

THE IMPORTANCE OF TIME SAVINGS IN ROAD PROJECT APPRAISAL: EVIDENCE FROM SWAZILAND

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As the authors wish to extend their work on time savings in transport projects, they would welcome any comments or criticisms on this paper. Their address is: Economic Research Unit, University of Natal, King George V Avenue, Durban 4001, South Africa.

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1. INTRODUCTION

The Economic Research Unit has undertaken feasibility studies of road investments in Swaziland since 1969. These studies have been directed at the Second and Third National Development Plans (Maasdorp *et al*, 1971; Maasdorp and Bennett 1977), mid-Plan reviews (Maasdorp and Bennett, 1981) and specific projects (Bennett *et al*, 1973; Maasdorp and Bennett, 1980) or problems (Bennett and Maasdorp, 1980), using the technique of cost-benefit analysis. During this period there have been some important refinements in project-appraisal techniques, especially as applied to less-developed countries (LDCs). Whilst these advances have helped to standardise the methodology demanded by aid agencies, there remain areas of disagreement with regard to the treatment of benefits. In transport projects, the role of time savings stands out as being one such area of controversy.

Most of the theoretical work concerning the valuation of time savings has been undertaken in the context of the developed countries, and most of the quantitative evidence is also derived from these countries. Inadequate attention has been paid to the role of time savings in LDCs, and economists from the developed countries have tended to be ethnocentric in their treatment of the subject in transport projects in the Third World.

Part of the problem, perhaps, is that only economists seem to have examined the issue; one seeks in vain for contributions from other social sciences, and this is an important lacuna. It is all very well to assume, as economists do, that there is widespread underemployment and hence abundant leisure time in LDCs, and then infer that a low value may be placed on time. But how do the people in the particular country actually view the reduced travel time and increased reliability of public transport services which often result from road improvements? It was in order to obtain answers to these questions, and to help fill the gap in the literature, that anthropological research was commissioned

during the recent round of studies conducted by the Unit in Swaziland.

Another weakness of the literature on the evaluation of time savings is that it has tended to neglect the benefits of reducing the transport time of goods. Perishable goods, for example, may deteriorate in quality on long journeys. Although some attention has been devoted to this issue in Swaziland (Maasdorp *et al.*, 1971), this was in the area of rail rather than road transport. This paper, therefore, in common with most of the literature, is concerned with the transport of people rather than goods.

This paper commences with a brief survey of theoretical approaches to the valuation of time savings, a discussion of the major areas of controversy and a résumé of some empirical work. The anthropological survey in Swaziland is then presented, and this leads to the identification of major questions to be asked in project appraisal and to the formulation of guidelines for the future treatment of time savings.

2. THEORETICAL ISSUES AND EMPIRICAL APPROACHES

Time saving in the appraisal of transport projects has a long history, its importance first having been mentioned in 1844 by Jules Dupuit. During the 1920s and 1930s, federal and state highway authorities in the United States evaluated time savings in highway investment studies, but in Britain and Europe time savings were introduced into cost-benefit analysis only from the 1960s onwards. The role of time savings in transport analysis is also stressed in some centrally-planned economies, e.g., in the German Democratic Republic manuals for transport planning have been developed which are almost identical to those in Western Europe (Bruzelius, 1979).

In many transport projects in developed countries, the imputed value of savings in time has proved to be the main benefit. But, in contrast, consultants appraising projects in LDCs have tended to be ambivalent in their approach to the valuation of time. The problem, as Howe (1976) points out, is that to omit a value for time savings from a feasibility study could be to exclude the main benefit and thus distort investments; to impute an incorrectly high value, on the other hand, might bias investment towards the urban areas with their higher incomes and rates of vehicle ownership.

The earlier studies tended to exclude time savings for three reasons: (i) doubt as to whether their inclusion was theoretically justified, (ii) the difficulty of calculating a monetary value and (iii) a belief that at the low levels of traffic characteristic of LDCs, other benefits were usually more important. But de Weille (1966), in his seminal work on the quantification of road-user benefits, recommended the inclusion of time savings and, although aid donors, planners and economists are still divided in their attitudes, it is probably fair to say that most project appraisals today include this item.

Theories of the Value of Time

Travel-time savings may occur either during working or non-working (commuter and leisure) time. There is no general agreement, however, that both these categories of savings have a value and that they should be included in the quantification of benefits. Yucel (1975), for example, argues that working time is paid for by the employer and is thus part of the total cost of production. Since time savings during business hours can be used for productive purposes and to increase GNP, they should be included in project appraisal. In contrast, leisure-time savings are not used to increase GNP and cannot be converted into goods and services; they should thus not be considered in the appraisal. But there is evidence that people are prepared to pay for non-working time savings; such savings, therefore, increase their welfare and have a positive value although this is not reflected in GNP. Thus most project appraisals include all time savings but value working and non-working time differently. Travel-time savings during working hours are usually valued according to marginal productivity theory, those during non-working hours according to the theory of consumer choice.

Marginal productivity theory assumes perfectly-competitive markets and profit-maximising firms. Employers hire labour as long as it pays them to do so, i.e., until the wage rate equals the marginal productivity of labour. The average wage rate therefore measures the value of working time, and is commonly used in cost-benefit analysis (CBA).

Consumer choice theory is used to explain an individual's preference among alternative baskets of goods. This is applied to the evaluation of non-working travel time, i.e., to determine that combination of work and leisure which maximises an individual's satisfaction. At equilibrium, the individual will divide time between work and leisure so that the rate of substitution between income and leisure

equals the wage rate. There are two effects, namely, (i) the substitution effect - as the wage increases, the attractiveness of work increases, and (ii) the income effect - as income increases, more leisure is desired. These effects operate in opposite directions; if wages are increased, therefore, the individual may devote more, less or the same amount of time to work than before. Yucel (1975) points out that these results have been erroneously interpreted to mean that the value of leisure time equals the wage rate. This is so only if the labour market is perfectly competitive. But the market in the real world is imperfectly competitive, and the wage rate equals or is greater than the marginal value of leisure under conditions of full employment.

Criticisms of consumer choice theory have led to several attempts at reformulation but with no marked success. Some efforts, however, have been made towards developing a more general economic theory of time (Yucel, 1975). These argue that the value of time depends on the activity being undertaken. But these methods have not proved suitable for an empirical estimation of time savings.

Behavioural models using a number of mathematical and statistical techniques have been employed to explain actual transport choices and in empirical investigations of the value of travel-time savings. These models use the 'revealed preference' concept and attempt to estimate the trade-off between different combinations of travel time and money cost. Travellers may incur extra costs in order to save time, or they may spend more time travelling in order to avoid extra money costs. Most of this work has been undertaken in Britain and the United States, mainly focussing on urban commuter trips, and the validity of these results in LDCs is open to question. But even in developed countries, the revealed preference approach has a number of limitations, e.g., respondent bias, the use of subjective versus objective data, and the exclusion of trade-offs other than that between money and time. Empirical studies themselves show that there is no

single average value of time; rather, the value depends on the purpose and length of the trip, mode of travel, the amount of time saved and on personal characteristics such as income, age and sex.

Applicability to Less-developed Countries

The methods of valuing time savings are controversial and their applicability to LDCs has been questioned. In this section we identify the most important issues in the literature.

