



Final Report
Application of Threshold 21 to
MOZAMBIQUE
July 25, 2003

For Review and Comment

I. Background

The Carter Center has been working with the government and civil society in Mozambique to complete a National Development Strategy exercise. As part of this exercise, the Agenda 2025 Committee was formed. It is comprised of members of many stakeholders in Mozambique's development, and it has held extensive consultations throughout the country about the options for the country's development strategy. The Agenda 2025 strategy was presented to the President of Mozambique on June 25, 2003. At that time, it was agreed that further consultations would be held to discuss the strategy and to develop an action plan to translate the strategic goals into an Action Plan.

Members of the Agenda 2025 Committee attended the Carter Center's Development Forum June, 2002 where they saw a demonstration of the Threshold 21 Model, a strategic analysis tool developed by the Millennium Institute (MI). In conjunction with other countries working with the Carter Center, they requested a formal evaluation of the model as a potential instrument for their National Strategic Planning exercise. This evaluation was undertaken, and it was confirmed that the T21 model would indeed be a valuable tool for their exercise.¹

Based on this evaluation and on the Carter Center's own appreciation of the model, the Carter Center engaged MI to adapt a version of the T21 model to Mozambique's exercise and to train a team of Mozambicans to use the model. A representative of MI (Jed Shilling) visited Mozambique in February, 2003 to meet with Agenda 2025 members and other interested parties, to identify the key questions that the model would be adapted to address, to collect data, and to present the model to a number of interested parties. MI staff developed an initial version of the T21-Mozambique model (Version 3.1) during March.

¹ The T21 Model and National Development Strategies, by Roger Norton for the Carter Center, November 2002

A team of six Mozambicans from the Ministry of Finance and civil society groups (the Mozambican Debt Group (MDG) and LINK (a national NGO forum) spent the first two weeks of April in Arlington learning how to use the model and working with the MI staff to further revise, calibrate, and adapt the model to Mozambique's needs. Their understanding and analysis of the issues faced in Mozambique contributed a great deal to the selection and design of the alternative policy choices included in the model. These contributions illustrate the importance of involvement of local experts in the application of the model to specific countries. The resulting model is the T21-Mozambique model Version 3.2.

During May 4 – 14, 2003 two MI staff (Jed Shilling and Weishuang Qu) visited Maputo, Mozambique for the presentation and use of T21-Mozambique v3.2 for Visioning Exercises, Policy Formulation, and Consultations with Civil Society. The use of T21-Mozambique in policy formulation and analysis processes was demonstrated. The presentations were attended by users and stakeholders from the Agenda 2025 Committee, government agencies, representatives of civil society, donors, and parliamentarians. The reactions from the participants provided guidance and advice for further revisions of T21-Mozambique into v.3.3a. After receiving data required for the revisions, MI staff modified the T21 Mozambique model into Version 3.3a.

This version, T21 Moz-3.3a, is described below and was delivered to Agenda 2025 on May 14, 2003. A Portuguese version of the model and script was provided shortly thereafter to facilitate use in consultations with Civil Society. We are currently seeking additional resources to provide advanced training and additional modifications of the model in order to assure that Mozambican experts are able to modify and add to the model and use it effectively for planning and consultation exercises in the future. In particular, additional training is being planned to enhance the ability of the Mozambican team to use the model effectively in the consultations being undertaken to create the Action Plan. (previous wording, “enable team to use it more wisely” could appear to be critical) A key objective of this project is to fully transfer the capacity to use the model to Mozambique.²

II. Summary of principles of the model

The Millennium Institute's Threshold 21 Integrated Development Model is designed as a transparent analytic tool to support strategic planning. The model:

- Integrates economic, environmental, and social elements through a holistic systems approach;
- Facilitates participation and builds consensus through an easy-to-understand, diagrammatic interface;
- Adapts readily to country-specific issues by sophisticated processes that fit the model to country data and accommodate structural modification;
- Informs long-term development strategy by simulating future impacts of alternative policy scenarios and demonstrating results transparently; and

² MI will provide technical advice on an ad hoc basis as needed in the future.

- Produces output for key policy documents such as the National Development Strategy, the World Bank's Poverty Reduction Strategy Papers (PRSPs), the Millennium Development Goals (MDGs), and the UN Development Assistance Framework (UNDAF).

The T21 Model has been developed over many years to address issues of sustainable development and integrated approaches to policy formulation. It is based on system dynamics and uses the powerful Vensim modeling software. This software rapidly solves large and complex models and presents the results in a transparent, graphic manner. The model produces quantitative and graphic results over 5-50 year time horizons. Twenty-five years is used in this exercise to correspond to the time-frame of Agenda 2025.

The model's open structure and easy-to-use interface can show the time path of any variable or set of variables over the time horizon being considered. The model demonstrates the impacts of policies or structural changes and encourages graphic comparison of the impacts of different policy or structural choices. This greatly facilitates dialogues on these options and alternatives within the government, with civil society, and with partner aid agencies. Using the model to evaluate potential impacts from different programs or strategies under consideration assists in the processes of making better strategic choices and of discussing these choices in consultation with Civil Society and other stakeholders. The model also allows users to establish results based targets and to monitor and evaluate progress toward these objectives.

