Human Settlements Policy Study (NHSPS) of Pakistan, which was funded by the World Bank, Harry Richardson (1984) used a modified form of the NUPS methodology. In addition to the data inputs for NUPS, NHSPS requires city-specific data on value added and job costs. The job cost data were derived using city-specific industrial mix data for 293 cities in Pakistan, so no assumption was needed about regional cost variation. Job creation costs also were defined differently than in NUPS, incorporating infrastructure costs

and land costs. The growth management cost function that NHSPS tailored for Pakistan is very different than the one tailored for Egypt, although equally arbitrary. It assumes no cost below a growth rate of 6 percent, and a growth management cost that rises rapidly to a maximum of 25 percent of the job creation, land, and infrastructure cost for growth rates of 10 percent or more.[6]

A final difference between NUPS and NHSPS is that NHSPS can determine the urban investment strategies that result from use of additional investment criteria, including: (1) maximize value added per capita, which is the solution with "maximum" economic efficiency, (2) balance (but not, thus, maximize) the marginal value added per capita per unit of job creation and infrastructure cost (effectively, a benefit-cost ratio), and (3) minimize total cost per job including job creation, growth management, and infrastructure costs, which is a different "least-cost" solution than the one in NUPS (where only job creation and growth management cost are minimized).

3. Assessment of the Differences

Garn (1984) argues that inclusion of land cost in the NHSPS model is unwise as the difference in land price presumably reflects a difference in amenities, past infrastructure on which costs were not fully recovered, etc.; effectively, minimizing land cost may equate to avoiding desirable locations. Garn's concern appears to be valid.

Another concern about NHSPS's "least cost" strategy is that it may not be a feasible solution if the lower standards implied in the infrastructure costs for secondary cities would not be high enough to actually attract the allocated employment. As yet, no one has computed "least cost" investment strategies for the same country with infrastructure cost included and excluded, so

it is hard to say how significant the difference would be. If the public investment plan requires full cost recovery, the strategy that minimizes job creation, growth management, and infrastructure costs probably would run a lower risk of steering public investment to locations where development will not follow. Conversely, if public subsidies make infrastructure a virtually free good from the private sector's viewpoint, the investment allocation that minimizes job creation and growth management costs probably provides the safer "least cost" strategy as it incorporates an implicit market test.

A related concern, and one that is not probed in detail here,[7] is that industrial location decisions actually derive from examination of total costs, including both investment and operating costs. NUPS/NHSPS implicitly assumed that operating cost differentials will mirror investment cost differentials. As a country develops, this becomes an increasingly shaky assumption.

On the whole, NHSPS represents an advance over NUPS in the development of a measure of value added per capita that could be used for allocating investment. Its use of infrastructure costs and especially land costs in selecting the least cost solution, conversely, seems questionable.

4. Strengths and Limits of the NUPS/NHSPS Approach: A Summary

From a broader perspective, some of the strengths of the NUPS/NHSPS approach are that:

- Given the number of urban jobs that are expected to be created during the planning period (which is estimated from expected GDP growth), it examines (1) the cost of creating these jobs using alternative urban patterns and (2) the implications of these patterns for future economic growth.

- It recognizes that some growth will occur in virtually every city and that some public or private infrastructure, possibly privately financed, will be provided to support it.

- It provides a basis for making strategy decisions about how many jobs (and thus, how much population) should go where in order to maximize

output, minimize specific kinds of costs, or achieve government development objectives.

- It provides a basis for judging how much extra subsidy is needed to spread urban investments more equitably among regions or accommodate government constraints and political objectives when meeting employment targets.

Some of the limits of NUPS/NHSPS are that:

- It gives order-of-magnitude answers, but needs to be used as or with a confirmatory method (often a rule of thumb method) to be reliable.
- It focuses strictly on development costs, making the weak assumption that operating costs are similar.
- It uses a relatively arbitrary method to adjust for growth management costs.
- It is still in an early implementation stage, which is somewhat experimental.

E. A Simple Linear Programming Model

1. Recommendations

A linear programming model can be used to determine the most economically efficient investment strategy subject to constraints on equity, provision of rural-urban linkages, and political considerations. Although a linear programming model appears conceptually superior to NUPS/NHSPS, it is virtually untried. Thus, it is not currently recommended for use in a UDA, although it might be an excellent approach for a larger study of longer duration. Since the data needed for a linear programming model appear to be comparable to those needed for NUPS/NHSPS, the model probably would be useful in a UDA after further development.

2. Purpose

In 1978, Rainer Thoss and Johannes Linn developed a linear programming model that uses input-output coefficients to target investment to cities and rural areas with the objective of maximizing economic activity in a country.

This model permits introduction of equity constraints. It also can guide decisions on the optimal level and nature of investments in public services (for example, how much should be invested in education services in each city and non-urban area).

3. Prior Use

Thoss and Linn adapted their model for middle income countries from an earlier model used in Germany, then tailored it to Colombia. They abandoned the effort when the World Bank chose not to fund the data collection needed to go beyond their initial, and seemingly promising, model runs in Colombia.

4. Methodology

The model's basic structure calls for maximizing investment plus consumption subject to five constraints:

a. In each region, the capital required cannot exceed the capital stock less depreciation plus investment.

b. In each region, capital investment must equal at least 5 percent of the existing capital stock. (The rationale underlying this constraint is not stated, but it probably provides funds for maintenance.)

c. For each sector of the economy (agriculture, industry, transportation, mining, construction, public services, and private services), the demand for goods needed to support investment, production, and consumption in all sectors, plus exports and consumption in the sector of interest cannot exceed sectoral production, i.e., intermediate plus final demand cannot exceed output. This constraint is the one that uses sectoral input-output coefficients by region or national coefficients that

can be broken down into regional coefficients using the same type of regional data on employment, costs, and value added that NUPS/NHSPS requires.

d. Total imports of intermediate and final products must equal national exports plus net capital imports.

e. Direct plus indirect taxes must equal revenues minus net internal borrowing.

5. Data Required

This model's requirements for regional data probably could be estimated adequately from coarse national input-output information and local data on employment and/or value added by sector. Alternatively, the data gathered to run NHSPS or NUPS probably should suffice, with some further manipulation, to run this model.

6. Assessment

The model has more capability than NUPS/NHSPS, because it can consider rural as well as urban development, it can optimize the sum of investment and consumption rather than just investment, and it can determine what level of infrastructure is most appropriate where, in light of existing conditions and the need to maintain a balance between revenues and expenditures. At this time, the model is largely untested. Consequently, it is only ready to be tried in a large project where time is available to test and perfect it. Thereafter, it may well be usable within the budget and timeframe of a UDA.

F. Linked Regional Econometric and Input-Output Models

In a small number of countries (notably India, Japan, and the United States), several years and a large quantity of resources have been expended in the development of linked input-output models and econometric models that

provide detail on the operation of regional economies as well as the national economy. These models can support very powerful analyses of the probable outcome of alternative public investment strategies oriented to industrial location. (See, for example, Becker, Mills, and Williamson, 1983; or Stevens and Treyz, 1984) They can show fairly precisely what industries it is realistic to try to attract to specific regions, what impacts the attraction of these industries will have on target and other regions (e.g., how much additional investment will occur in the region, how much of the supportive developments and the investment returns will revert to the primate city or leave the country), and what labor demands will result. This paper does not review these methods in detail because they take years to implement, require extensive primary data collection, and are not presently available in most developing countries. Only in rapidly developing countries that conduct an annual or particularly detailed business census (e.g., Korea), is it likely to be cost-effective to consider developing this type of sophisticated model. Additionally, some countries (e.g., Brazil, Colombia) already possess recent national or regional input-output models.

G. Summary Guidance on Method Selection

This chapter has described four methods that can be used to quickly identify localities that are investment targets from the viewpoint of economic growth potential. Table 3 compares these methods in terms of roughly how much time they probably would require in the field and in the office, what information they can provide, their current stage of readiness, and the probability of the necessary data being available or easy to estimate.

Rules of thumb provide the least information, but conversely, they take the least time to use, can proceed with whatever data are available, and often are adequate. If enough existing data are available on project rates of

TABLE 3:

COMPARISON OF TECHNIQUES FOR SELECTION BASED ON ECONOMIC DEVELOPMENT POTENTIAL

	Rules of Thumb	Rate of Return (existing estimates)	Rate of Return (estimates made in the field)	NUPS/ NHSPS	Linear Programming
TIME REQUIRED					
In County	Medium	Low	High	High	High
In Office	Low	Medium	Medium	High	High
ABLE TO ANALYZE					
Priorities for Investment	Yes	Yes	Yes	Yes	Yes
Amounts to Invest by Place				Yes	Yes
Tradeoff Between Efficiency and Equity		Limited	Limited	Yes	Yes
Levels of Infrastructure				Limited	Yes
STAGE OF READINESS	Tried and true	Tried and true	Tried and true	Evolving	Largely Untested (needs 6 months of research)
PROBABILITY OF DATA AVAILABILITY					
Essential Data	Very high	Low	High	High	Medium
Helpful Data	High	N/A	N/A	Medium	High

return, the **rate of return** approach can provide more information than rules of thumb for roughly the same effort. Estimating rate of return in the field is not recommended because it takes as much effort as more sophisticated modelling but yields less information. The **NUPS/NHSPS** approach is risky in that it is still evolving; but it does provide much more information than rules of thumb and rate of return, and the data that it requires generally are available. This approach, however, provides answers that should be used as part of a broader decision process. NUPS/NHSPS results should not be trusted if they are substantially different from the results of a simple analysis based on rules of thumb or past rates of return. The **linear programming** method currently is far more experimental than NUPS--too experimental to use in a UDA--although it seems less controversial from a theoretical viewpoint and is capable of producing a more informative solution.

If the time and money are available to apply them, NUPS/NHSPS or linear programming can yield extremely informative results. Use of a sophisticated technique is particularly helpful when many political and equity constraints have been proposed, the overall development program in the country seems ambitious, or the country has more than 3 or 4 functionally diverse cities. **Sophisticated techniques are sufficiently new, however, that they generally should be used in conjunction with some confirmatory rule-of-thumb analysis.**

CHAPTER III URBAN NEED AND EQUITY

Equity frequently is used as an objective when developing an investment strategy. Sometimes an equity objective is applied by identifying basic urban needs and a strategy for meeting them. A less complex approach is to target funds to the poorest areas on the assumption that they are the neediest. An equity objective often is applied arbitrarily based on a sense of fairness or political practicality. For example, at least one project may be allocated to each region of the country, or cities and towns where the donor community already is funding projects may be considered ineligible for the next round of projects.