Imperfections in the Labour Market

Neo-classical marginal productivity theory is grounded on assumptions of perfect competition and equilibrium. However, because of imperfections in the labour market such as minimum-wage legislation and the existence of labour unions (Little *et al.*, 1971), the wage rate may not equal the marginal productivity of labour and reflect the value of labour in alternative uses.

Unemployment and Underemployment

Moreover, marginal productivity theory assumes that labour has alternative uses. This view is challenged by development economists who not only point to the high rates of open unemployment in LDCs (especially in urban areas) but also commonly accept that there is a substantial degree of underemployment both in urban and rural areas. Thus it is argued that labour in LDCs does not have other uses and that time saved on trips may aggravate the situation; time savings would be spent not in economically-productive activities but in involuntary idleness. Hay (1969), for example, found that in Nigeria the opportunity costs of time were low, being associated with unemployment, underemployment and concealed employment. Thus, for those who travelled for social reasons, the fare paid was the only cost.

The unemployment problem in LDCs has also been used to criticise the applicability of consumer theory in the valuation of non-working time. This theory assumes that individuals are able to vary total time worked. But this is not so in developing countries - because of high unemployment and underemployment, individuals do not have this freedom. However, some people do part-time work in addition to their full-time employment and therefore derive a fair proportion of their total income from part-time work. Such part-time work is often more remunerative than full-time work and incomes often are not declared for tax purposes; this work is then part of the informal sector. The utility of 'non-working' time spent in informal economic activity is therefore greater than that of working time. The use of the average full-time wage rate would in such cases undervalue non-working time (Banjo, 1979).

Another argument here is that hours of work are institutionally fixed and time is, therefore, not privately valued at the wage rate. Its value could be greater or less than the wage rate (Anand, 1975).

Distinction between Working and Non-working Time

Related to the above point is that in certain activities it is not easy to distinguish between working and non-working time. In LDCs self-employed persons constitute an important component of overall employment, whether they be in the small-scale and informal sectors in urban areas or in the agricultural sector. (Even in modern farming in developed countries, there is no clear-cut dichotomy between working and non-working time, nor indeed is there for business executives or top civil servants). This leads us to the next point.

Cultural Perceptions of Time

In terms of marginal productivity theory, working time is valued from the viewpoint of the employer, not the employee who may perceive work differently and place a different value on time saved and hence

on the way leisure time is spent. Although Sharp (1981) believes that there is no better practical alternative to the use of the wage rate as a measurement of time savings, this point is particularly pertinent in LDCs since economic studies of time do not reflect cultural perceptions of time. How is time perceived in traditional agriculture and does this still determine society's attitude to time? If traditional attitudes dominate, it is difficult to (i) distinguish between utility of working and non-working time, (ii) establish when travel is viewed as a disutility and (iii) establish when travel is used productively and when it is for business or personal purposes (Banjo, 1979).

Different Transport Markets

A number of writers have pointed out that the value of time is not homogeneous. Rather, the transport sector consists of different markets each of which have different characteristics. Thus the use of the wage rate as a measure of the marginal value of time has been criticised on several grounds. There are four main objections (Bruczelius, 1979): two of them question the validity of assuming that the marginal value of time is the same for two persons even if their wage rates are identical, while the other two point out that even for one and the same consumer, the marginal value of time may vary depending on the activities for which the time is used.

For the method of evaluating time savings based on constant marginal values of time to be valid, it has to be assumed that the utility function is linearly additive and that demand may be expressed in terms of one parameter only, namely, generalised cost. These assumptions imply that demand and the willingness-to-pay to save time are not affected by changes in real disposable income. Such assumptions do not appear realistic, nor do those which accept a homogeneity of traffic composition and apply only one average value of time to all trips, e.g., by not differentiating between commuter and holiday traffic.

Thus the valuation of time should reflect the different characteristics of transport markets. Bruzelius (1979) isolates three factors, namely, consumer tastes, trip purposes and travel modes.

Consumer tastes: The reason why different consumers may be willing to pay different amounts of money for a given time saving is essentially due to differences in tastes and income. The possibility of accounting for the variability among individuals depends on whether there exists a relationship between values of time and measurable characteristics of the consumers such as age, sex, social status and income. But only in the case of income has any real attempt been made to establish such a relationship, and the importance of the other variables as explanations of the behaviour of individuals is uncertain. The (non-constant) marginal values of time can be expected to be an increasing function of the level of income, reflecting the condition that the consumer is actually prepared to pay more to save time the higher is his income.

Trip purpose: For simplicity, Bruzelius (1979) assumes that there are only two types of journey: the journey to and from work and other journeys during non-working time. We would then expect to find higher values for the first type. Zahavi (1976) provides empirical evidence in support of this contention, while Bruzelius adduces several reasons which justify such a hypothesis. First, the commuter journey is generally fixed in time so that there is little room for the consumer to decide for himself if and when he wants to travel. Sharp (1981) supports this view: on working days, the amount of time available for non-work activities is very limited, hence the marginal utility of time saved is likely to be greater on such days than on non-working days. Second, commuter journeys are often undertaken during hours when streets are congested and public transport crowded, so that the average traveller probably experiences the journey as less comfortable than during the other hours. Third, some journeys during non-working time are simply demanded *per se*, i.e., they are ends in themselves (such as Sunday afternoon outings). The consumer cannot be expected to be willing

to pay anything to save time during these journeys. Bruzelius' third reason is valid in relation to pure pleasure trips, but this should not obscure the fact that trips during non-working time can have many different purposes with correspondingly different utilities. Sharp (1981), for instance, considers the following trip purposes:

- (a) Education/escorting children: These trips may have little utility and he believes the value of time savings transferred to alternative activities may therefore be relatively high.
- (b) Shopping/personal business: Again, such trips may have a relatively low utility and a high time-savings value.
- (c) Leisure (restaurants, sport, friends): Sharp regards these as more pleasurable but points out that travel time for active sporting purposes may have a positive value as travel is an essential part of the total amount of time allocated to such activities. A high money value may also be placed on time savings during long holiday trips.

In practice, however, many trips are multi-purpose, and the distinction between work and non-work travel cannot always be hard and fast. In LDCs the proportion of multi-purpose trips, particularly on rural roads, is likely to be high (Howe 1976). Pure pleasure trips in LDCs are likely to be a luxury affordable only by the high-income group.

Travel mode: It seems plausible that the value of time may be a function of the mode used since modes differ in terms of comfort, e.g., the average consumer may be expected to prefer a car journey to a journey by public transport. This may justify the division of total door-to-door travel time into various components. Since several attitude studies indicate that consumers regard frequent and regular service as important aspects of public transport, we would also expect the consumer to be willing to pay more per unit of time to avoid waiting for public transport than to reduce travelling time by a public transport mode. There is empirical evidence which lends support to this hypothesis (Bruzelius,

1979). There is little or no empirical evidence on the importance attached to travel comfort in LDCs, but whether consumers can afford to be as fastidious as those in the richer countries is doubtful.

Small Time Savings

A number of writers have pointed out that the proportion of time saved in relation to the duration of the trip is important (Tipping 1968); if this proportion is small, the savings may be of little use to the firm and therefore have little if any value. This is a position which may often be encountered in countries in which distances are small and trips are consequently short. In such cases, the time savings on any one trip resulting from transport investments may be very small in magnitude, perhaps even less than a minute.