The T21 model includes a full range of feedback links across sectors and variables. For example, increased government spending on education results in higher literacy, which leads, with appropriate lags, to higher labor productivity, output, and tax revenues. The model can examine the effects of different policies affecting income growth on population growth rates, employment, and poverty. The full integration of the different sectors and the ability to track impacts of different policy choices make the model an ideal tool for designing well-integrated strategies and for examining the implications of the policy options facing the government in the context of a broad development framework.

III. Challenges Facing Mozambique, the Base Case

As a reference for evaluating strategic options and to validate the structure and parameters of the model, a base case is constructed using historical data. It is used to replicate the past as a check on the accuracy of the model structure and to run the base scenario that assumes no changes in Mozambique's policies in the future. Changes in policies can then initially be compared to this case. Later in this report, we will discuss five cases elaborated by the Mozambican team and compare them with the base case.

Since 1995, Mozambique has seen steady growth, low inflation, and strong foreign support in grants and loans. In this case, we assume that basic parameters supporting this growth continue, that foreign support is maintained at the current level, and that there are no major domestic disturbances (such as war), big natural disasters, and international shocks. The baseline scenario shows continued growth in real GDP with an average annual rate of about 3.5 – 4%. However, the growth rate is declining from about 7 to 8%

in the near future, to less than 2 % towards 2025. Government real revenues will also grow at a similar rate. Without further stimulus, agricultural growth stays low, and there is not enough demand to accelerate the industrial investment, so growth declines.

On a per capita basis, growth is slower, averaging about 1.5%. Approaching 2025, the per capita growth begins to turn flat. This is due to continued fast population growth of about 2.4% annually in conjunction with the declining overall growth rate. The total fertility rate does decline, but very slowly, from about 5.9 in 1997 to 4.9 in 2025. In 2025, the population age cohorts still show a wide and expanding base to the pyramid structure, which indicates fast population growth will continue beyond the year 2025.

With fast population growth, the government faces the challenge of creating employment opportunities for its fast growing labor force. Using 15 to 59 as the working age, the labor force in Mozambique will increase by almost 50% during the 22 years from now to 2025, from about 8 million now to about 11.6 million in 2025. With no change in the development strategy, not enough job opportunities will be created in either the urban or the rural areas.

There will be some reduction in poverty, but it will remain a problem. The percentage of households below the poverty line will decline to about 25% for rural areas and about 11% for urban by 2025. That constitutes a significant decline, but less than what is desired. And there will be little potential for further reduction. The actual number of people living below the poverty line will remain sizable – about four million in the rural areas and about one million in urban areas. The big income gap between rural and urban will remain. Average rural households will earn about one third as much as their urban counterparts.

Government debt will steadily grow, from over 6 billion \$US now to about \$8 billion. The still high HIV adult prevalence rate (about 14.0% now) will grow to 15.6% in 2009 and then gradually decline, if the continued extent of poverty and limited opportunities do not lead to a resurgence of the infection rate and if our current assumptions about prevalence and infection rates are correct. Annual HIV infection will remain around 200,000 cases. Adult literacy rates for both female and male will gradually increase to about 80% for male and 60% for female by 2025.

The non-renewable resources of minerals, fossil fuels, and sand will decrease, while pollution emissions will increase. More data and studies are needed to address these sectors adequately in T21 for Mozambique.

Table 1: GDP, population, and per capita GDP

Time	1995	2000	2005	2010	2015	2020	2025
GDP in million MZM95	20674100	30704900	45841200	60743500	73414900	83550500	91546400
Average annual growth		8.23%	8.35%	5.79%	3.86%	2.62%	1.84%
total population	15574600	17449000	19006100	20349300	21693300	23183800	24887300
Average annual growth		2.30%	1.72%	1.38%	1.29%	1.34%	1.43%
Per Capita GDP in M MZM95	1.33	1.76	2.41	2.99	3.38	3.60	3.68

Average annual growth		5.80%	6.51%	4.36%	2.54%	1.27%	0.41%
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Table 2: Population and HIV/AIDS cases

Time (Year)	1995	2000	2005	2010	2015	2020	2025
total population	15574600	17449000	19006100	20349300	21693300	23183800	24887300
Average annual growth		2.30%	1.72%	1.38%	1.29%	1.34%	1.43%
rural population	11369500	12613100	13486100	14085200	14638300	15240800	15927800
Average annual growth		2.10%	1.35%	0.87%	0.77%	0.81%	0.89%
urban population	4205140	4835870	5520030	6264040	7055050	7942980	8959410
Average annual growth		2.83%	2.68%	2.56%	2.41%	2.40%	2.44%
HIV/AIDS population	449910	1031950	1334130	1507680	1581740	1600600	1567520
Average annual growth		18.06%	5.27%	2.48%	0.96%	0.24%	-0.42%