Formal methods related to equity generally either determine the level of urban needs, analyze minimum cost locations for meeting urban service needs, or evaluate the cost of equity investments in terms of economic growth foregone.

Analysis of Urban Needs

To determine the level of basic needs, one must define what realistic minimum acceptable standards are, then compare these standards with existing urban conditions. The minimum acceptable standards will vary with climate and the country's customs and stage of development. They usually should be set in conjunction with host country planners; the difficulty of achieving agreement on appropriate minimum standards should not be underestimated.

Unmet basic needs tend to co-occur. For example, places without potable water are unlikely to have adequate sanitation and places without roads are unlikely to have schools or access to health services. Consequently, the minimum standards considered need not be all-encompassing. They primarily

should focus on whatever urban infrastructure and service needs already have been assessed nationwide. Nevertheless, it is important to estimate the costs of remedying the overall shortfall in basic urban needs that is likely to exist given the shortfall from the standards selected.

Almost invariably, the cost of meeting all basic needs exceeds the urban investment funds available. **If equity is the primary investment objective, several actions may be taken singly or in combination in order to arrive at an investment program consistent with the budget.**

- The level of the minimum acceptable standards can be reduced.
- The degree of cost recovery planned can be increased.
- Investment can be spread equally to needy places in different regions out of a concern for treating states or provinces fairly.
- Investment can be targeted to the urban areas in greatest need.
- Investment can be targeted to the poorest communities on the assumption that they have the least financial capacity to address their needs.
- Investment can be made on a first come-first served basis.

If equity is only one of several investment criteria, a ranking of cities on their shortfall in basic needs per capita is probably the most useful measure to incorporate in the broader decision analysis.

Analysis of Service Locations

Much research has been done on ways to select the smallest possible number of service locations in order to provide a given level of service accessibility. Accessibility generally is measured as average travel time or distance. Sometimes a limit also is placed on the maximum travel time to a service location. Service locations have been selected with guidance from location-allocation models in such diverse places as India, Indonesia, Sierra Leone, Israel, Colombia, Honduras, and the United States. **If an investment**

strategy will focus primarily on locating services that will meet the population's basic needs, location-allocation models tempered with judgment will provide the best basis for selecting where to invest. A new paper by Gerard Rushton (1984) provides an excellent review of the methods available and their application in developing countries.

Evaluation of the Cost of Equity

Both the linear programming and NUPS/NHSPS methods described in the last chapter can be used to evaluate the cost of alternative settlement patterns. By adding an equity constraint in the linear programming model (for example, at least 5 percent of investment must go to each major region or city; or regional per capita income should be at least 30 percent of the national average), it is possible to determine total investment plus consumption under the equity-constrained investment strategy. The difference between this total and total investment plus consumption without the equity constraint is the cost of equity.

NUPS/NHSPS also accommodates inclusion of equity constraints in determining a settlement pattern and its costs. The cost of equity is computed as the difference in cost between a solution where a minimum investment in some localities is required in order to meet equity goals and a "least cost" or "maximum efficiency" solution. In NUPS/NHSPS, however, the "cost" is the cost of investment to create a given number of jobs, not the total of investment plus consumption. NUPS/NHSPS also is less flexible than linear programming in the constraints that can be imposed. Its constraints consist of target employment levels for localities where investments are being made for equity

purposes. In addition, NUPS/NHSPS is more arbitrary than linear programming about the level of infrastructure standards that will be required to achieve the equity-based employment targets.

Currently, NUPS/NHSPS has been tested much more extensively than the linear programming approach. Therefore, it is the recommended approach for studies of 3 to 6 months.

Summary Guidance on Method Selection

When meeting basic urban needs or creating a more equitable distribution of resources is an investment objective, two approaches are possible. In one approach, the per capita shortfall of existing urban infrastructure from minimum acceptable standards provides a basis for ranking investment priorities. This measure is easy to compute and is the best measure if the objective is to address basic urban needs for water, sanitation, and other infrastructure. Caution is needed, however, in designing the standards. The difference in cost between an organized system of water distribution, access to "safe" water, and access to any water is substantial. Existing standards often are geared to organized distribution systems and, thus, are expensive. In some cases, unmet basic needs drive migration that is of benefit to the country's economy or it may be cheaper to subsidize people who are willing to relocate rather than building more infrastructure where the people are. This possibility should be explored before a final strategy is selected. The shortfall in basic needs per capita also is recommended as a way of prioritizing localities for investment based on a rule of thumb about equity. These priorities can be combined with rules of thumb about other objectives to make decisions about multi-objective investment strategies involving equity and economic efficiency objectives.

The second approach is more appropriate if the objective is to address basic urban or regional service needs (e.g., for schools and health care facilities). Location-allocation models are the recommended way to determine where to site the planned increment in service capacity in order to have the greatest impact on access to services. The location-allocation model approach should be used to target investment with an externally determined budget. It also can prescribe the level of investment needed if efficient coverage of the populace, constrained by consistency with existing spatial patterns and political considerations, is the only objective for deciding the number and location of service facilities.

Investment to create equity generally reduces efficiency. NUPS/NHSPS presently is the best tool for evaluating how much extra cost results from equity-driven investment. Such broad estimates, which will reveal any major mistakes, are the principal purpose of NUPS/NHSPS. If linear programming is developed further, it should be at least as appropriate a tool. When basing investment on an equity objective, public investment in some places will generate minimal complementary private investment and, thus, may be too costly, especially if a country's economy already is not thriving. In general, this tradeoff is analyzed better with a model than with a rule-of-thumb approach.

CHAPTER IV RURAL-URBAN LINKAGES

If equity or political concerns suggest spreading resources more widely than just three or four major cities, then it may be better to select cities and towns as investment targets based on regional needs rather than urban needs. The least developed countries and regions, in particular, may benefit much more from urban investment strategies aimed at creating or strengthening local functions and linkages supportive of rural development than from strategies that encourage urban economic growth inducing rural-to-urban migration. In Zaire, Mali, the Philippines, Upper Volta, Bolivia, and Ecuador, recent national or regional urban investment strategies have focused primarily on building rural-urban linkages rather than on economic efficiency per se. This has been particularly true of development strategies for areas where agricultural potential has not been fully realized.

As Deborah Prindle (1984b) points out, strategies intended to enhance rural development often direct investment in public facilities to urban areas because of their existing facilities (e.g., a post office or a school), which may not be closely related to their economic development potential. Conversely, the relationship between gaps in rural-urban linkages and economic development often is not clear. Filling a gap may do little to help the local economy, although it will deliver services more equitably and efficiently. This implies that **rural-urban linkage analysis either should be applied strictly as an equity-based tool for identifying unmet basic needs or must include an analysis of the demand for facilities and services.**

The analysis used to plan an urban investment strategy oriented toward supporting rural development identifies which cities serve what functions, what functional gaps apparently exist, how many people they affect, and whether there is sufficient demand to justify filling them. Both of the methodologies available for assessing rural-urban linkages were developed recently for AID. Each looks well beyond basic needs, yet fails to address the demand issue. **No proven method exists to assess demand other than surveys on perceived needs and willingness/ability to pay to meet them.** Significantly, Belsky and Karaska (1984) report on an application of the Urban Functions in Rural Development (URFD) methodology (discussed below) in Guatemala that compared surveys of households and key informants. This study found that the survey of key informants identified the perceived needs of the rural populace as accurately as the more costly and time-consuming household survey. It may be that this method also would provide insight into willingness and ability to pay.

A. Rural-Urban Profiles

1. Recommendations

Rural-urban profile analysis measures how many urban functions are present in different localities, among selected key functions. By organizing this information, the method helps to guide decisionmaking on which localities to target for investment based on their importance to the rural hinterland and their gaps in key functions and infrastructure. Thus, rural-urban profile analysis is not a complete analytic tool capable of targeting investment. It identifies gaps in the supply of urban services and facilities that are important supporters of rural development, but does not establish that the rural population is willing to use and pay for these linkages.

2. Purpose

The Rural-Urban Profile (RUP) methodology (Prindle, 1984c) organizes key information about which localities are most important to their rural hinterland, and about the adequacy of selected infrastructure. The decision on where to invest based on this information, however, is left to the judgment of the analysts and decisionmakers.

The RUP methodology grew out of Deborah Prindle's experience in developing RUPs in Mali and Zaire under the sponsorship of AID's Regional Housing and Urban Programs Office in Abidjan. The methodology is intended for implementation at minimum cost in West and Central Africa and possibly elsewhere.

3. Methodology and Data Requirements

RUPs are simply tables of urban indicators, which originally were intended for ongoing monitoring of urban conditions. The tables all generally can be completed using secondary data available in the field, and the documentation explains the nature and utility of each table and how to get the data. For the purpose of developing an investment strategy, the methodology should be applied to the secondary cities that local staff and decisionmakers feel may be targets for investment, administrative centers, or the cities and towns with the largest populations. Based on her field efforts, Prindle estimates that about one person week of data collection will be required for each locality.

The methodology does not try to comprehensively assess urban functions. It focuses on indicators about the urban functions that seemed most important in West and Central Africa. These include:

- Educational services.

- Health services, and their concentration within the region.
- Price indices for food staples, construction supplies, and basic household "imports and manufactures" (for example, soap powder, tomato paste, and bicycles).
- The number and regional distribution of markets, commercial businesses, and industries processing rural production.
- The number and regional distribution of registered motor vehicles, by type of vehicle, and of passenger and freight transport volumes.
- The pattern of migration.
- The percent of each town served by electricity and public water.

In an earlier Mali linkage study, Prindle (1984a) noted the importance of recording which towns had a post office and a gas station. Although they were not included in the indicator methodology, these probably should be added to the tables suggested in the methodology if it will be used to develop rural-urban profiles.