The general policy in CBA has been to value small time savings on the same basis as larger savings. This procedure has been severely criticised and it has been suggested that small time savings should be evaluated at a lower rate or even ignored completely. Heggie (1976), for example, assigns small values to time savings of five minutes or less.

Bruzelius (1979) argues that if small time savings *per se* actually have a lower value per unit than large time savings, this has to be explained by the fact that the assumptions behind the model of consumer behaviour do not adequately correspond to real world conditions. According to the theory there is nothing to suggest that small time savings should be valued differently, and the theory could indeed be compatible with an empirical finding where small savings may be valued at a higher rate per unit of time than large savings. Thus, it seems reasonable to expect that a consumer who stands in a crowded train for half an hour would be willing to pay much more per unit of time to eliminate the last five minutes than the entire half-hour ride. The reasons which indicate why small savings have little or no value are also based on assumptions which conflict with those of the model. It has thus, for example, been

argued that small time savings are too small to be used for substitute activities or to be perceived or experienced by the consumer.

Since no conclusions can be drawn from available empirical evidence, recommendations as to how small time savings should be considered in CBA have to be based on theoretical reasoning. When considering that time savings often occur far into the future, the argument for assigning lower values to small savings seems untenable (Bruzelius, 1979). Over time it appears reasonable to expect that consumers will be able to adjust their activities so that they can exploit a time saving. Moreover, the time saving associated with a single project should not be viewed in isolation; over time, more than one project will in general affect a particular link in a network (as in the case of road investment programmes in LDCs) so that the journeys on the link will be affected by more than one time saving. If all these time savings are added together, the total time saving may be substantial. As long as this condition is fulfilled there does not seem to be any reason for differentiating between time savings according to their size, even if some of them in isolation are very small. As with the empirical evidence, the theoretical considerations do not provide well-founded justifications for treating small time savings differently.

Rather than consider each time saving separately in CBA, Bruzelius (1979) suggests that it may be better to approach the problem in an iterative manner. All time savings would be evaluated first with the same value of time, regardless of the size of the savings. Thereafter, sensitivity analyses could be carried out to determine whether the profitability and ranking of projects are sensitive to adjustments in the values of time. If the answer is negative, there is no reason to bother about small time savings. If it is positive, the consequences of assigning lower values to small time savings should be analysed.

Time and Equity

The income-distributional effects of imputing values to time in

CBA have been examined by several writers.

Empirical evidence shows a positive relationship between annual income or wage rates and values of time. In line with the requirements of the Pareto ranking, the fact that the value of a time saving is a function of the level of income implies that in CBA we should differentiate between different income groups and apply higher values of time to those with higher incomes. However, this has been strongly opposed for reasons related to the distribution of income. Howe (1976) argues that it would be inequitable for society to value the time of individuals at different levels according to their incomes, since this would bias investment in favour of schemes used predominantly by higher-income groups. In LDCs the distribution of investment between the urban and rural sectors, or even between different categories of rural roads, could be seriously affected by an income-based value of time.

Instead of using differentiated values, therefore, some writers argue in favour of using 'equity values' of time, the general approach being to use one and the same value of time for every person regardless of income. However, Bruzelius (1979) criticises the fact that the question of income distribution is raised only with respect to time savings and not to other cost or benefit items. He believes that the means available within the transport sector for redistributing income are in general very ineffective. In contrast, some means outside of the transport sector, such as income taxes, are much more effective and have a much more direct influence on the real incomes of persons whom it may be desirable to affect. If income-distributional effects are to be considered within the transport sector, then all costs and benefits, e.g., savings in vehicle operating costs, have to be weighted and not just time savings.

This argument of Bruzelius may be related to a point raised by Thomas (1979), namely, why value only some time savings, e.g., working-

time and not leisure-time savings, when all savings in vehicle operating costs, irrespective of when they occur, are included as a benefit in the CBA? The justification for following this procedure has been based on the assumption that savings in vehicle operating costs are put to productive use rather than being spent on consumption goods (a contention of dubious validity) whereas leisure-time savings represent consumption benefits.

Empirical Approaches

Most of the empirical work on time savings has been done in the industrialised countries of Western Europe and North America rather than in the Third World.

Data on recent empirical approaches in Britain are given by Sharp (1981) who refers to the methodology employed by the Departments of Transport and of the Environment. Travel time during work hours is valued on the basis of average earnings plus insurance and pension contributions plus any overhead costs of employers which vary directly with the hours of labour employed. All other journeys are considered as non-working time travel and two standard time values are used, namely, 'in-vehicle' and 'waiting' time. These values are based on empirical evidence which suggests that the average 'willingness to pay' for non-working time savings is at a rate equal to 25 per cent of the average wage rate. The time-savings ratios for working and non-working time and different categories of vehicle user are shown in Table 1.

The indices of time-savings values per vehicle were: 'average' car (100), 'working' car (288), heavy goods vehicle (216) and bus (703). These indices were based on trip-purpose and vehicle-occupancy statistics and on a ratio of working-time to commuter-time values of 100:75.

Among transport economists and consultants who have worked in LDCs, there are differences of opinion on the valuation of working and non-working time savings and even on the valuation of leisure-time savings in urban and rural areas.

Anand (1975) evaluates the time savings of different categories of

Table 1

Time-savings Indices - Britain, 1980
(all workers = 100)

Category	Index
<u>Working time</u>	
Car - driver	104,5
- passenger	83,6
Bus - driver	70,4
- passenger	69,4
Heavy goods vehicle occupant	76,3
Light goods vehicle occupant	65,7
<u>Non-working time</u>	
In-vehicle	14,1
Waiting	28,2

Source: Adapted from Sharp (1981)

road users separately. He places no social value on time saved on commuter or leisure trips, but calculates savings for business trips whether by car, taxi or commercial vehicle. With regard to commercial vehicles, if the wage rate accurately reflects the social value of time, the wage costs saved from a reduction in distance and/or increases in speed as a result of a road improvement will measure the value of time saved for the driver and crew.

Thomas (1979) points to an urban bias in the way some consultants have valued leisure time, i.e., by distinguishing between urban and inter-urban travel. In the case of the former category, empirical estimates tend to show a value of approximately 25 per cent of the wage rate. Because of urban congestion, leisure-time savings often form a significant proportion of total benefits in urban transport projects. But with regard to inter-urban travel, leisure-time savings are usually ignored. Thomas believes this is questionable; if leisure-time savings have a

social value in LDCs only if they occur in congested urban areas, transport investments could be biased towards urban areas which are already the most privileged in LDCs. We would agree with Thomas; there certainly seems to be no valid reason for supposing that time saved by vehicle occupants in urban areas is any more valuable than that saved on the open road. If one were to assume that urban vehicle occupants were more likely to be employed than be part of the 'open unemployed' group, then one could equally assume that occupants of vehicles on the open road were more likely to be engaged in productive economic pursuits than be part of the rural 'underemployed'.