IV. How the Model Addresses These Issues

MI staff worked with the six technical people from Mozambique to develop an initial adaptation of the model to Mozambique (v3.2). After MI staff visited Maputo, Mozambique to demonstrate the use of the model for policy formulation, it was further modified (v3.3a). The discussions and analyses about the model structure focused on the questions of how best to achieve poverty reduction in an equitable manner, to provide adequate social services in the context of the current economic environment in Mozambique, and to measure the consequences of HIV/AIDS reduction. In addition to adapting the basic structure of the model with the parameters derived from the country data and experience of the technical team, the following sectors/components were added to the model to address issues determined to be of great importance to Mozambique and its on-going planning process:

1. Expanding micro credit to enhance urban income earning opportunities,
2. Building new roads to increase income earning potential in rural areas,
3. Increasing agriculture extension services to raise farmers' incomes,
4. Strengthening family planning programs and enhanced skills training in social services to slow the rapid population growth; and providing more vocational training to increase the skill and productivity of current workers,
5. Enhancing anti HIV/AIDS measures to reduce the HIV infection rate and its consequences,
6. Modifying the rate of implementation of mega projects to reflect alternative paths for the program of major projects under consideration, and
7. Examining the effects of combining several of these scenarios.

The first three additions are directly aimed at means to reduce poverty. The fourth will improve living standards and help slow population growth to allow faster growth of per capita income and reduce the dependency ratio. The fifth will measure the consequences of HIV infection reduction policies. The sixth will allow analysis of impacts of different rates of implementation of the proposed mega projects to see how much they actually

contribute to the improved standards of living of the Mozambican population. The following sections describe each modification in more detail.

1. Micro Credit Sector:

For poverty reduction in the urban area, there is a consensus that developing more locally based, labor-intensive businesses to provide more employment opportunities for the poor will help develop a national class of entrepreneurs, some of whom may be able to expand their enterprises to develop a national industrial base. Building on MI's experiences in other countries (Bangladesh, Indonesia (Papua)), a Micro Credit sector was added to T21.

The Micro Credit Sector employs a process where the government makes small, low interest loans and training available to entrepreneurs to start and operate their businesses. The micro credit funds are made available from government expenditures. The model allows the government to allocate up to 5% of its expenditures to micro credit activities, including loans, training, and administration. Other expenditures are reduced by the amount allocated to micro credit so as not to affect the overall budget deficit. It is further assumed that micro credit loans have a payback period of three years, and their default rates are related to interest rate, such as at an interest rate of 6%, the default rate will be 10%. The higher the interest rate, the higher the default rate. These assumptions can be later modified to reflect different estimates of the effectiveness of the program.

Micro credit loans will finance small enterprise investments. Micro credit capital will grow with the investments and decline with micro credit depreciation. The capital in small enterprises supported by the credit program will generate value added at the rate of 20% (meaning every million MZM in capital will generate 0.2 million MZM annually in value added) and generate one employment position with every \$1,000 (about 9 million MZM95) of capital created.

In an initial example, a scenario was run in T21 with 5% of government expenditures spent on micro credit programs. The direct effects of the expansion of micro credit benefit urban income. This generates higher GDP, which then leads to higher government revenue, and related indirect effects of that higher revenue on the rest of the economy over time. The most pronounced consequence is in urban employment: by 2025, about one million additional jobs will be generated by micro credit programs.

This option also generates about 3% of urban income, improves urban Gini coefficient by about 1.5%, and reduces urban proportion under poverty by 2%. To the extent that some micro enterprises grow beyond the scope of the program, even more benefits will result.

Although all of the government's other expenditures are proportionally reduced by 5%, actual expenditures in other sectors do not fall that much, as total government revenues grow more rapidly with the micro-credit program. This positive feedback loop mitigates one of the negative effects of this program.