B. Urban Functions in Rural Development

1. Recommendations

UFRD focuses exclusively on gaps in supply without establishing if these gaps result from a lack of demand for or ability to afford the linkages that are missing. Thus, it is merely an elaborate tool for organizing some of the information needed for decisionmaking. Current research in Ecuador is attempting to expand the analysis to examine demand. Until this research is completed and proves successful, UFRD only can be used to organize information on linkage supply. This information is merely an input to a broader planning process. An investment strategy geared to filling the gaps identified by UFRD would be inappropriate and risk creating heavily subsidized, little used facilities and services.

2. Purpose

The UFRD approach[8] is more ambitious than the RUP approach, although both treat the decision on where to invest as an informed judgment. It provides for a complete analysis of the functions in the national or regional settlement system and of spatial linkages among them. Its strongest point may be its detailed instructions on how to graphically display the mass of available information in a way that makes it easy to interpret. Conversely, a major weakness is its tendency to describe all available techniques without distinguishing which to use on a short assignment. It also does not provide a basis for prioritizing or choosing among investments in an economically efficient manner.

This paper attempts to identify the UFRD methods that would be useful and practical to apply in a UDA.

3. Places Used

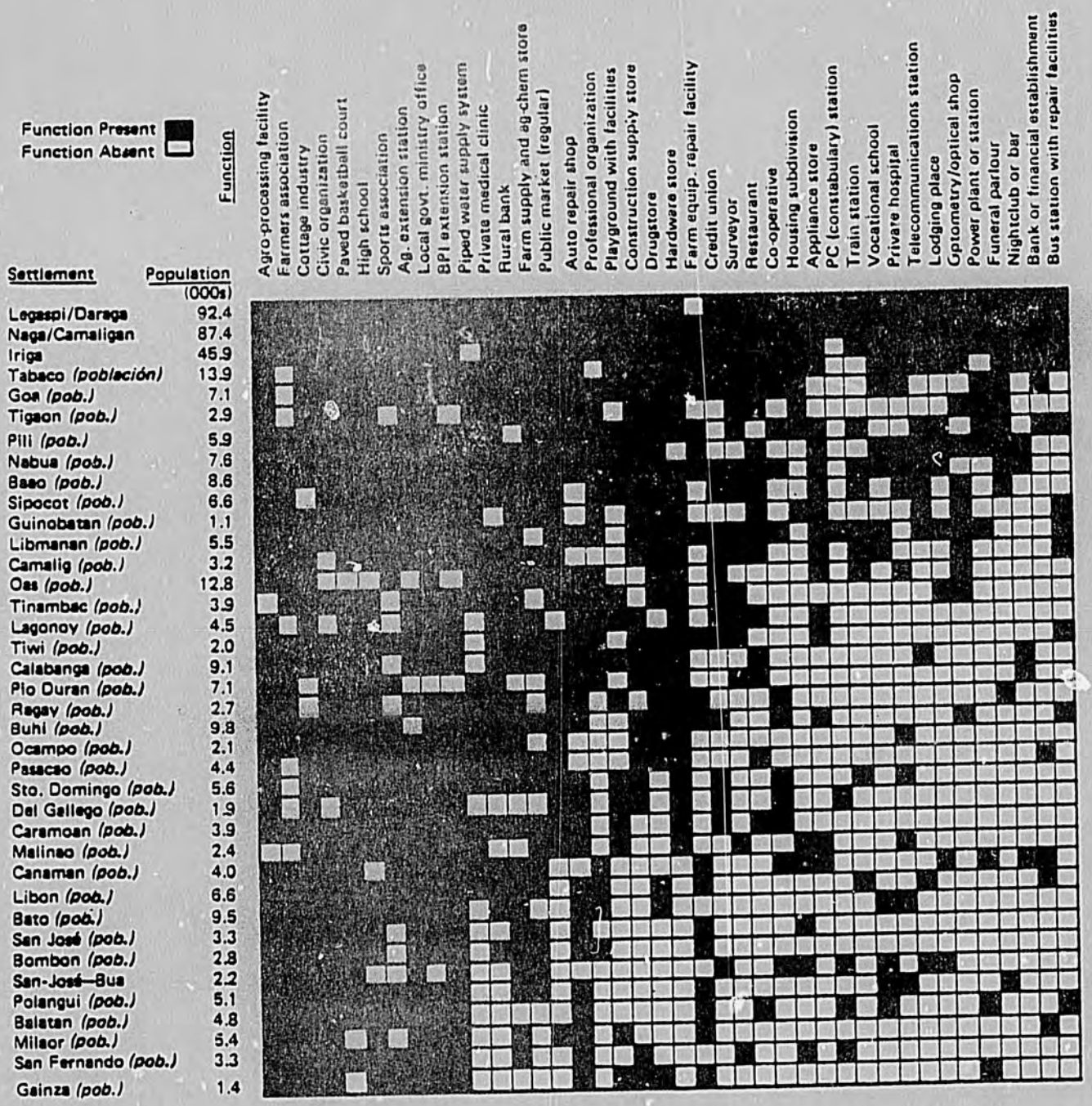
The Urban Functions in Rural Development (UFRD) approach was developed with funding from AID and the United Nations' ESCAP project. It has been applied in Bolivia, the Cameroons, Ecuador, Guatemala, the Philippines, and Upper Volta, with a notable lack of success.

4. Methodology and Data Required

The first step in the UFRD approach is to select the settlements for analysis. Rondinelli advocates starting the analysis with a relatively comprehensive list. Once the settlements are selected, the functions, defined as "services, facilities, infrastructure, organizations, and economic activities," in each settlement are cataloged. Rondinelli concludes that the best way to present the functional pattern is in a scalogram, a table that communicates visually. Figure 2 shows a scalogram for the Bicol River Basin in the Philippines. Among the uses that Rondinelli lists for the scalogram,

FIGURE 2

SAMPLE OF A SCALOGRAM: SETTLEMENTS IN THE BICOL RIVER BASIN OF THE PHILIPPINES



Source: Rondinelli 1980.

the most important is its ability to pinpoint unexpectedly absent or present functions that warrant investigation. For example, in Figure 2, why does Tiagon with a population of 2,900 have so many urban functions; and is proximity to another settlement the reason that Oas, with a population of 12,800--fifth highest among the 38 settlements listed--is one of only three settlements without a high school.

The data collected for the scalogram analysis are also very easy to use to calculate a **centrality index** and determine the settlement hierarchy (e.g., regional center, sub-regional centers, rural centers, and local centers). This is a very useful step. From the viewpoint of an investment strategy, localities that were determined to be local and possibly even rural centers can be dropped from further analysis if they also are not very populous. At least in Bolivia, some small settlements without larger neighbors nearby were sub-regional centers. They were much more functionally complex, and therefore, better investment targets, than much larger settlements with neighbors that were still larger. (This finding also may mean that road improvements will cause functions to shift from some small but previously inaccessible sub-regional centers to more centralized and efficient locations.)

Another valuable tool that Rondinelli describes is the **functional service area index.** This index combines the function data with data on the distance between settlements in order to pinpoint settlements and groups of settlements that have especially low service access. To be useful, however, the method requires some implicit or explicit judgment of how accessible different functions need to be. Those with the least access still may have adequate access.

Linkage studies reveal the service areas of settlements that are important centers, how much access people in different places have to town-based services and facilities, and how well the settlement system is integrated. In a UDA, they can be used to identify projects that are needed to increase rural access to central places and the interaction among important settlements. Rondinelli describes five kinds of linkage studies, which address market centers, transport and physical access, social services, social interactions, and political and administrative linkages. Some of these are more adaptable than others to the timeframe of a UDA. In particular, the analysis of political and administrative linkages is based on case studies and would require too high a level of resources for inclusion in a UDA.

The first phase of Rondinelli's **market analysis** method can stand alone. It includes a catalog of market size and periodicity (much like the information Prindle suggested, but with rough estimates of market size added). The second phase of the method involves direct surveys that would be too time-consuming for a short study.

Inadequacies in the transport network are a major hindrance to development. Indeed, transport in a developing country often shapes the settlement pattern. Consequently, **analysis of the transport network** is an important element of development planning. The UFRD approach includes the kinds of transport analysis that can be done quickly if information on road traffic volumes, commodity flows by mode, and vehicle origins and destinations are available. Prindle uses a simpler set of measures, which would be appropriate when recent data on traffic volumes, origins, and destinations are lacking.

Investments in equity-oriented linkages can have an especially high payoff when they remedy physical isolation identified through transport linkage analysis.

Like Prindle, Rondinelli concentrates on **health and education** when analysing "social services." Rondinelli suggests going beyond the RUP measures, however, by sampling records to determine where students and patients came from. This information will take some effort to collect, but can be quite valuable if origin and destination data for transport and markets are not available.

Rondinelli suggests a simple method for identifying **social interaction linkages** in some cultures where social interaction is closely tied to kinship and ritual. The method, based on a sampling of marriage records over a five year period, shows how much interaction occurs between municipalities and where marriages between spouses from different settlements tended to occur. This information provides an interesting way to confirm data from the social service, market, and transport linkage analyses, but its primary use probably should be in cases where all other origin and destination data are lacking.

One of the real strengths of Rondinelli's book is its description of ways to present information visually. This description is reproduced in Appendix D. Rondinelli also describes several powerful analysis techniques--market area and commodity flow networks, service area clusters, and accessibility models--that are informative ways to interpret detailed origin and destination data when they exist. Finally, to aid in the task of using information from a UFRD to decide on an investment strategy, Rondinelli provides a section (in Chapter Seven) on identification and design of project portfolios. It describes the decision process used in Bolivia and, to a lesser extent, the Philippines.

Application of UFRD, without demand measurement, is likely to require as much time and resources as application of NUPS/NHSPS or a simple linear programming model. After a bit of research, it probably would be wiser to use one of those models, extending its measure of economic impact from the urban to the regional level.

5. Assessment

Perhaps the best assessment of UFRD is provided by examining the statements of those involved in its applications. Belsky (1984) reports that:

> ...the utility of assessing the degree to which an urban hierarchy is articulated and integrated with its region when compared to some idealized case is unclear, and how to transform this assessment into recommendations for actual projects was left obscure. Rushton (1977, p. 6) a consultant to one of the UFRD projects, noted that: "Nowhere, in the literature related to the project, does there exist an analytical framework for relating the results of the first two phases of analysis to achieving the third phase of plan formulation." On another project, the USAID project manager noted that "the mission and the local (Cameroonian) authorities did not comprehend how recommendations were arrived at and to the extent which they did comprehend it, felt it lacked analytical rigor" (Belsky, 1983, p. 3). And on still another project, a consultant reported that: "For some reason or another, it is sometimes assumed that the 'urban functions in rural development' approach is something which can be used by itself to prepare plans and identify projects in a comprehensive manner and thus much is expected of it. This assumption is false and the expectations are exaggerated" (Fass, 1980a, p. 10).