The tentative guidelines offered by Yucel (1975) are roughly equivalent to the British approach outlined earlier in this section. Yucel suggests the following methodology for LDCs:

- (a) Working time: The maximum value should be the average wage rate plus social insurance, taxes and other overhead costs associated with employment.
- (b) Non-working time: Most empirical studies show that commuters value their travel time savings at 25-50 per cent of their hourly earnings and that the value of time is a positive function of earning levels. Because of lower incomes in LDCs, a figure of 20-25 per cent of hourly earnings appears to be in order. There is insufficient evidence to derive a definite relationship between time values and trip purposes, therefore the same values should be used for commuting and non-commuting trips (unless there is evidence available in the specific case).
- (c) Non-wage earners: The value of time should be equal for all adults in a family, i.e., in a particular vehicle, but the value for children should be lower.
- (d) Value of small time savings: The problem here is that people find it difficult to perceive time differences of less than 5 minutes, and therefore savings of less than this amount should not be valued. In contrast, Sharp (1981) suggests that leisure- or commuter-time values should possibly be applied to working-time savings of less than 10 minutes.

- (e) Value of future time savings: Future time savings should be valued according to the expected rate of increase in real per capita income.

We find, therefore, that the methodology applied to the treatment of time savings in LDCs adheres closely to that in the developed countries. However, for those involved in the appraisal of transport projects in Third World countries, it is important to obtain some understanding of local attitudes to time - something that is attempted in Section 3.

3. THE ECONOMIC VALUE ATTACHED TO TIME SAVING
AMONG THE SWAZI OF SWAZILAND

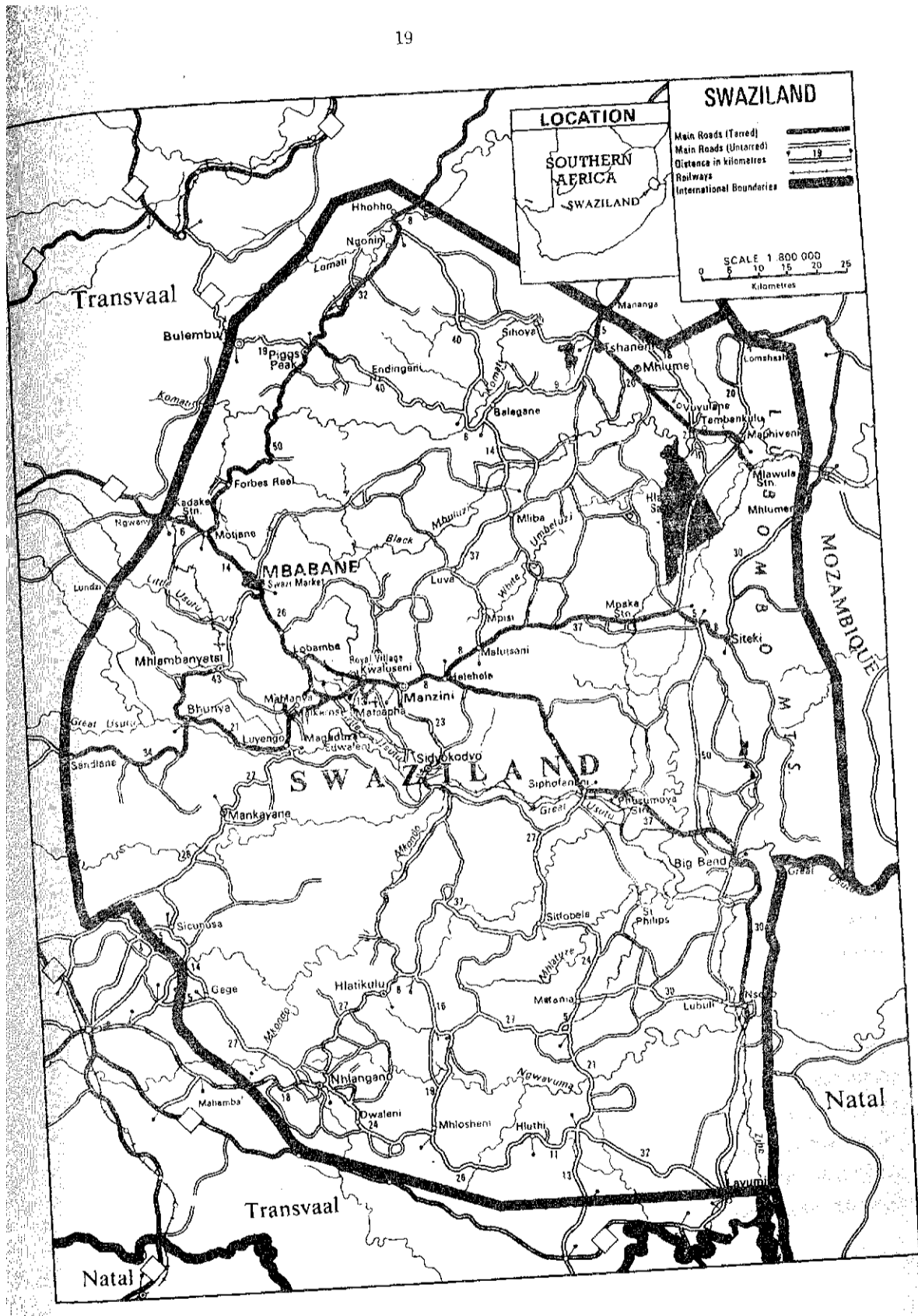
Anthropological research was conducted in Swaziland with a three-fold objective, namely, to establish:

- (i) an appreciation of some 'traditional' concepts of time perception and the extent to which these might be counter-productive to the development of an awareness of Western time systems and time measurement;
- (ii) the extent of road-user awareness of time savings gained through road improvements with particular reference to a distinction between production and leisure-time savings; and
- (iii) an understanding of Swazi attitudes to road improvements and the effect of road improvements on economic development in the rural areas.

Research Method

Open-ended interviews were carried out both in urban and rural areas. It was felt that data would be more reliable and relevant if respondents recounted their response to actual rather than hypothetical road improvements. Consequently, particular emphasis was given to rural communities adjoining either recently-paved or gravelled roads linking them to the urban centres of Mbabane, Manzini, Piggs Peak, Siteki and Big Bend (see map).

Although no sample was devised, respondents generally were interviewed at random in offices, bus terminals, markets, shebeens, stores, etc. Those interviewed included civil servants involved in rural development projects and working in communities which had benefited from road improvements, farmers (both those growing crops on a commercial basis and those growing only subsistence crops), teachers, rural storekeepers, bus owners, bus drivers, regular and occasional public transport users and private vehicle owners. These occupational categories are by no means exclusive, e.g., civil servants might maintain a rural home



to which they return periodically to secure their rural community interests and for farm management. It was felt that the range of people interviewed was representative of the total population excluding highly professional occupations other than in agriculture.

The attempt to interview a wide range of occupational groups and road users, and the fact that interviews usually took the form of informal conversations, necessarily resulted in an emphasis on qualitative data. However, an attempt was made to eliminate respondent bias by interviewing several people within each occupation/road-user category, the smallest number of people interviewed in any one category being those of bus owner (2) and rural storekeeper (5). The interviews were remarkable for their consensus even though a wide range of opinion was expected.

Swazi Concepts of Time

Traditionally, Swazi tell the time by reference to a natural phenomena such as sun, stars, shadows and cock-crowings, and historical events are recorded through devices such as naming children, e.g., girl babies born in 1968, the year of independence, were often named Nonkululeko ("we are independent"). Time is also reckoned in terms of the agricultural cycle and routine, e.g., early morning is the "time when the oxen are cool"; the moon before the summer crops ripen, a period of food scarcity and hunger, is termed "to swallow the pickings of teeth"; while the following moon heralds the beginning of a time of plenty, namely, Incwala ("first fruit ritual").