Figure 1: Urban employment comparison between Micro Credit and Base cases

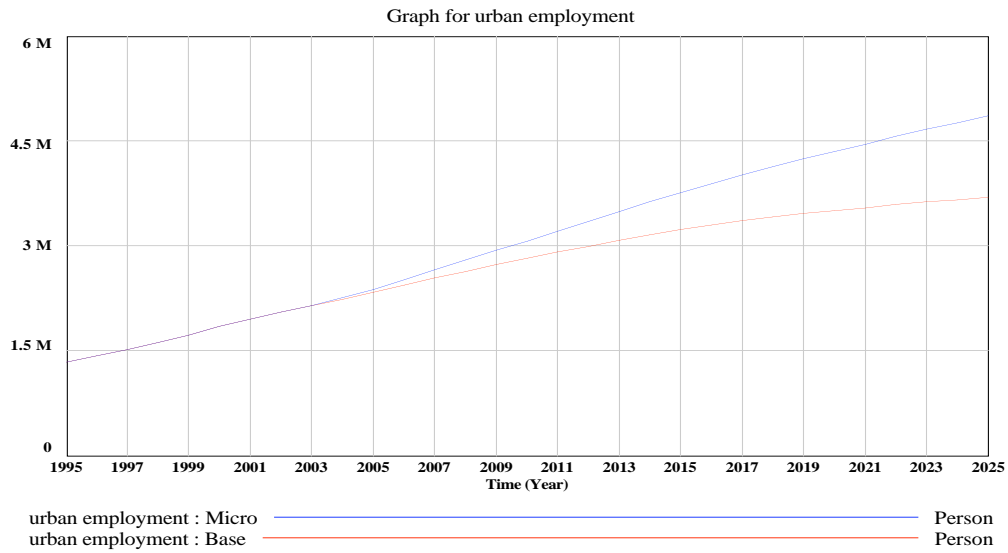
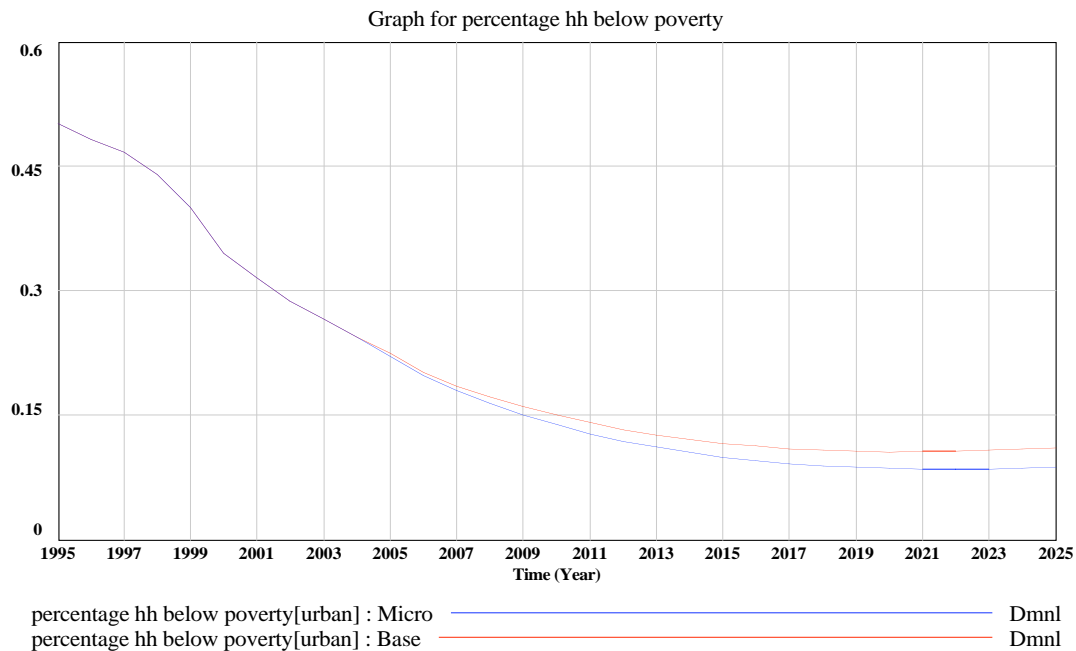


Figure 2: Poverty comparison between Micro Credit and Base cases



2. New Roads Sector

The rural areas in Mozambique face a range of challenges. The northern and central part of the country has fertile land for farming, but the infrastructure, especially road infrastructure, is inadequate. There are high transportation costs, and poor access to information about market opportunities. This adds greatly to marketing costs and uncertainty, and, as a result, most potentially marketable products from the region are

uncompetitive, and farmers essentially live on a subsistence basis. With new and improved roads, it is believed that the production and marketing potential in this area will be greatly expanded, allowing farmers to earn higher incomes. On the other hand, new roads could lead to more HIV infection in the areas close to the roads. A road sector was developed and added to T21 to explore the cost and benefit of building new roads in this region.

Two road programs are included: a northern road program that will build 500 km of roads, and a central road program of 300 km. Each road opens up surrounding agricultural lands to easier access to markets. When these roads are completed, the transportation cost of farm produce from the near-by areas will be reduced and farmers will have better information about market demand and prices. The lower cost of products delivered to markets will stimulate demand and production in these areas.

In running new road scenarios, it may be assumed that funds for building the road come either from external financing or from domestic financing, with the expected impacts on external debt or the government's investment budget. Maintenance costs for the new roads are included (\$4,000 or about 36 million MZM95 per km annually) and will come from government expenditures. These roads will substantially decrease the transportation cost of farm produce, and consumer prices will be accordingly reduced. Demand for the farm produce will grow with the drop of its consumer price, at a rate determined by the price elasticity for food crops (negative 2). As agriculture production potential exists in these areas, the rise of demand will be met by more production. The areas opened by these roads are assumed to be a band extending about 25 km on either side of the roads.

Within the covered areas, this represents about 30% is farm land.

Completing these two roads will open up enough land to increase the current amount of productive land in Mozambique by 25%. In the opened up areas, transportation costs are reduced from 33% of total cost to 25%, lowering the consumer price, driving up demand, and then production.

But with new roads, HIV transmission could be accelerated among the people living close to the roads. The model assumes that if no preventive measures are adopted, HIV infection rate will rise 20% in these areas. With higher HIV prevalence rate, the labor productivity will be negatively affected, thus reducing the economic benefit of the new roads.