Belsky and Karaska (1984, pp. 3-4) states:

> There is a general consensus that the techniques used were simple, straightforward, and easily understood by local planners. On the other hand, planners had great difficulty in comprehending how the techniques were meaningful to the planning function....The UFRD approach was seriously limited from a planning and analytical point of view in that its methods were entirely descriptive, portraying only a static view of a region's spatial structure....The UFRD methodology is not inherently capable of prescriptive uses.

These statements are only a sampling of the criticisms of UFRD. For example, Fuss (1980b) and Rushton and Yapa (1983) both criticize the use of scalograms and map overlays for identifying functional needs. Belsky (1984) concludes that UFRD's strictly supply-oriented approach to investment needs is based on the form of central place theory (Christaller, 1966) and implicitly assumes that Third World and European development patterns are similar. Without this assumption, which is obviously wrong when examined explicitly, UFRD as described above is unable to provide any kind of strategy recommendations.

The UFRD study in Ecuador is trying to add tools for studying demand to UFRD and has succeeded in integrating its supply data into a broader planning process. Until this study makes further progress, however, UFRD is solely useful as a way to provide planners with input on the supply of services and facilities.

C. Summary Guidance on Method Selection

The two methods available to support decisionmaking based on rural-urban linkages both are ways of organizing information about supply to support a judgmental decision about what linkages it would be logical to add next and where to add them. RUP takes less resources to apply, but it also provides less information than the Urban Functions in Rural Development (UFRD) approach. More importantly, UFRD involves some analysis, while Prindle's work is strictly descriptive. Consequently, if an analysis of rural-urban linkages seems desirable, we recommend using the UFRD approach to analyze the urban functional hierarchy and identify functional gaps. Beyond this, the time, funding and data available will dictate the choice between the Prindle and UFRD approaches. The two approaches can be mixed. For example, Prindle's measures for health facilities can be used with the UFRD measures for

schools. In any event, to be useful in developing an investment strategy, the resultant information must be combined with normative judgments about the minimum service levels to meet basic needs or survey data on the services and functions that people are able and willing to pay to obtain.

CHAPTER V ADMINISTRATIVE AND POLITICAL CONSIDERATIONS

Constraints that administrative and financial capability and political feasibility impose on urban investment strategies are just as real as constraints imposed by topography and economics. Just as a public investment commitment cannot make a town thrive if private investors do not perceive it as a profitable location, the commitment will do no good if the administrative and financial capability is lacking to efficiently build sound public infrastructure using the investment funds provided. And an investment strategy that cannot gain political approval is as unlikely to be implemented as one that ignores limits on engineering feasibility.

A. Administrative and Financial Capability

1. Recommendations

Administrative and financial capability are essential to successful investment. Those funded generally should have demonstrated their commitment and capability in terms of at least some of the following:

- Completion of public infrastructure projects of reasonable quality in a timely and cost-conscious manner.
- Cost-conscious, effective maintenance of existing public infrastructure.
- Debt-servicing.
- Full cost recovery.
- Local revenue raising and collection.
- Prioritizing investment options based on development needs and affordability.
- Implementation of recommended reforms in financial management and development planning policies and practice.

If some of the desired commitment and capability is lacking, training and technical assistance often should be provided in order to help the locality to qualify for future programs.

Both indicator-based analysis and a final screen through self-selection usually should be used to incorporate administrative and financial capacity into the investment strategy. When the host country will strongly control investment choices, self-selection and commitment to program conditions become especially crucial ways to screen out localities lacking the necessary administrative and financial capability.

2. Self-Selection Mechanisms

As Table 1 in Chapter I showed, several methods have been used to incorporate administrative and financial capability into urban investment choices. Perhaps the simplest approach is to incorporate an element of **self-selection** in the investment strategy. For example, both AID and the World Bank recently have funded projects where a group of otherwise-promising localities became eligible for investment, but still had to submit acceptable applications or development plans in order to obtain funds. In most cases, one criterion for application acceptability has been a workable plan for full cost recovery. AID often also seeks a demonstrated commitment to undertake recomended reforms in financial management and development planning policies and practices. Use of this self-selection method generally is desirable.

3. Indicators

Good indicators of **administrative capability** are easy to specify and can be applied quickly by someone familiar with the relevant localities. Two simple administrative measures, which probably are not useful for towns under 10,000 population, deal with the localities' past track records. These are: (1) whether public infrastructure projects generally have been projects of

reasonable quality completed on time and within budget, and (2) whether infrastructure generally has been adequately maintained. Another measure, which is very easy to apply, is the availability of a locally determined set of infrastructure priorities, possibly with preliminary plans for the highest priority projects. A more sophisticated measure that requires more work to compute would compare actual and anticipated rates of return or, more simply, estimate the percentage of cost recovered on past projects. A rate of return comparison only would be appropriate in countries where fairly extensive development aid has been provided to many localities.

Good indicators of **financial capability** are (1) debt servicing track record and capability, (2) demonstrated capacity to manage and control costs, and (3) demonstrated commitment to local revenue raising and collection. It also is useful to examine tax effort, computed as the percent of average family income collected in taxes. Tax effort depends on how adequate area incomes are. Too low a tax effort level generally indicates a lack of interest in local revenue generation or such extreme poverty that local revenue generation is severely restricted. Too high a tax effort means that the current debt levels probably are too high for the locality to be able to afford further development. The appropriate range will be country-specific.

The assessment of general institutional structure and capability performed in an Urban Development Assessment, on its own, often will reveal which local governments are particularly likely to succeed and fail when managing development activities.

When administrative and financial capability are used to help target urban development, some otherwise promising localities generally will be dropped from the investment strategy. Since investment funds are limited,

that is not inappropriate. Over time, however, the country will be well-served if these otherwise desirable cities and towns develop better administrative and financial capabilities. For this reason, administratively-oriented technical assistance and training frequently should be offered to a broader range of localities than development assistance itself.

B. Political Considerations

1. Recommendations

Politics always will have a strong influence on investment decisions. To aid the politicians, the investment strategy should analyze the cost and development implications of politically motivated alternatives. If the time and budget are available, NUPS/NHSPS currently provides the best analytic tool for the purpose. When the political process is concerned with decentralization or strengthening of border areas, it generally will be desirable to examine any means of achieving the desired ends without spatial targeting. These means often will be less costly than interventions through spatial investment policy.

2. Analysis of the Costs of Political Decisions

Throughout the world, decisions on central government investment strategy are political. They require tradeoffs and compromise among factions committed to conflicting spatial priorities. Political considerations serve as constraints on city selection in much the same way that equity concerns do. They may dictate inclusion or exclusion of specific cities when structuring an investment program. Quantitative analysis sometimes can help to inform the decisionmaking process. For example, NUPS/NHSPS can be used to evaluate the cost of specific positions or compromises. The methods used are the same ones used to estimate the costs of equity constraints.

3. Decentralization

Another political constraint that warrants analysis is the decision to adopt a decentralization strategy.

> Mexicans feel that Mexico City is much too large with its population of 11.9 million (1976); Koreans feels that Seoul is too large with a population of 7.8 million (1978); Malaysians feel that Kuala Lumpur is too large with its population of 452,000 (1970)--even though Singapore was much larger in 1975 with 2.25 million; and it would not be surprising to hear that Papuans feel that the population of Port Moresby, in Papua New Guinea, with 113,000 (1976) is also too large. (Renaud, 1981, p. 56)

Since so many countries are uncomfortable with the size of their largest cities, urban investment strategies often stress decentralization of population growth or promotion of secondary cities. **To the extent that primate city growth is the result of public subsidies, a strategy of greater or full cost recovery clearly is a rational decentralization measure that requires no analytic justification.** Beyond this, however, the merits of decentralization are unclear.

Such authors as Kyu Sik Lee (1982), Bertrand Renaud (1981), and Marc Bendick and Mary Lou Egan (1984) stress the importance of economic analysis as an input to decentralization decisions. Actual attempts at economic analysis, however, are rare. NUPS/NHSPS currently is recommended as a way to quantify the loss in economic efficiency inherent in a decentralization strategy. (If the linear programming method were developed, it would be at least as suitable a choice.) A primary purpose of the Egyptian NUPS analysis was to examine the loss inherent in decentralization. Economic efficiency, however, is not the only criterion that should be examined in analysing a decentralization strategy.

The stated purposes of a decentralization strategy can vary widely. Among others, they may include:

- Slowing the growth in urban traffic congestion, pollution, and crime.

- Constraints on primate city growth, such as topography or the capacity of the water table.
- Reducing public growth management costs in the primate city.
- Fear of a serious failure of primate city management.
- Strengthening of other urban centers in order to lay the groundwork for future rural and urban economic growth.
- Spreading government investment more equitably.
- Political priorities.
- National defense.

The reasons given for decentralization efforts cover virtually all of the possible investment strategy objectives. Some of these, most notably management capacity, physical constraints, politics, equity, and the national defense are not concerns for economic analysis. Our ability to predict the future implications of alternative urban patterns, further, is quite limited. And NUPS/NHSPS incorporates growth management costs in its economic efficiency analysis. It also is able to include the increased costs of doing business in cities like Bangkok and Mexico City where growth is so rapid that it is difficult to simultaneously maintain and expand reliable telephone and electric systems. Thus, the only reason for a decentralization strategy which is readily amenable to economic analysis but would not be examined by NUPS/NHSPS is a reduction in the costs of urban congestion, pollution, and crime. Garn examined this separately in Egypt and found it had little impact on the relative consequences that NUPS predicted for alternative strategies.

The issue of pollution and congestion costs (but not crime costs) has been examined thoughtfully. Both Tolley (1979) and Henderson (1980) conclude that restrictions on population and employment growth in large cities is unlikely to have much effect on traffic congestion and air pollution. Murray

(1982) points out that if the primary pollution cost of a factory is a function of how many people live within a mile of it, its pollution cost will be higher if it locates at the dense center of a smaller city than if it locates in a sparsely populated industrial area on the fringe of Seoul. Renaud (1981) concludes, based on his reading of studies on the social costs of industry in advanced countries, that the growth in congestion and pollution costs represents a very small percentage of the value in a large city's output but that it is important to charge newcomers fully for the pollution and congestion that they impose on present residents.