Through colonial rule, the Western calendar and time-reckoning system were introduced and officially adopted in Swaziland. However, it would be erroneous to assume that Swazi traditional concepts of time perception are necessarily counter-productive to the development of an awareness in Swazi of Western time systems and time measurement. Contract work, radio transmissions and school education have instilled Western attitudes to punctuality, time saving and time wasting. Thus,

for example, a common topic for discussion in rural areas is the nightly story serial transmitted on Radio Bantu. But what is important here is that the Swazi and Western time systems are seen as operating in different social situations and circumstances. Contract work-hours are fixed independently from the agricultural cycle, and bus schedules do not take cognizance of agricultural routine. Even Swazi who are not familiar with Western time measurement make use of bus schedules. They know when a bus is late although they might not be able accurately to judge how late it is. However, waiting for late buses is not seen as wasting time. Swazi are aware that the punctuality or non-punctuality of a bus service is something over which they have no control. If they want to catch the bus, they must wait. As one respondent put it: "we have developed a fatalistic adjustment to conditions over which we have no control".

Respondents were unanimous on the following six points:

- (a) Unpaved or ungravelled roads necessarily result in an irregular, unreliable and unpunctual bus service.
- (b) Bus services to and from rural areas are most unreliable during the rainy season. As will become clear, an unreliable public transport system during this period can affect agricultural production adversely.
- (c) Improved road conditions result in a speedier, more punctual and more reliable bus service. Thus, for example, two bus owners calculated that with improved road conditions they were able to maintain their bus schedules 26 days per month as opposed to only five days per month before road improvements and during the rainy season.
- (d) With improved road surfaces, a poor bus service is a legacy of previous vehicle deterioration caused by adverse roads. Such buses gained reputations for unreliability and lost passengers to competitors.
- (e) Improved road conditions generate more traffic and the increased flow of traffic offers a degree of independence from bus schedules.

- (f) They expressed the wish that road improvements would result in improvements to bus schedules. This would give non-vehicle owners greater control and choice regarding time usage.

These observations suggest that both school-educated and uneducated Swazi are familiar with, and place a positive value on, concepts such as punctuality, reliability and time saved. This conclusion is obviously contrary to popular (in certain quarters) ideas of 'African time' which make reference to cultural impediments to change. These conflicting viewpoints are resolved if we appreciate that attitudes and values develop within a history of contact. Thus, for example, farmers are often unpunctual in their meetings with government and other farming advisors. This is not because they do not appreciate punctuality and are ignorant of time wasted through being unpunctual, but because officials too have a history of being unpunctual; the time wasted waiting for officials (who in all probability arrive late and then decry notions of 'African time' and reaffirm their stereotypes) can be used productively. Officials, like buses, have reputations for punctuality or unpunctuality. However, unlike the bus driver who will not wait for passengers who are not fatalistically waiting at the roadside, officials must wait for farmers to arrive if they are to conduct a successful meeting. Farmers' unpunctuality, then, is a rational response to a situation in which they evaluate the optimum usage of time.

In Swaziland the traditional methods of telling and recording time are not impediments in the development of, and an appreciation for, Western concepts of time and time measurement. The two time systems operate in different contexts and the appropriate system is used within the logic of the situation. Without further research it is not possible to determine the accuracy of clock-time-saved evaluations. It is likely that these would vary in accuracy with education, occupation and watch ownership. However, what is important is that Swazi are aware of relative time savings. For rural communities, time saved through improved road conditions is often quite significant and is given a positive value.

Production and Leisure-time

Savings

Because Swaziland is a small country and distances are short,⁽¹⁾ it may be tempting to assume that time savings through improved roads are negligible. Time savings on travel between urban centres such as Mbabane and Manzini might indeed be minimal, so much so that the cumulative effect of increased traffic on journey time is unnoticed by regular road users. Thus, in interviews with bus drivers, bus conductors, commuters and taxi drivers, no respondent noted an increase in journey time over the past few years. These respondents did, however, note an increase in journey time during peak *vis-à-vis* non-peak hours, and this they attributed to traffic build-up. (When asked to quantify this increase in journey time, respondents would either ignore the question or estimate five minutes). However, even though respondents noted a build-up in traffic over the past few years and would volunteer explanations thereof, they did not correlate this with an increase in journey time. On the other hand, irregular users of the Mbabane-Manzini road all commented on an increase in journey time and attributed this to an increase in traffic. This anomaly in journey time cognition is understandable in that gradual increases in journey time are accepted unconsciously by regular road users.

In travel from rural to urban centres, journeys often represent a major undertaking and the loss of one or more days' productivity. The duration of a journey cannot be evaluated with reference to distance alone. Mode of transport and road surface are important criteria in evaluating time savings. Even the relatively short (39 km) distance between Mbabane and Manzini can result in significant time savings when

(1) The east-west highway from the Transvaal to the Mozambique border is 164km, and the north-south Lowveld road between Lomahasha and Lavumisa 170km in length. Some distances and driving times between main centres are:

Mbabane-Manzini	38,5km	30-45 min.
Mbabane-Piggs Peak	70km	1hr.
Manzini-Mhlume	103km	1hr 15min.
Manzini-Big Bend	81km	1hr.
Manzini-Nhlangano	102km	1hr 45min.

correlated with mode of transport. This is one reason why commuters prefer non-stop bus travel when travelling to work.⁽¹⁾ (One driver of a non-stop bus estimated that 90 per cent of his early-morning passengers were commuters).

Although they weighted the benefits from road improvement schemes differently, all respondents emphasised time saved in travelling. Thus civil servants noted that improved road conditions gave easier accessibility to rural areas. This allowed them to provide farmers with a more fluent and regular service and to visit more rural communities than was previously possible within the same production time. Farmers, on the other hand, emphasised that improved road surfaces had made agricultural implements, machine parts, chemicals and fertilizers more easily available and that this had definitely improved agricultural production and reduced the 'risk factor' in smallholding farm management. They noted that poor road conditions had often jeopardised agricultural yields when machine parts could not be obtained at crucial stages in the agricultural cycle. They also felt that improved road surfaces would encourage competition between bus services and lead to a rescheduling of the bus time-table. It is significant that farmers envisaged competition between bus services resulting in more buses at a greater variety of times rather than in terms of a reduction in tariffs. The significance here for time savings is that bus schedules do not take cognizance of agricultural routine. It is usual for buses to leave rural communities at dawn and to return at late afternoon or evening. For farmers this means that an entire day's labour is lost.⁽²⁾ (Peak labour periods in the agricultural routine are roughly 5 a.m. - 1 a.m. and 3 p.m. - 6 p.m. and agricultural officers point out that only meetings arranged between 12 p.m. - 2 p.m., when it is considered too hot for physical labour, are usually well attended). Farmers who purchased motor vehicles maintained that one major advantage of, and factor motivating, vehicle ownership is time saved by being 'free of bus schedules'.

(1) The cost of journey between Mbabane-Manzini is the same for non-stop and all-stop buses. Journey-time on a non-stop bus is 35-40 minutes, as opposed to a minimum of 1 hour 45 minutes on an all-stop bus.