The net results of the positive and negative factors are: Agricultural production in the areas that benefit from the new roads will ultimately rise by 22%. With this production increase, rural incomes will grow. As a result of their higher incomes, the farmers will increase their demand for products from industry and services, and their production will grow as well. Real per capita GNP will be 2% higher than the baseline by 2025, and rural employment will be 4% higher. Proportion of rural population under poverty will be 1.4% lower. But adult HIV prevalence will be 1.4% higher by 2025.

Figure 3: Agriculture production comparison between New Roads and Base cases

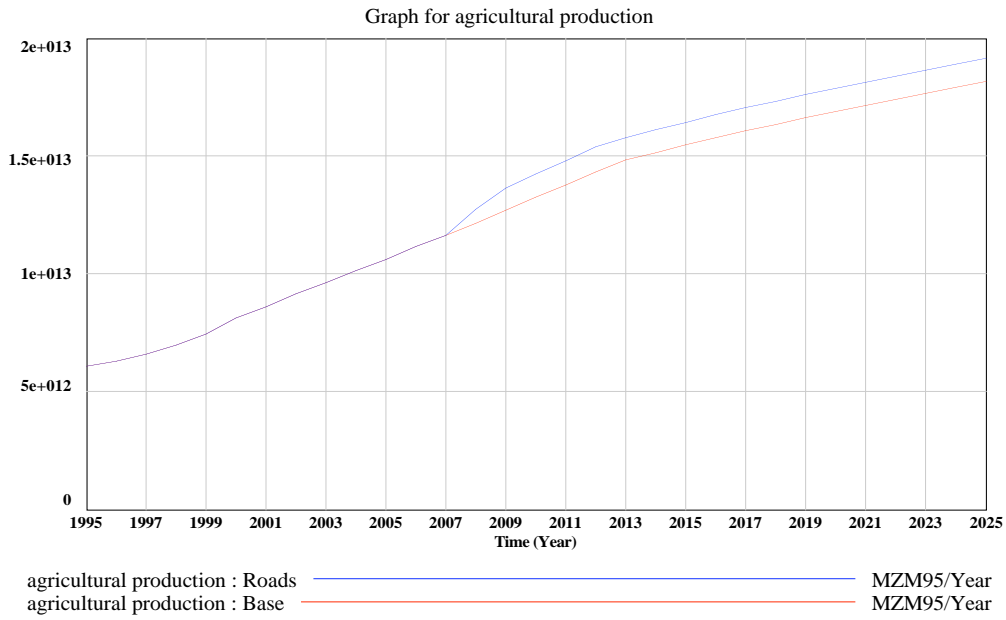


Figure 4: Rural poverty comparison between New Roads and Base cases

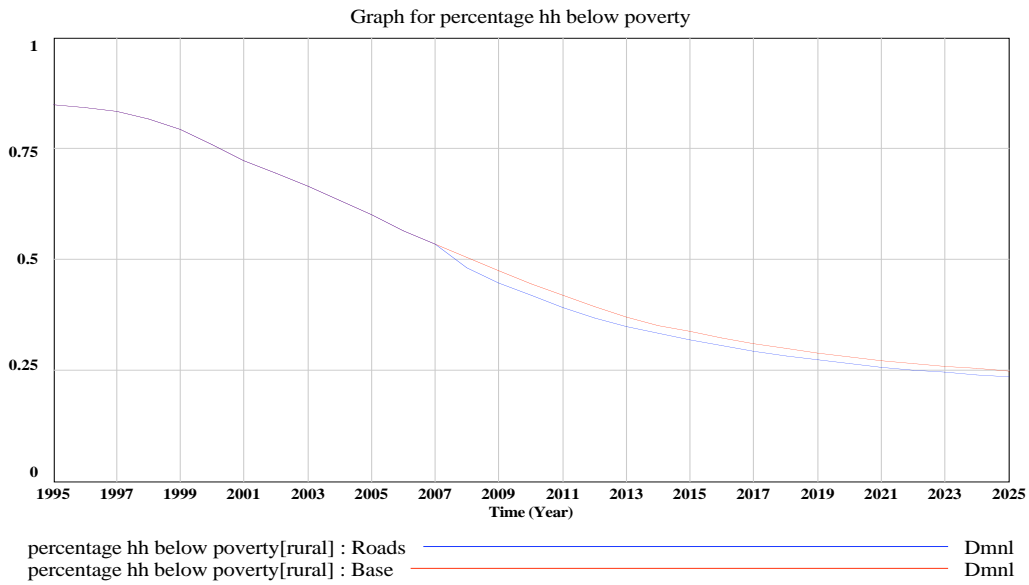
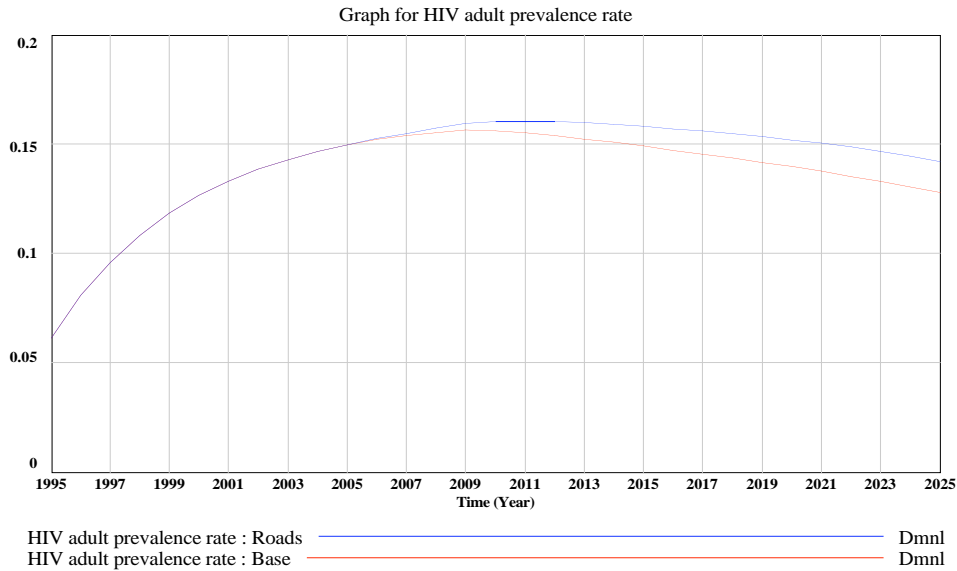