Full cost recovery can reduce in-migration considerably and induce some companies to install pollution controls. When cost recovery means requiring car owners to pay for the downtown space that they consume in parking and the congestion delays that they impose on public transit, however, it may not be politically feasible. Furthermore, when industries choose to locate in other countries in order to avoid pollution cost recovery in the primate city, the net impact on the economy generally will be negative.

Besides cost recovery, other types of urban management activities, most notably strictly enforced zoning in accordance with a land use plan, well-planned and properly managed signalization and traffic flow, and pollution control ordinances, can reduce urban congestion and pollution costs. These interventions are less sweeping than national spatial policy changes, yet they deal with the problems already evident in the city, not just problems of future growth. Their impacts also are reasonably easy to estimate. Thus, a reduction in congestion and pollution (and crime) costs probably is not a good reason for implementing a national spatial policy. These issues usually can be addressed better through non-spatial policies and rarely would fall within the scope of an Urban Development Assessment.

Summary Guidance on Method Selection

Administrative and financial capability generally should be incorporated in the analysis by ranking the candidate investment sites on a set of indicators (e.g., past track record in construction, maintenance, debt service, local revenue generation, and full cost recovery; demonstrated capacity to manage and control project costs and time schedules; and availability of prioritized capital improvement plans) and by introducing an element of self-selection into the investment decision process. Candidate sites eliminated as investment targets because of a lack of administrative and financial capability generally are good targets for training and technical assistance efforts.

Political considerations serve as constraints on the strategy-making process, not as the analytic driving force. They may require investment in specific cities or just specific regions. NUPS/NHSPS will yield an estimate of the costs of required investment in specific cities. When politics suggests strengthening of border towns or decentralization of urban growth as ways to achieve national goals, economic analysis of alternative ways to achieve these goals often is warranted.

CHAPTER VI CONCLUSIONS: WHICH ANALYTIC TECHNIQUES TO USE

This paper has described methods available for analysing urban investment strategies from the viewpoint of several alternative development objectives. This section summarizes the analyses recommended for determining investment priorities based on individual objectives, then explains how to combine the inputs of these analyses to arrive at an overall strategy. The objectives considered are: (1) realizing economic development potential and the resulting efficiency of investment, (2) meeting basic urban needs or creating a more equitable distribution of resources among cities or regions, (3) strengthening rural-urban economic and service linkages, and (4) responding to political realities and administrative and financial capability to successfully carry out investment activities.

Analyses Recommended

In the preceding chapters, methods were identified for determining investment priorities based on each of the investment objectives.

For analyses oriented to economic efficiency and economic development potential, **rules of thumb provide the least information, but conversely, they take the least time to use and can proceed with whatever data are available. They generally are worth implementing, at least as a first step.** If enough existing data are available on project rates of return, the rate of return approach is recommended over the rule of thumb approach because it can provide more information than rules of thumb for roughly the same effort. Estimating rate of return in the field is not recommended because it takes as much effort as more sophisticated modelling but yields less information. The NUPS/NHSPS approach is risky in that it is still evolving, but it does provide much more information than rules of thumb and rate of return, and the data that it

requires generally are available. A linear programming (LP) model potentially offers the most informative solution. LP currently is far more experimental than NUPS, however, although it seems to be less controversial from a theoretical viewpoint.

If the time and money are available to apply them, NUPS or LP can yield extremely informative results. Use of a sophisticated technique is particularly helpful when many political and equity constraints have been proposed, the overall development program in the country seems ambitious, or the country has more than 3 or 4 functionally diverse cities. **These sophisticated techniques provide order-of-magnitude estimates. They should be used in conjunction with some confirmatory rule-of-thumb analysis.**

For investment strategies where meeting basic urban needs and creating greater equity are primary considerations, two approaches are possible. In one approach, the per capita shortfall of existing infrastructure from relatively arbitrary minimum acceptable standards provides a basis for ranking investment priorities. This measure is easy to compute and is the best measure if the objective is to address basic needs for water, sanitation, and other infrastructure. If the objective is to address basic service needs (e.g., for schools and health care facilities), location-allocation models provide a way to determine where to site the planned increment in service capacity in order to have the greatest impact on access to services. The location-allocation model approach usually would be used when efficient coverage of the urban or regional populace, constrained by consistency with existing spatial patterns and political considerations, is the only objective being considered in siting service facilities.

The objective of strengthening rural-urban linkages is closely related to the equity objective, but is oriented more strongly to regional rather than

city- or town-specific needs. These two objectives rarely should be applied in the same regional city selection process, as they essentially are two approaches to the same problems. The two methods available to support decisionmaking based on rural-urban linkages both are ways of organizing information about gaps in supply to support a judgmental decision about what linkages to add and where to add them. These data must be linked with information about demand--what people are willing and able to pay for--or with normative judgments about basic needs in order to be useful. The Rural-Urban Profile (RUP) method takes less resources to apply but also provides less information than the Urban Functions in Rural Development (UFRD) approach. More importantly, UFRD involves some analysis, while Prindle's work is strictly descriptive. Consequently, when supply data are needed, the UFRD approach should be used to analyze the urban functional hierarchy and identify pressing functional needs. Beyond this, the time, funding, and data available will dictate the choice between the RUP approach and the more detailed UFRD approach. The two approaches can be mixed. For example, the RUP measures for health facilities can be used with the UFRD measures for schools. **After a bit of front-end research, however, NUPS/NHSPS or LP using a measure of regional rather than urban development impact probably would be a superior approach.**

Strengthening of rural-urban linkages, as constrained by politics and topography, is not uncommonly the sole objective of an investment program, especially in the least developed countries and regions where rural development is a higher priority than urban development over the medium-term. **The analysis supporting this objective must consider the demand for facilities and services, not just gaps in supply, in order to develop a sound investment strategy.**

Administrative and financial capability should be incorporated in the analysis both by ranking the candidate investment sites on a set of administrative and financial indicators and by introducing an element of self-selection into the investment decision process. Political considerations serve as constraints on the strategy-making process, not as the analytic driving force. They may require investment in specific cities or just specific regions.

Decisions Based on Multiple Objectives

Development of an urban investment strategy usually requires balancing multiple objectives. Generally, the first step will be to determine preliminarily the constraints imposed by engineering, planning, administrative, and political considerations.

Modelling Approaches. If economic efficiency will be one of the selection criteria and sufficient time and money are available to support the use of NUPS/NHSPS or LP, a preliminary investment strategy should be generated at this point based strictly on economic efficiency, tempered by engineering constraints and, possibly, administrative capability. A second run should examine the loss in economic efficiency needed to meet city-specific planning and political constraints. Depending on the degree of urbanization of the regions, an interurban equity or a rural-urban linkage objective now may be introduced.

If the region is fairly urbanized, the standards levels prescribed in NUPS/NHSPS or LP can be compared to existing conditions to identify investment priorities. NUPS/NHSPS or LP can be applied to determine the loss of economic efficiency associated with investment to meet basic urban needs and can demonstrate how this varies as the minimum standards are reduced or only part of the shortfall from standards is met.

In less urbanized regions, investment priorities to support rural development will be determined judgmentally based on analyses of the supply of and demand for functions and linkages. In this instance, the NUPS/NHSPS approach loses some of its power, because the loss in economic efficiency of the urban system will be offset by increased rural development. NUPS/NHSPS presently only provides an analysis of the appropriate places to reduce investment and the loss in urban output that will result from allocating different proportions of the urban investment funds to specified urban investments supportive of rural development. Furthermore, NUPS/NHSPS' assumption of a fixed number of urban jobs that are needed should be revised if one uses urban investment to create rural jobs instead. For these reasons, further development work on NUPS/NHSPS would be needed to apply it when strengthening rural-urban linkages is an important investment priority. Instead, it may be worth the risk of pioneering in the use of LP or else the strategy could be based on a multiple rankings approach, as discussed below.

In using NUPS/NHSPS or LP, it often will be desirable to incorporate administrative and financial capability into the urban investment strategy in the form of a self-selection criterion. This criterion may not work well for those investments that are intended to meet basic urban needs or create stronger rural-urban linkages since the neediest areas often have the least administrative and financial capability. In these cases, technical assistance or outside management would be needed to assure effective implementation of the investment strategy.

Approach Based on Ranking. This paper has described methods for ranking urban investment priorities based on economic development potential, unmet urban needs, potential for strengthening rural-urban linkages in order to meet basic regional needs, and administrative and financial capability. In

addition, constraints on maximum or minimum investment in some cities may be imposed by spatial and political considerations. This information can be integrated to set investment priorities. To make this process easier, the lowest rank for each objective should be assigned consistently, probably to the cities with the best value on the indicator. It may be desirable to assign each city a different ranking or to split the cities into groups (based on indicator values or geography) and assign the same rank to all cities in a group. A decision on investment targets may follow easily from a comparative examination of the ranks on the indicators.

If an investment strategy is not obvious, the analyst might assign weights to the indicators. The weights can be based on the analyst's judgment of which objectives are relatively more important or, preferably, can be derived from a survey of 5 to 10 key decisionmakers in the host country and the AID mission. In the survey approach, one would ask each decisionmaker to score (from 1 to 5 or 10) the relative importance of each of the objectives that were used, with the highest score going to the most important objective. The weight for each objective will equal the score for the objective's importance divided by the sum of the scores for all objectives (e.g., 10/(10+5+3) = 10/18).

In any event, if one multiplies each of the objective weights times a city's associated objective rank and sums the resulting products, one obtains a single numeric score for each city. The cities with the highest scores should be the best investment candidates.

At this point, it may be possible for planners or politicans to allocate the investment funds judgmentally based on the composite ranking. Alternatively, the ranks can be used to allocate investment funds. To do this, the analyst should arbitrarily choose a score below which cities only will be

included if it is politically necessary. The minimum sensible investment per city and the maximum sensible investment per capita also should be determined, as should any constraints that topography and hydrology may impose on the growth potential of specific cities. Next, the scores should be summed across all cities where investment will be made. Each city then should be allocated a share of the available urban investment funds roughly equal to the proportion of its score to the sum of the scores, bounded by the constraints on minimum politically acceptable investment, minimum sensible investment per city, maximum rational investment from the standpoint of topography and hydrology, and maximum sensible investment per capita. The investment funds allocated by this procedure should approximate those available, although some adjustment is likely to be needed.