(2) This is verifiable from the first-named author's personal experiences of bus travel between rural communities and urban centres.

There is, then, in Swaziland a general appreciation of time saved through improved road surfaces and of the fact that time savings can and do affect production. However, in rural communities it is not always possible to distinguish production and leisure-time savings. Swazi families living on Swazi Nation Land, i.e., 68 per cent of the Swazi population and 63 per cent of the land 'area', must all, of necessity, participate in the cash-based market economy. Their choice of participation in the market economy is restricted in a number of ways. Thus, for example, an inadequate road system to facilitate the necessary infrastructure to market crops automatically excludes the choice of commercial farming. This study is restricted to rural areas that have already been linked to urban centres through road improvement. In such communities it is essential to distinguish (a) farmers who grow subsistence crops only and who derive a cash income from some means other than that of marketing crops, (b) farmers who grow both subsistence crops and specific commercial crops, e.g., cotton and tobacco, and for whom farming is a livelihood, (c) absentee 'urban workers' who return to rural homes over week-ends and holiday periods to supervise the cultivation of commercial crops, and (d) professional persons whose skills are required in rural areas, e.g., agricultural field officers, teachers.

Within this context it must be emphasised that the following viewpoint expressed by Odier (quoted in Howe, 1976) needs, at least for Swaziland, serious qualification. He says:

"Developing countries are nearly always countries with underemployment, and a user who saves time on a journey will probably not use it productively....It would be a grave error to try to link up the time saved with equivalent wages or production. In these conditions, it is impossible to fix a reasonable value for the time saved by the user".

In Swaziland there is underemployment only in the cultivation of subsistence crops. However, all farmers combine subsistence crop cultivation with some form of cash earning. Those people who earn their livelihood through farming usually cultivate cotton, sugar cane or tobacco, all of which are labour-intensive crops to cultivate. It has been calculated that tobacco and cotton

require a labour input of 1 831 and 733 hours per hectare respectively. This can be compared with maize which requires a labour input of 366 hours per hectare (Swaziland, 1977). It is important to realise that farmers growing commercial crops for a livelihood do so in conjunction with subsistence crop cultivation and cattle/goat herding. Further, since many rural areas in Swaziland are not electrified, farmers must necessarily attend to fields, household and community affairs during daylight hours. It is not surprising, therefore, that a recent survey reported that insufficient labour was considered only after insufficient land and poor soil as "the most important perceived reason for not growing cotton or tobacco" (de Vletter, 1979). The relative lack of leisure time in commercial crop cultivation often was unfavourably commented on by 'non-progressive' farmers when comparing their lifestyle with that of 'progressive' farmers.

In fact, 'progressive' farmers and agricultural extension officers are unanimous in their insistence that there is no leisure time in commercial farming, only periods of less-intense work. While farmers emphasised that, at certain stages in the agricultural cycle, intense labour within a relatively short period is crucial for successful yields, agricultural officers noted the inadvisability of arranging meetings with farmers during these periods.

The suggestion is, then, that there is little or no underemployment in the rural economy for cultivators of commercial crops, and that time saved in travel would be used productively. A similar observation could be made concerning absentee 'urban workers' who return to rural homes over week-ends and/or holidays to attend to farm management and community affairs. In other words, the leisure time defined in their contract is used in the production of subsistence and/or commercial crops. Without a census it is impossible to gauge the extent to which 'urban workers' contribute labour, and not simply capital, in farm production. However, in a survey conducted by de Vletter (1979), "40 per cent of homesteads had resident members engaged in proximate wage employment, i.e., within daily commuting distance". Significantly, "between 60-85 per cent of the home-

steads near urban areas had commuting workers as against 21-39 per cent for more isolated areas". Also of interest is that all nine civil servants (five in the Ministry of Agriculture and four in the Ministry of Local Administration) whom we questioned specifically on this topic claimed that they generally used the week-end leisure time associated with government employment, in farming production. In fact, seven had purchased motor vehicles to facilitate their dual participation in the urban and rural economies. Further, journey time was usually used productively in that vehicles were used as illegal taxis.⁽¹⁾ Similarly, professional people employed in rural areas stated that if they had land rights within the community, then leisure time was usually used in a productive capacity within the homestead economy.

It seems clear, then, that for some sectors of the rural population, time saved in travel through improved road surfaces is given a positive value and would be used in a productive capacity. For these sectors of the rural population, it is extremely difficult to distinguish production and leisure-time savings. It seems pertinent, therefore, to support de Weille's (1966) viewpoint that working and leisure time should be valued equally. However, this evaluation should not be applied to the entire rural sector. Although subsistence crop farmers value time saved in travelling, they do not use that time to increase crop production. Rather, their positive evaluation of time saved stems from an easier access to clinics in particular and urban centres in general. It would be erroneous, therefore, to treat the rural sector as if it presented a homogeneous economic response to time savings derived from improved road surfaces. Although there was a differential response, all concerned nevertheless placed a positive value on time savings.

It is difficult, however, to place any precise money-value for the rural sector on time savings derived from road improvements. What seems certain is that time saving should be considered within the context of general rural development stimulated by road improvement. This is considered in the next section.

(1) This is the general case for private vehicle operators.

Within the urban sector, i.e., Mbabane and Manzini, the situation is less problematic. Drivers of non-stop buses all claimed that while early morning buses ran at full capacity, evening buses were not full. Although several factors would contribute to this phenomenon (the tariff for non-stop and all-stop buses is identical), a likely explanation is that commuters place a higher value on punctuality and rapid transport when travelling to work than they do on leisure time saved travelling home after work. It is also likely that daily commuters between urban centres such as Mbabane and Manzini are employees who do not use public transport during work hours. Further, although road improvements would reduce journey time, it is unlikely that this reduction would result in any significant increase in bus traffic as the current bus time-table between Mbabane and Manzini appears adequate. Consequently, it seems reasonable to ignore public transport in an economic evaluation of time savings in travel between these towns.

Swazi Attitudes to Road Development and the Effect of
Road Improvements on the Economic Development of the
Rural Sector

Perhaps the Swazi attitude to road improvement is best exemplified by reference to communities like Ekuhlamkeni and Singweni.⁽¹⁾ Both these communities (and they are not the only examples) built their own roads to link up with urban centres. In Ekuhlamkeni the farmers lent their labour to build, under government supervision, a road and a bridge to facilitate the introduction of an irrigation scheme to grow cotton. The Singweni community hand-dug a 20-km road to gain access to urban centres. Swazi realise that road developments widen their choice in participating in the cash-based market economy. They are also well aware that, for rural communities, improvements to roads result in greater

(1) These are rural communities near Mhlume and Piggs Peak respectively.

agricultural productivity (or the potential thereof),⁽¹⁾ better access to health services and new levels of consumption. Thus, the tarring of the Motjane-Matsamo road (MRI - completed early 1979) and the graveling of the link road to Entonjeni have already effected many changes in communities adjoining these roads. It is readily observable that there has been considerable voluntary homestead resettlement along roads. Most of these homesteads are now characterised by Western-type houses - a development directly attributable to greater access to building materials. It is worth noting that Swazi also associate road improvements and Western-style housing with electricity supply. They believe that electricity will follow from road improvements and that homesteads close to the road will have electricity installed more cheaply than, and before, those homesteads situated away from the road. Furthermore, they believe that electricity will only be installed in houses not roofed with thatch (because it is combustible). Irrespective of the validity of these beliefs, they have stimulated a minor 'road-side' housing boom and this in itself can have beneficial consequences.