Figure 5: HIV prevalence comparison between New Roads and Base cases



3. Agriculture Extension Services

In the rural areas around Maputo and other towns, the basic infrastructure is already in place. However, farmers, especially small farmers, need more assistance in improving their knowledge and skills, and they need better access to inputs such as seeds and fertilizer. These are the kinds of services that would be provided by an agriculture extension service. To examine the potential benefits of better extension services, a sector was added to T21 to analyze the possible consequences of increased effort in such agricultural extension services to support small farmers. It is assumed that the detailed structure of the extension services are adapted to the needs of the farmers and reasonably well executed.

The government currently allocates a small portion of its expenditures (1% or less) to support agriculture extension services, which covers about 10% of the agricultural land in use. It is believed that when this coverage percentage grows, it will help increase yield and expand the agricultural land in use.

In this scenario, it is assumed that the government increases its expenditures on agriculture extension to 5% of its total expenditures, others being reduced proportionally. Expanding this service to an additional hectare of land used by a small farmer requires about 2 million MZM95 (about \$220). The amount of additional land covered depends on the size of the incremental expenditure.

With 5% of total government expenditures spent on agriculture extension services, the land covered by this service will grow to about 3 million hectares in 2025. This is equivalent to about two-thirds of the total agricultural land in use at present (about 4.5 million hectares). However, due to population growth, the amount of land under

cultivation will grow to about 5.8 million hectares in 2025. By then, over 50% of the land under cultivation will be directly assisted by the extension service. As a result of these services, the average yield will increase about 20% over the baseline result, to 3 tons per hectare. Agriculture production will be about 22% higher than the baseline by 2025, rural average household income will be 12.5% higher, and rural Gini coefficient will be substantially improved (about 3% lower than the baseline). As a result, the percentage below the poverty line in the rural area will drop from 25% in 2025 for the baseline to about 16%, a 36% reduction. This assumes that the provision of these extension services is effective. However, this presents an example of how T21 can be used for monitoring and evaluation. The actual results in the initial period can be compared with the assumed effectiveness to see if the agricultural extension service is doing its job effectively. If not, other measures would have to be taken.

Government expenditures in all other parts will be proportionally reduced by 5% at the start of this strong support to agriculture extension services. However, like the expenditures on urban micro credit, the strong positive feedback of the resulting increases in agricultural production and incomes will lead to higher GDP growth and to higher government revenues. This growth in government revenues will be strong enough that resources available for expenditures on the rest of the government budget will almost reach those available in the base case by the year 2025.