A multiple ranking technique is imperfect and sometimes will miss the best solution. It also can be very sensitive to the weights assigned to the different objectives and indicators. Still, it is quick and easy to implement and can stand alone or preferably, be used in conjunction with NUPS/NHSPS or LP.

In summary, determination of an urban investment strategy requires use of a variety of analytic methods. A good strategy can be developed using simple methods to organize information and rank priorities. The NUPS/NHSPS model can support more informed decisionmaking, but it still is somewhat developmental and it does not seem well-suited for setting urban strategies supportive of rural development. In addition, it takes more time and costs more than a less formal approach. Conceptually, a linear programming model offers great potential for guiding urban investment strategy decisions, but this approach has not yet reached the operational stage. None of the techniques described

is perfect, however. Therefore, except when the proper strategy is simple and obvious, this paper strongly recommends using both rules of thumb and either NUPS/NHSPS or LP to make sure that their results are confirmatory.

NOTES

1. In the Kenya Secondary Towns project, AID, the World Bank, and the British Overseas Development Administration shared responsibility for funding projects in 31 target cities identified by the host government. In this instance, only the selection criteria used AID have been cited.

2. The location quotients, which measure economic structure, have to be combined into a single measure in order to be ranked. To do this, one could multiply the location quotient for each sector in each region times a macroeconomic projection of the expected increase in GDP in that sector over a convenient planning period. When the regional products are summed across sectors, the resulting value is appropriate for ranking.

3. It would be very unclear whether the differences observed were just statistical aberrations with fewer than three observations per town. Thus, at least three observations are needed to permit defensible decisionmaking.

4. The Peruvian government currently is developing another modified version of NUPS.

5. This equation is:

$$RCVI = 0.5\ (1 - \frac{EMPMMCi}{TOTEMPi} / \frac{EMPMMCprivate}{TOTEMPprivate}),$$

where: RCVI is the regional cost variation index,

EMPMMCi is the mining, manufacturing, and construction employment in city i and

TOTEMPi is the total employment in city i.

Two arbitrary factors are implicit in this equation. One, the multiplication by 0.5, is presented without justification. The other, the use of primate city employment, was justified in the original Egyptian application of NUPS with the explanation that "the sectoral and subsectoral mix of Cairo's mining, manufacturing, and construction and service sectors is highly correlated with the national mix" so "the expected cost per mining, manufacturing, and construction" or "service job in Cairo would tend to be equivalent to the national average cost per job estimated in the aggregate projection at an equivalent growth rate" (Garn, 1984, p. 12). Given this justification, it is unclear why the national (non-agricultural) employment ratio would not be a better choice than a ratio that is selected because it tends to be equivalent to the national ratio.

6. Since NUPS used an urban growth rate of 7 percent in Egypt, the NHSPS growth management cost for a city in Egypt would be a higher percentage than the comparable NUPS cost up to an 13 percent growth rate and would be a higher net cost, including infrastructure cost, up to a 20 percent growth rate.

7. PADCO currently is exploring this concern further.

These constraints essentially provide that capital requirements and capital investments, supply and demand, revenues and expenditures will be balanced in the economy. Two capabilities make the model very powerful. First, it can readily accept added constraints based on equity, politics, acceptable pollution levels, etc. Second, if one collects data on the public service sector, the model can be expanded to determine a national public investment plan, showing how much investment should be targeted to each type of public service in each city or region. One limit on this model is that it probably would become extremely costly to run if many cities and regions were analysed. The best strategy probably is to use a maximum of perhaps 10 to 20 cities and regions to determine public investment, then use a simpler approach to allocate investment within individual regions.

8. The principal references on this methodology are Chapters 4-7 of Dennis Rondinelli's 1983 book, Applied Methods of Regional Planning and the UFRD end-of-project assessment report (Belsky and Karaska, 1984).

9. Rondinelli's writeup is adequate, but his example is erroneous. In his Table 3-7, he fails to treat the variation in growth rate as a percentage, resulting in the computed industry mix effects being 100 times their actual values. This error also makes a major change in the regional share effects in his Table 3-8.

APPENDIX A

BIBLIOGRAPHY

Ahmed, Masood. 1981. "Incremental Capital-Output Ratios and Growth Rates in the Short Run--Evidence from Pakistan." Pakistan Economic and Social Review, vol. 19(2), pp. 123-130.

Ancot, J.P., et al. 1983. "Long-Term Urban Trends in Developing Countries: Some Further Econometric Results." Environment and Planning, A, vol. 15(9).

Becker, Charles M., Edwin Mills, and Jeffrey G. Williamson. 1983. Public Policy, Urbanization and Development: An Introduction to a Computable General Equilibrium Model of the Indian Economy. Discussion Paper, Report No. UDD 22. Washington: Water Supply and Urban Development Department, Operations Policy Staff, The World Bank.

--------. 1983. "Mathematical Statement of the BMW Computable General Equilibrium Model of the Indian Economy." Discussion Paper, Report No. UDD-38. Washington: Water Supply and Urban Development Department, Operations Planning Staff, The World Bank.

--------. 1984. "The Impact of Unbalanced Productivity Advance on Indian Urbanization: Some Preliminary Findings." Discussion Paper, Report No. WUDD 53. Washington: Water Supply and Urban Development Department, Operations Planning Staff, The World Bank.

Belsky, Eric S. 1984. Adopting the Form and Abandoning the Logic: The Application of Central Place Theory to Development Planning. Masters Thesis. Worcester, MA: Clark University.

Belsky, Eric S., and Gerald J. Karaska. 1984. Urban Functions in Rural Development End-of-Project Assessment Report. Worcester, MA: Clark University, Institute of Development Anthropology. Prepared for U.S. Agency for International Development.

Belsky, Eric, et al. 1983. The Role of Secondary Cities in Regional Development. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

Bendavid-val, Avrom. 1983. Regional and Local Economic Analysis for Practitioners. New York: Praeger Publishers.

Bendick, Marc, and Mary Lou Egan. 1984. "The Urban-Rural Dimension in National Economic Development." Paper commisioned by U.S. AID and presented at the Ninth African Conference on Housing and Urban Development, Dakar, Senegal, April 9-13, 1984. The Urban Institute.

Birch, David L. 1981. "Choosing a Place to Grow: Business Location Decisions in the 1970s." M.I.T. Program on Neighborhood and Regional Change.

Carlton, Dennis W. 1977. "Models of New Business Location." Report 7756, Department of Economics and Graduate School of Business, The University of Chicago.

Carlton, Dennis W. 1979. "Why New Firms Locate Where They Do: An Econometric Model." Working Paper no. 57, Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University.

Christaller, Walter (translated by C.W. Baskin). 1966. Central Places in Germany. Englewood Cliffs, NJ: Prentice Hall.

Denison, Edward F. 1967. Why Growth Rates Differ: Postwar Experience in Nine Western Countries. Washington: The Brookings Institution.

Dickinson, G.C. 1973. Statistical Mapping and the Presentation of Statistics, 2nd edition. London: Edward Arnold.

Fass, S. 1980a. "Final Evaluation Report of the Urban Functions in Rural Development Project in Upper Volta--Technical Note." Washington: U.S. Agency for International Development.

--------. 1980b. "Report of the Project Management Review of the Urban Functions in Rural Development Project in Upper Volta." Washington: U.S. Agency for International Development.

Garn, Harvey A. 1984. "The National Urban Policy Study for Egypt: An Approach to National Urban Settlement and Investment Strategies." Washington: The World Bank.

Government of Zimbabwe and The United Nations Centre for Human Settlements. Undated. "Proposal for two experimental low-cost housing projects and community development programmes, with attendant financial and thrift-generating solutions for lower income groups."

Greenwood, Michael J. 1978. "An Econometric Model for Internal Migration and Regional Economic Growth in Mexico." Journal of Regional Science, vol. 18.

Hackenberg, Robert A., Rene Hinojosa, and Beverly H. Hackenberg. 1983. Rural Growth and Service Centers: The Small Scale Enterprise Component. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

Hansen, Niles. 1984. The Roles of Infrastructure and Secondary Cities in Unbalanced Regional Development Strategies. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

--------. 1984. Rural Development and the Urban System in Mexico: Issues and Policies. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

Havrylyshyn, Oli, and Tradj Alikhani. 1982. "Protection Levels and Policies in Developing and Industrial Countries, Annotated Bibliography and Data Bank Summary." Washington: The World Bank.

Henderson, J. Vernon. 1978. Economic Theory and the Cities. New York: Academic Press.

--------. 1980. "A Framework for International Comparisons of Systems of Cities." Urban and Regional Report No. 80-3, The World Bank.

Humberger, Edward. 1983. Business Location Decisions and Cities. Washington: Public Technologies, Inc.

Isard, Walter. 1956. Location and Space Economy. Cambridge: MIT Press.

--------. 1960. Methods of Regional Analysis: An Introduction to Regional Science. Cambridge: MIT Press.

Joint Economic Committee, Congress of the United States. 1982. Location of High Technology Firms and Regional Economic Development. Staff Study prepared for the use of the Subcommittee on Monetary and Fiscal Policy. Washington: U.S. Government Printing Office.

Jones, Lonnie L., and Mike D. Woods. 1982. "Industrial Location Theory." Texas A&M University System, Department of Agricultural Economics, Staff Paper Series, DIR 82-1 SP-3.

Kipnis, Baruch A. 1984. "Input-Output Tables for Medium-Sized Cities: Survey Coefficients or Short-Cut Methods? A Case Study in Brazil." Journal of Regional Science, vol. 24(3), pp. 443-450.

Ledebur, Larry C., and Ronald L. Moomaw. 1983. "A Shift-Share Analysis of Regional Labor Productivity in Manufacturing." Growth and Change, vol. 14(1).

Lee, Kyu Sik. 1983. "Decentralization Trends of Employment Location and Spatial Policies in LDC Cities." Discussion Paper, Report No. UDD-20. Washington: Water Supply and Urban Development Department, Operations Policy Staff, The World Bank.