Swazi also see a correlation between vehicle purchases, particularly in rural areas, and improved road surfaces. For example, in one community served by a road gravelled in 1976, 11 farmers had bought motor vehicles by 1980. Prior to 1976 there was only one vehicle-owner (the storekeeper) in the community. As noted earlier, vehicle ownership is seen as decreasing the 'risk factor' in small-holding farming. This can, and does, result in a greater diversification in land-use and entrepreneurial activity. An unconsidered aspect of the underdevelopment of rural communities is the type of crop grown. Unless farmers can market their own produce, and until they have acquired a knowledge of markets, they are 'obliged' to cultivate those cash crops for which an advisory and marketing service is provided. The only real alternative to this is wage employment. As has been noted, Swazi farmers are encouraged to grow cash crops which are labour intensive

(1) Field officers and extension workers claimed that increases in the number of farmers expressing an interest in Farmers Association membership corresponded with road improvement. They also claimed that the pattern of men seeking wage-employment outside the community had changed. Today it is mainly young men who do not have rights to land who tend to migrate. This viewpoint is supported in Swaziland (1979).

and which have export value (Derman 1977). Although peasant farmers do not calculate their labour costs in crop production, the relative labour intensity of these crops results in the exploitation of other avenues for deriving a cash income.⁽¹⁾ A motor vehicle - or even a regular bus service - allows for some marketing of perishable garden crops in the informal sector. This in turn encourages the cultivation of garden produce beyond the immediate needs of the homestead. It is interesting that teachers note a difference in learning ability between children who live in Rural Development Area (RDA) communities and those who do not. They point out that children from RDA communities are more 'active', i.e., do not fall asleep during lessons, more aware, better nourished and better dressed than other children. This they attribute to an overall improvement in output, particularly of garden produce (tomatoes, cabbage, spinach and carrots), increased employment opportunities within the community, and an increase in traffic (and therefore access to markets) generated by the road improvements that are associated with the RDA programme.

Road improvements result in the opportunity for higher levels of consumption. For the rural sector, consumption levels have a correlation with crop production. New avenues for wealth investment are created and this provides an incentive for increased crop production.⁽²⁾ The importance of this observation for long-term planning in Swaziland should not be underestimated. In rural communities individuals often invest capital derived from crop sales and/or wage employment on increasing cattle herds. As de Vletter (1979) notes:

"Although from a national perspective cattle must be reduced because of severe overgrazing, the acquisition of cattle from the individual's point of view is perhaps the best form of investment or saving: cattle are a good inflationary hedge, they multiply, are a source of food, can be easily converted to cash, are tax-free, and very cheap to maintain in terms of labour (family) and food (communal land)". (3)

- (1) The relative lack of employment opportunities for females might explain the emphasis given by women to commercial crop cultivation.
- (2) Though it should be noted that farmers often increase the acreage under commercial crop production without necessarily increasing the overall yield. This is because the increase in acreage under cultivation might over-extend available family labour.
- (3) See also Doran *et al* (1979).

Another factor relating time savings to rural development is the attitude of professional and schooled people to the relative attractiveness of urban amenities over rural conditions. It is rare in rural research to encounter professional or schooled people who relish rural conditions. This is particularly true for the more remote rural areas. However, here it must be emphasised that for a small country like Swaziland, remoteness is more a factor of accessibility rather than distance. It has already been noted that improved road conditions provide easier access to urban centres and such access ameliorates the attitude of professional people to rural postings. Thus, for example, teachers at one rural school reported that the recent improvement in the road linking the area with the nearest town meant that they could now bank their salaries whereas previously they could not meet banking hours. Further, while the negative effect that labour migration has on family life is well-documented, little attention has been given to the family life of professional people in developing countries. In Swaziland a rural posting for a professional person can disrupt the urban family whereas an urban posting can disrupt the rural family. The situation is compounded when both spouses are professional or in cases of polygyny. In a country with limited employment opportunities, vacancies are unlikely to open simultaneously to accommodate the professional couple and this does disrupt family life and the socialisation of children. In cases of polygyny, it is common for the husband to maintain both an urban and a rural home or two rural homes depending on his posting.

For professional people, then, the extent to which family life is disrupted is influenced by the ease or difficulty in travel and communication between separate homes - a factor certainly influenced by road development or the lack thereof. Professional people relate road improvements to easier access to urban amenities and to a better family life. It is clear that rural development would be handicapped if not impossible without professional services and schooled people. In as much as a positive or negative attitude to living conditions bears upon production/work, it must be reiterated that time savings should be considered within the context of general rural development stimulated by road improvement.

As grazing of herds is a political right in Swazi society, increasing cattle herds must inevitably result in serious overgrazing and an impoverishment of the natural environment. Paradoxically, a significant increase in a farmer's cattle herd often leads to a corresponding fall-off in his commercial crop production. It is clear from previous statements that commercial farming is considered by Swazi to be labour intensive with little or no leisure time. Consequently, if farmers can find no attractive alternatives to cattle for capital investment, it becomes almost inevitable for successful farmers to increase their herds to the point when the calving rate of the herd is sufficiently high to allow regular sales to meet immediate cash needs. Significantly, cash needs are not always inflationary as they do decrease (and increase) to an extent independently from inflation rates according to the development cycle of the family during which the ratio of effective producers to dependent children and elders varies. Improved roads allow for accessibility to a wider variety of consumer goods. This creates new status symbols in rural communities (brick/cement-block houses, motor vehicles, household furniture, etc.) and alternative avenues for capital expenditure. New status symbols which are declarations of relative wealth should not be equated with traditional notions of wealth such as size of cattle herd. Traditionally, inequalities in wealth were transformed into social standing through ancestral feasts, cattle loans, deferred lobolo (bride-wealth) payments and generous hospitality. In many ways the community benefited from and shared in the wealth of the rich, and wealth discrepancies were camouflaged through a similarity in lifestyle between rich and poor.

Modern avenues of capital expenditure such as motor cars, tractors and better housing are simply declarations of wealth. The community does not share in, or necessarily benefit from, this type of consumption. Indeed, it is usual for poorer Swazi to pay wealthier neighbours for the hire of transport, tractor ploughing, etc. Differences in lifestyle in rural communities are apparent and these have created aspirations towards new status symbols. Not only does this encourage a sustained agricultural effort to cope with consumption, but it also provides a partial answer

to ecological problems that are inevitable in the face of increasing human and livestock pressures on land.

For the rural sector, then, road improvements increase accessibility to markets, consumption levels, agricultural services and health facilities, and provide rural families with a wider choice regarding their participation in the cash-based market economy. It is important, therefore, that secondary road development in Swaziland be encouraged. The effect on the rural economy of an upgraded gravel road and a tarred road does not appear significantly different. Certainly, in terms of the rural sector and in a country where high speeds are curtailed both by law and unfenced land (animals on roads), it would not be appropriate to sacrifice an extended secondary road development in favour of a limited primary road development at the same cost. For the rural sector, time savings gained from road improvements are dramatic and have a positive effect on commercial crop production and the consumption of goods manufactured outside the local community.