Figure 6: Rural household income comparison between Extension and Base cases



Figure 7: Government revenue comparison between Extension and Base cases

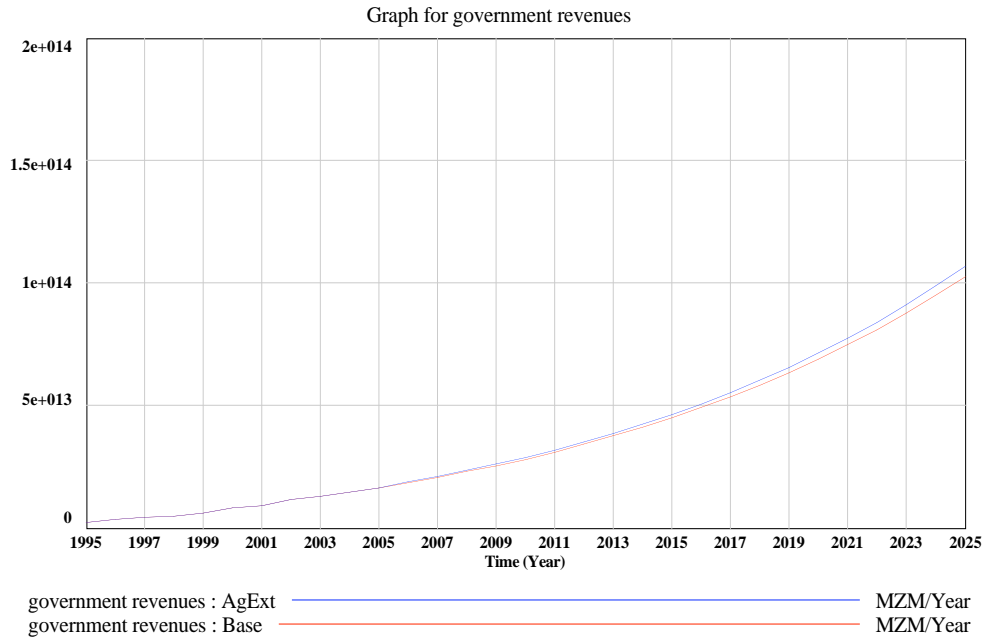
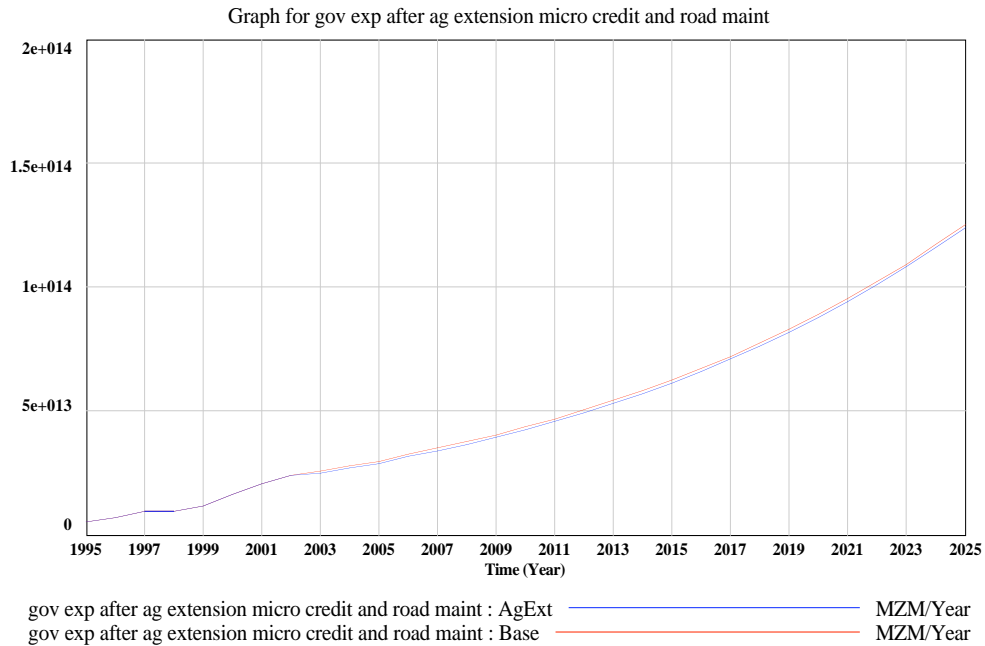


Figure 8: Gov. non-extension expenditure comparison between Extension and Base cases



4. Social Service Components

Two components were added to T21 to extend its coverage of social services. In view of the high total fertility rate projected by the baseline of the T21 model, a family planning

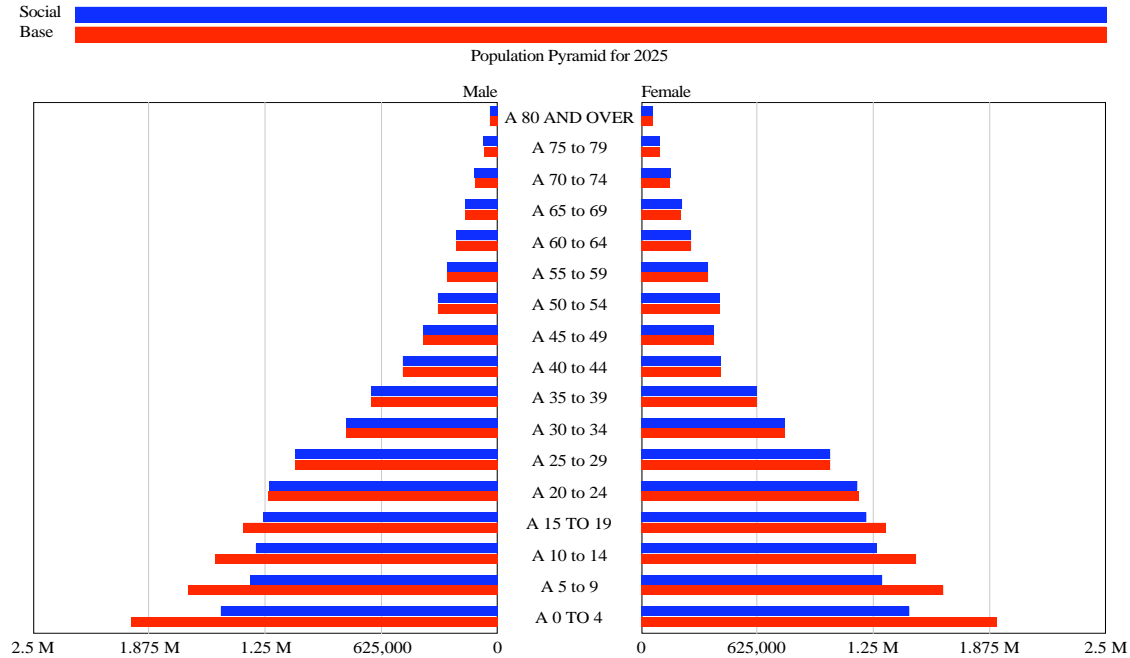
component was added to the health care sector to increase the contraceptive prevalence rate. And in view of the relatively low productivity in industry and services, a training component was added to the education sector to enhance skills of adults in order to promote the growth of productivity of workers in industry and services in the near term.