Leibenstein, Harvey. 1966. "Incremental Capital-Output Ratios and Growth Rates in the Short Run." The Review of Economics and Statistics, vol. 48(1), pp. 20-27.

Linn, Johannes. 1979. Policies for Efficient and Equitable Growth of Cities in Developing Countries. World Bank Staff Working Paper No. 342. Washington: The World Bank.

--------. 1980. "Urbanization Trends, Polarization Reversal, and Spatial Policy in Colombia." In Walter Buhr and Peter Friedrich (eds.), Planning Under Regional Stagnation. Baden-Baden: Nomos Verlagsgesellschaft.

--------. 1982. "The Costs of Urbanization in Developing Countries." Economic Development and Cultural Change, vol. 30(3).

Lund, Leonard. 1979. "Factors in Corporate Locational Decisions." Conference Board information bulletin no. 66. New York.

Mera, Koichi. 1982. "Project Proposal for a National Spatial Development Strategy Study for the Republic of the Philippines." Draft. Washington: The World Bank.

-------- and Hisanobu Shishido. 1984. "A Cross-Sectional Analysis of Urbanization and Socio-Economic Development in the Developing World." Discussion Paper, Report No. UDD-40. Washington: Water Supply and Urban Development Department, Operations Policy Staff, The World Bank.

Mohan, Rakesh. 1979. Urban Economic and Planning Models. World Bank Staff Occasional Papers, No. 25. Baltimore: The Johns Hopkins University Press.

--------. 1984a. "The Economic Determinants of Urbanisation: The Regional Pattern of Urbanisation in India Explained." Discussion Paper, Report No. DRD78. Washington: Development Research Department, Economics and Research Staff, The World Bank.

--------. 1984b. "The Effect of Population Growth, the Pattern of Demand and of Technology on the Process of Urbanization." Journal of Urban Economics, vol. 15, pp. 125-156.

Morrill, Michael L., and John Symons. 1977. "Efficiency and Equity Aspects of Optimum Location." Geographic Analysis, vol. 9(July).

Murray, Michael P. 1982. "Here, There, Where? A Strategy for Evaluating Industrial Relocation Policies in Korea." Discussion Paper, Report No. UDD-6. Washington: Water Supply and Urban Development Department, Operations Policy Staff, The World Bank.

Norcliffe, G.B. 1982. "Using Location Quotients to Estimate Economic Base and Trade Flows." Regional Studies, vol. 17(3), pp. 161-168.

PADCO. 1982. The National Urban Policy Study (2 vols.). Prepared for the Advisory Committee for Reconstruction, Ministry of Development, Arab Republic of Egypt. Washington: U.S. Agency for International Development.

--------. 1984. "Analytical Methodology for Preparing National Urban Policy Recommendations." Draft for discussion. Washington: PADCO. Prepared for U.S. Agency for International Development.

Prindle, Deborah Zubow. 1984a. Country Monitoring Project: Urban Indicators. Washington: U.S. Agency for International Development, Office of Housing and Urban Programs.

--------. 1984b. Rural-Urban Profile for Mali. Washington: U.S. Agency for International Development, Office of Housing and Urban Programs.

--------. 1984c. Rural-Urban Profile for Zaire. Washington: U.S. Agency for International Development, Office of Housing and Urban Programs.

Psacharopoulos, George. 1980. Higher Education in Developing Countries: A Cost-Benefit Analysis. World Bank Staff Working Paper No. 440. Washington: The World Bank.

Ray, Anandarup. 1984. Cost-Benefit Analysis: Issues and Methodologies. Baltimore: The Johns Hopkins University Press.

Renaud, Bertrand. 1981. National Urbanization Policy in Developing Countries. New York: Oxford University Press (published for The World Bank).

Rhoda, Richard. 1982. Urban and Regional Analysis for Development Planning. Boulder, Colorado: Westview Press.

Richardson, Harry W. 1981. "National Urban Development Strategies in Developing Countries." Urban Studies, vol. 18(3), pp. 267-283.

--------. 1984. "Urban Crisis and the Resource Crunch in Pakistan: The Costs of Urbanization and the National Human Settlements Policy Study." Draft. Washington: The World Bank.

Rivkin Associates, Inc. 1982. Approaches to Planning for Secondary Cities in Developing Countries. Washington: U.S. Agency for International Development.

Rondinelli, Dennis A. 1978. Urbanization and Rural Development: A Spatial Policy for Equitable Growth. New York: Praeger.

--------. 1980. "Spatial Analysis for Regional Development: A Case Study in the Bicol River Basin of the Philippines." Resource Systems Theory and Methodology Series, no. 2. Tokyo: United Nations University.

--------. 1983a. Secondary Cities in Developing Countries: Policies for Diffusing Urbanization. Vol. 145, Sage Library of Social Research. Beverly Hills: Sage Publications.

--------. 1983b. Applied Methods of Regional Planning: The Urban Functions in Rural Development Approach. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

Rowe, James E. 1980. The Theory of Industrial Location. Public Administration Series: Bibliography, no. P-576. Monticello (Ill.): Vance Bibliographies.

Rushton, Gerard. 1977. "Urban Functions in Rural Development--Bicol River Basin Pilot Project." Washington: U.S. Agency for International Development.

--------. 1984. "Use of Location-Allocations Models for Improving the Geographic Accessibility of Rural Services in Developing Countries." Paper presented at the North American Meetings of the Regional Science Association, Chicago, November 1983. Revised March 1984.

Rushton, Gerard, and Lakshman S. Yapa. 1983. "Review of USAID Bolivian Urban Functions in Rural Development Project in Potosi, Bolivia." Worcester, MA: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

Schofield, J.A. 1980. "Cost-Benefit Analysis in Regional Policy Evaluation." Draft, presented at the 27th North American Meetings of the Regional Science Association. Department of Economics, University of Victoria.

Scott, Ian. 1982. Urban and Spatial Development in Mexico. Baltimore: The Johns Hopkins University Press (published for The World Bank).

Sekhar, A. Uday. 1983. Industrial Location Policy: The Indian Experience. World Bank Staff Working Papers, No. 620. Washington: The World Bank.

Squire, Lyn, and Herman G. van der Tak. 1975. Economic Analysis of Projects. Baltimore: The Johns Hopkins University Press.

Stevens, Benjamin H., and Craig L. Moore. 1980. "A Critical Review of the Literature on Shift-Share as a Forecasting Technique." Journal of Regional Science, vol. 20(4): pp. 419-438.

Stevens, Benjamin H., George I. Treyz, et al. 1984. "Targeting Measures and Target Industries for Western Massachusetts." Amherst, MA: Regional Science Research Institute.

Task Forces on Housing and Urban Development. 1983. Planning of Urban Development. New Delhi: Government of India Planning Commission.

Thompson, John Scott. 1983. "Patterns of Employment Multipliers in a Central Place System: An Alternative to Economic Base Estimation." Journal of Regional Science, vol. 23(1), pp. 71-82.

Thoss, Rainer, and Johannes Linn. 1978. "The Spatial Allocation of Urban Public Investment in Colombia, South America: An Exploratory Linear Programming Model." Draft Urban and Regional Report No. 78-3. Washington: Development Economics Department, Urban and Regional Economics Division, The World Bank.

Tolley, George S., Philip E. Graves, and John L. Gardner. 1979. Urban Growth in a Market Economy. New York: Academic Press.

Tower, Edward. No date. "Effective Protection, Domestic Resource Cost and Shadow Prices: A General Equilibrium Perspective." Staff Working Paper. Washington: The World Bank.

Treyz, George I., and Benjamin H. Stevens. 1979. "Location Analysis for Multiregional Modeling." RSRI Discussion Paper Series: No. 113. Philadelphia: Regional Science Research Institute.

11

U.S. Agency for International Development. 1980. Ivory Coast Secondary Cities Project Paper. Washington: U.S. AID.

--------. 1980. Kenya Secondary Towns Shelter and Community Facilities Project Study. Washington, U.S. AID.

--------. 1983. "Urban Development Support Services (UDSS)." Washington: U.S. AID.

--------. 1984. Guidelines for Preparing Urban Development Assessments. Washington: Office of Housing and Urban Programs, U.S. AID

--------. 1984. Nepal Urban Development Assessment. Prepared by PADCO, Inc. Washington: Office of Housing and Urban Programs, U.S. AID.

--------. 1984. Senegal Urban Development Assessment. Prepared by PADCO, Inc. Washington: Office of Housing and Urban Programs, U.S. AID.

Underhill, Jack A., et al. 1980. French National Urban Policy and the Paris Region New Towns: The Search for Community. Washington: U.S. Department of Housing and Urban Development, Office of International Affairs.

United Nations Industrial Development Organization. 1970. Industrial Location and Regional Development: An Annotated Bibliography. New York: United Nations.

Wilkie, Richard, Barry Lentnek, and Thomas Carroll. 1983. Urban Dimensions of Rural Development in Ecuador. Worcester, MA: Clark University. Prepared for U.S. Agency for International Development.

World Bank. 1976. Appraisal of the Urban Sites and Services Development Project Peru, Report No. 1065a-PE. Washington.

--------. 1978. Appraisal of Colombia Urban Development Project, Report No. 1681a-CO. Washington.

--------. 1979. Brazil Medium-Sized Cities Project: Staff Appraisal Report, Report No. LN-1720-BR. Washington.

--------. 1980. The Development of Regional Cities in Thailand. Report No. 2990-TH. Washington.

--------. 1981. Mexico Second Urban and Regional Development Project: Staff Appraisal Report, Report No. 2937-ME. Washington.

--------. 1983. Staff Appraisal Report: Brazil Parana Market Towns Improvement Project, Report No. 4403a-BR. Washington.

--------. 1983. Staff Appraisal Report: Philippines Regional Market Towns, Report No. 4094-PH. Washington.

--------. 1983. Staff Appraisal Report: Kenya Secondary Towns Project, Report No. 4427-KE. Washington.

18

--------. 1984. Staff Appraisal Report: Korea Jeonju Regional Development Project, Report No. 4719-KO. Washington.

--------. 1984. Staff Appraisal Report: Zimbabwe Urban Development Project, Report No. 5023-ZIM. Washington.

--------. 1984. Staff Appraisal Report: Indonesia Fifth Urban Development Project, Report No. 4887-IND. Washington.