4. CONCLUSIONS, QUESTIONS AND GUIDELINES

In this section we draw together the theoretical and empirical discussion of Section 2 and the anthropological fieldwork of Section 3, identify questions which require further consideration and suggest some interim guidelines for project appraisal in Swaziland.

Summary

A number of points stand out, namely, (i) there are different transport markets in Swaziland with a particularly notable difference between the Mbabane-Manzini road and other main roads; (ii) there are dual roles in the urban and rural economies; (iii) there are differences between Swazi commercial and subsistence farmers, and (iv) there is a unanimity with regard to the importance of time savings.

The Mbabane-Manzini road is the only one in Swaziland which is at present worthy of consideration for improvement to freeway standards. This is almost an urban road, linking as it does the two major urban centres of the country over a relatively short distance. Almost one-fifth of the total population - 105 000 out of 547 000 in 1979 - is located in the Mbabane-Manzini corridor (including the two towns themselves and their peri-urban or informal areas). There are, at short intervals along this road, the Matsapha industrial estate, the Kwaluseni educational area, the Mahlanya market, the parliament and national stadium at Lobamba, and the hotel/entertainment strip in the Ezulwini Valley. Detailed origin and destination (O&D) studies were undertaken yielding data on trip purpose, day, time, etc. It is therefore possible to apply differential time savings to different types of trips, distinguishing among work-based, home-based and other trips.

Although O&D surveys showing trip purposes on other roads still have to be processed, there is almost certainly a different trip profile. These roads carry mainly local commercial, industrial and agricul-

tural traffic, rural traffic and service traffic from the Mbabane-Manzini region, and there is little commuter and leisure traffic as such.

The anthropological survey showed the importance of cultural perceptions of time, the optimal use of time by Swazi farmers, the importance of good roads and a reliable transport system, the importance of motor vehicle purchases, the problems of distinguishing between working and non-working time, and the dual roles of individuals both in the urban and rural economy. Some of these observations are supported by a recent anthropological study among Swazi farmers (Sibisi, 1981). Three points in particular need further elaboration, namely:

- (i) Many urban workers use their weekends to work their rural plots and increase agricultural output. Many of these individuals own light delivery vehicles (LDVs), i.e., of approximately 1-ton payload capacity, and therefore LDV traffic over weekends on main roads is probably related not to leisure but to economic activity.
- (ii) In the case of Swazi commercial farmers, there appears to be little underemployment, and time savings can be used productively. For this part of the rural sector it is difficult to distinguish between working and non-working time, even over weekends. Saturdays and Sundays often represent the peak agricultural time for farm management, especially when the owner is employed in the urban area for the rest of the week. With regard to evening traffic, it is likely that this consists largely of vehicles returning from longer trips or on emergency business, e.g., visits to clinics and hospitals.
- (iii) For Swazi subsistence farmers, it seems that time savings would be important only for trips to clinics, etc.

A Suggested Approach

In the light of these points, it is suggested that the approach to time savings be as follows:

- (i) For all motor vehicles except cars, working and non-working time

should be treated equally.

- (ii) In the case of cars, an adjustment should be made for evening and weekend traffic as it is likely that this may represent mainly leisure travel.

It is further suggested that the evaluation of time savings for the different vehicle categories be approached as follows:

Cars: An estimate of the average income of car owners can be obtained from a variety of sources and then used to value the driver's time. In the absence of any data regarding passenger characteristics, it seems plausible to apply the mean income for all sexes in all occupations to adult passengers. There are no data on evening trip purposes; however, it is likely that evening traffic on rural roads may not be directly concerned with production, and this traffic could be ignored. Weekend car traffic is more problematic; Swazi-owned vehicles could indeed be concerned with agricultural affairs or used as informal 'taxis', but many cars are owned by expatriates who are arguably engaged in leisure trips on these days. Pending the analysis of trip data, however, it is suggested that the weekend be regarded as non-working time and that the custom of valuing such time savings at 25 per cent of working-time savings be adopted. This will probably mean an under-valuation of weekend time savings, but it is better to err on the conservative side in CBA.

Light delivery vehicles: LDVs (or 'bakkies') are reported to be the most popular vehicle among Swazi buyers. They are cheaper than cars and can be used to carry not only goods but also passengers who are often charged a fare. In the latter case, the vehicle is a source of income for its owner. Many urban Swazi own bakkies and use them for travel to and from their rural homesteads; the purpose of such trips is often of a business nature even though they may be made over weekends. LDVs are also popular as company vehicles, e.g., on the sugar estates, and their presence on the road over weekends is also probably due to business, not leisure. Thus all LDV trips are treated as working-time travel. No occupational or income profile of drivers or occupants is available. Some drivers may be skilled workers or professional persons, others small far-

mers. The average income of drivers was taken as the average income of persons in wage employment from the semi-skilled category upwards. The shadow wage rate could perhaps be applied to passengers on weekdays (on the assumption that many are unskilled workers, e.g., loaders or school-going children), but over weekends it is likely that the average vehicle occupancy may increase and that the passengers may have a higher income profile than during the week. In the absence of further information, it seems reasonable to apply the driver's income to each adult passenger over weekends.

Other light commercial vehicles: Data are available in respect of the wages paid to drivers of other light commercial vehicles (LCVs), e.g., 2½-ton trucks and small buses with a capacity of 25-35 seats. The application of the shadow wage rate to truck crews is recommended but this may be conservative when applied to bus passengers. However, it appears the best available measure.

Heavy commercial vehicles and large buses: Drivers' wages are subject to minimum-wage legislation and may be obtained from fleet operators. The use of the shadow wage rate in respect of crew and passengers is suggested as in the case of LCVs.

Foreign-registered vehicles: A fair proportion of traffic on Swaziland's roads consists of vehicles registered in South Africa or Mozambique. Cars and small commercial vehicles such as Kombis may safely be regarded as tourist traffic (businessmen who stay overnight at hotels being regarded as tourists) and, since a separate calculation is undertaken in CBA for benefits from tourism, may thus be omitted from the calculation of time savings. All other vehicles may be regarded as being on working trips which contribute to production, and time savings may thus be valued on the same basis as for locally-registered vehicles.

Additional Data Requirements

This would seem to provide a workable set of guidelines until such time as more detailed data become available. A data collecting survey has recently been undertaken with a view to establishing:

- (a) type of vehicle;

- (b) capacity of vehicle (bus, truck);
- (c) load factor (bus, truck);
- (d) number of occupants divided into adults (16 years plus) and juveniles;
- (e) purpose of trip;
- (f) activity at origin and destination of trip, e.g., home to work, urban home to rural home, etc.;
- (g) day of week;
- (h) time of day; and
- (i) nationality of driver and of vehicle registration.

Ideally, one would also need data regarding occupations of vehicle occupants. However, O&D studies should not delay vehicles for any longer than necessary and questionnaires should consequently be kept as short as possible. It would, for instance, be impractical to obtain this information in respect of bus passengers.

From the evidence available in Swaziland, it seems that there is a consensus of opinion both in urban and rural areas which places a positive value on time savings. Further in-depth investigation is planned, but in the meantime there seems to be no reason not to grasp the nettle and to include the valuation of time savings in cost-benefit analysis. This is the approach we would recommend. However, sensitivity analysis should be undertaken excluding time savings as a benefit so as to show the impact of this factor on the internal rate of return.

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