Yapa, Lakshman S. 1984. Regional Issues in Strategies for Increasing Rural Employment. Worchester, Mass.: Clark University, International Development Program. Prepared for U.S. Agency for International Development.

APPENDIX B

LIST OF PEOPLE INTERVIEWED AND THEIR AFFILIATIONS

From AID

Avrom Bendavid-val
Eric Chetwynd
Sarah Clark
Fred Glickman
Pamela Hussey
David Ollinger
Paul Vitale
Jerry Wolgin

From The World Bank

Henri Beenhakker
Harvey Mike Garn
Andrew Hamer
Kyu Sik Lee
Johannes Linn
Koichi Mera
Rakesh Mohan
Larry Westphal

From Other Places

Allan Carroll, PADCO
Gerald Karaska, Clark University
Orest Koropecky, PADCO
Harry Richardson, State University of New York at Binghamton
John Ross, U.S. Department of Housing and Urban Development
Gerard Rushton, University of Iowa
Benjamin Stevens, Regional Science Research Institute
Alfred Van Huyck, PADCO

Note: Excludes staff of The Urban Institute.

APPENDIX C

METHODS FOR DETERMINING INDICATOR VALUES

This appendix discusses six methods for determining indicator values. These are: (1) mix and share analysis, (2) location quotients, (3) measures of distribution and association, (4) economic base theory, (5) the incremental capital output ratio, and (6) the ratio of private investment to past public investment.

Two books -- Applied Methods of Regional Planning: Urban Functions in the Rural Development Approach by Dennis Rondinelli (1983) and Regional and Local Economic Analysis for Practitioners by Avrom Bendavid-val (1983) -- describe how to use the first four methods and provide examples of the computations involved. Rather than duplicate that information, this section describes what can be learned with each method and what cautions should be observed in using it.

Mix and Share Analysis describes how much of the change in regional or city-specific employment in each sector is caused by changes in the national economy; differences in the previous sectoral distribution of employment, and thus in industrial mix, between the nation and the region or city; and shifts in the region's or city's share of national employment in the sector. Sectors can be defined broadly -- for example, as manufacturing, services, or small scale enterprise -- or be individual industries (e.g., steel, textiles) of particular interest. The definition of sectors is based on the level of detail that seems useful, provided that much detail is available in national and regional or city employment data. Bendavid-val's description of mix and share analysis is the preferred reference.[9]

If one assumes that the current trend in the shifts of regional shares of national employment will continue, mix and share analysis suggests targeting investment to areas with positive shifts in regional shares. These are the areas where growth is likely to occur and which have sufficient industrial attractiveness that an attempt to intensify industrial development has a reasonable likelihood of succeeding. One strong caution about mix and share analysis is that it will be misleading if heavy public subsidy caused a disproportionate increase in some region's share of employment in a sector. Such subsidies, for example, could include development of a major government-owned industrial project or a regional electric grid with rates that are well below the rates required for full cost recovery. Mix and share analysis results generally should be adjusted for any major subsidy effects before they are used to guide decisionmaking.

A Location Quotient is a ratio of national and local ratios, most often ratios of national and local employment concentration in a sector or industry. For example, a location quotient might show the relative concentration of professional and technical employees among the employees in a city and in the nation. A location quotient is not necessarily related to employment. Bendavid-val gives the example of square meters of cold storage space per hectare of fruits and vegetables grown by commercial farmers.

The location quotient is very easy to compute and shows what an area specializes in. Location quotients are useful for determining what industries will be most likely to voluntarily locate in specific regions or metropolitan areas/cities. They also can be used to estimate what goods the industry produces that are exported to other parts of the nation.

92

Rondinelli provides the simpler explanation of location quotients, but Bendavid-val gives more detail about their possible forms and their limitations. It is important to recognize that location quotients are just rough descriptive indicators. Before acting on the information they provide, it is important to do some more detailed validation of the most significant variations. For example, cold storage space may be limited because of the presence of major canneries, the concentration of the area's agriculture in products that do not require cold storage, the presence of good roads to a nearby area with excess cold storage capacity, or a lack of the facilities necessary for agricultural success. To make investment decisions, it may be necessary to know not only that cold storage is not a regional specialty, but why.

Measures of Distribution and Association are simple descriptive indicators of how activities and characteristics are distributed among regions and which ones tend to concentrate together. As described by Rondinelli, they include:

- The distribution quotient, which shows activity density, for example, in terms of manufacturing establishments per square kilometer in each town.
- The measure of concentration, which shows whether things like agroprocessing establishments or employees are particularly dense in some locations within a region.
- The measure of deconcentration, which shows the change over time in the density of an activity at a location.
- The measure of association, which shows the degree to which two types of activities (e.g., manufacturing and retail trade) tend to be concentrated in the same places.

Among these measures, deconcentration probably has the greatest use in setting investment priorities, as it shows what locations have experienced rapid growth for their size. Like location quotient and mix and share values,

these measures must be used cautiously because they do not reflect underlying causes. Furthermore, most of them may be more useful in planning the details of investments in an area than in targeting areas for investment.

Economic Base Theory allows crude estimation of multiplier effects -- how much overall employment in a region will grow as a result of growth in employment in industries that are regional exporters. The exporting industries, taken together, are considered the region's basic sector. The economic base multiplier can be defined as the ratio of total to basic employment in the region or, if time series data are available, the ratio of changes in total and basic employment over time.

Bendavid-val describes a method, originally developed by Hoyt, that seems a sensible way to decide which industries to treat as basic industries. A difficult decision is whether to include agriculture in the economic base. It seems like inclusion of commercial agriculture is important as export returns create urban jobs. Conversely, employment in subsistence agriculture probably should be excluded from the economic base and the total employment figures.

A quick economic base analysis is only likely to yield rough multiplier values. Nevertheless, a ranking of areas based on these multipliers provides some indication of where investment will stimulate the most development. Some development also is induced outside the area where the economic activity originated. For example, profits from extraction industries often flow to the capital city and grain sales may finance purchase of a truck produced in another region. Therefore, a ranking based on economic base multipliers may not show the investment strategy with the greatest return for the nation as a whole.

The Incremental Capital Output Ratio (ICOR) is the ratio of output to investment, where output may be measured in terms of value added, employment, or growth in Gross Domestic Product (GDP). ICOR is an informative ratio since it indicates the relative economic efficiency of past investment in different cities. Such studies as Leibenstein, 1965 and Ahmed, 1981, however, caution that ICOR often is not a very good predictor of future efficiency. Furthermore, data on public and private investment by city are essential for calculating ICOR and may be difficult to obtain or estimate.

Mera (1982) recently proposed to use ICOR in spatial strategy decision-making in the Phillipines. He proposed to estimate private investment by taking national sectoral investment data from the Phillipines' annual national income accounts and breaking it down spatially using judgment informed by available data on construction permits, changes in the number and size of establishments, and incentive applications. Public investment is much easier to estimate, although one must be sure that local investment is included and that funds transferred to the local governments from the central government are not double-counted.

Output growth following investment takes time as projects are not completed instantaneously. To account for this, Mera suggests computing ICOR using a time lag of two years. For example, ICOR could be computed as new jobs or value added in 1977-1982 divided by investment in 1975-1980. A long time span is recommended both because investment impacts will take a little longer to occur for some investments than others and to assure that the estimates were not overly affected by fluctuations in the business cycle, exchange rates, oil prices, and other external events.

ICOR is most commonly applied to the mining, manufacturing, construction, and agricultural sectors. Impacts of investment on employment or value added in the service sector then can be estimated using an economic base multiplier.

The Ratio of Private Investment to Past Public Investment is essentially a leveraging ratio. A ranking based on this measure provides guidance into where to spend a fixed public investment budget in order to maximize total investment in the economy. Like with ICOR, investment should be examined over a long time span with some time lag. Mera's proposal, for example, suggests comparing private investment in 1977-1982 to public investment in 1974-1979.

APPENDIX D

WAYS TO PRESENT INFORMATION VISUALLY

A wide variety of graphic and statistical presentation methods can be used in regional planning. Dickinson concisely summarizes and describes the range of techniques that can be used in the UFRD approach. He notes that:

1. Statistical diagrams can be used to show the relationship between quantities when the presentation of spatial distribution is not important. Among the most effective statistical diagrams are:

   a. Line graphs

   b. Bar graphs

   c. Circular graphs

   d. Scatter graphs or scatter diagrams

Statistical diagrams can also be used to show the division of characteristics into components--usually in percentages or absolute numbers. Among the most effective statistical diagrams for showing parts or components of a whole are:

   a. Compound line charts

   b. Bar graphs

   c. Divided circle or "pie" charts

   d. Divided rectangles

   e. Triangular graphs

2. Statistical maps can be used to show the spatial distribution of social or economic characteristics, population, activities, resources or other features that exist at different levels or in different quantities in various parts of a region. When differences in degree or level are to be shown in a non-quantitative manner, various symbols, letters or levels of shading can be used at different locations on the map.

When it is important to show on the map quantities distributed among places, the following devices can be used:

a. For showing the quantities distributed at specific points:

1) Reported unit symbols--such as a small drawing of a cow at each location representing 100 head of cattle raised in that place

2) Proportional bars--representing different levels or amounts at each place

3) Squares, circles, spheres or cubes--with each symbol representing different amounts or proportions

4) Graduated range of symbols--such as circles of different sizes representing larger amounts or percentages

5) Repeated statistical diagrams

b. For showing the quantities distributed in an area:

1) Dots--with the density of dots representing the amount within the area

2) Shading--the darker the shading, the greater the amount or percentage

3) Proportional shading

4) Isolines--connecting areas with equal amounts or levels and forming areas within an area

c. For showing quantities distributed along a line--such as a road, river, or railroad--bands with proportional widths or graduated size indicating the level or amount.

The most effective type of map, table or chart to use depends on the types of data to be presented, the emphasis or focus that is desired, and the ability of the audience to comprehend the information. There are graphics

that are more or less appropriate to different types of data: for example, population or commodity flow data along roads are most appropriately highlighted by proportional width bands along the line of flow. But other means might be used to highlight other data. Part of the planners' responsibility is to select those graphic techniques that are most likely to highlight the relevant implications of the data and that are most likely to be understood by those who must make decisions about the information presented.

Source: Rondinelli, 1983.