In this case, it is assumed that a national family planning program is launched in 2003, using 40% of the government's health care budget. This program is assumed to be effective enough to increase the contraceptive prevalence rate to 62% by 2025, compared to 32% generated by the baseline in 2025. Total fertility rate will drop to 3.6 by 2025 compared to 4.9 from the baseline.

It is also assumed that 10% of the government's education budget will be allocated to skills training. It is assumed that the cost of training each worker is about 2 million MZM95 (about \$220). By 2025, almost 3 million workers will be trained. As a result productivities in industry and services will gradually increase, to about 5% over the baseline in 2025.

The consequences on the size of the total population will take time to emerge. The population will reach 22.7 million in 2025, instead of 24.9 million for the baseline, a reduction of only 9%. But the population age structure for 2025 shows a more interesting result. Lowering the fertility and birth rates has almost all of its impact on the bottom of the population pyramid. The rest of the population matures as before. The smaller young age cohorts mean that the future population size and growth after 2025 will be much smaller, putting less pressure on the country's resources and allow income per capita to grow faster. The dependency ratio will fall and the workforce will have a smaller total population to support. Per capita incomes will surge as the productive population will not have shrunk and the growing output will be spread over a smaller total population. Consumption can grow and there will be more resources to invest in capital to raise future growth. This kind of an opportunity occurs once – when the population growth rate decelerates sharply. And it is important for the country to take advantage of it to concentrate on accelerating growth.

Figure 9: Population pyramid comparison between the Social and Base cases



The blue (upper) bars represent the 5-year age cohorts that results from the expanded family planning and enhanced training (most of the change is the result of family planning for these variables). The red (lower) bars are from the baseline. It is clear that if family planning programs are introduced now, in 22 years from 2003 to 2025, age-cohort differences will only happen to under 22 year olds. The much smaller population of ages 1 to 22 will substantially reduce the employment pressure facing the country in the years ahead.

Real GNP of this case is only 4% higher than the baseline in 2025. But per capita income shows a much larger gain and is about 14% higher in 2025.

There are costs to this option. As a substantial fraction (40%) of government health care funds are diverted to family planning programs, general access to basic health care will suffer. Also as 10% of public educational funds are shifted away from school education to job training, entrance rate will decline a little, while dropout rate and repeat rate will increase a little, and the rise of adult literacy rate will be slowed down a little. These negative factors can also be examined in the model to determine whether the benefits are worth the costs. With somewhat higher GNP growth, some of these costs can be offset. And in these areas, it may be possible to secure additional external financing once the benefits can be demonstrated and once a reliable program is designed.

5. HIV/AIDS Sector

Although the Mozambique government has started its HIV/AIDS prevention efforts, it is projected that the annual HIV infection will remain high, at about 200,000 new cases

each year from now through 2010 (see “HIV Moz.Eng.final version 02.pdf”). As a result HIV prevalence rate will rise to 15.6% in 2009 and stay at levels above 13% for most of the years through 2025.

In this scenario, it is assumed that the government will work with civil society and donors to start an effective HIV prevention program in 2003 that will gradually reduce the infection rate by 20% each year. With less people infected with HIV, and each HIV patient having a 20% less chance to infect other people, the combined effect on reducing the HIV adult prevalence rate is very striking, perhaps even astonishing: It will reach 5% by 2025. Due to less people dying of AIDS, total population will rise to 26.8 million in 2025 (24.9 million for base case), and the population pyramid for 2025 shows that there will be more people in the working age who will also be healthier, which will contribute to economic growth. Real GNP will be 7% higher by 2025 than the base case. On a per capita basis, the gain on GNP growth will be eventually overtaken by population growth as shown in Figure 13. This indicates that the HIV prevention program should be integrated with a family planning program to achieve the optimal results.

Figure 10: HIV prevalence comparison between the HIV and Base cases

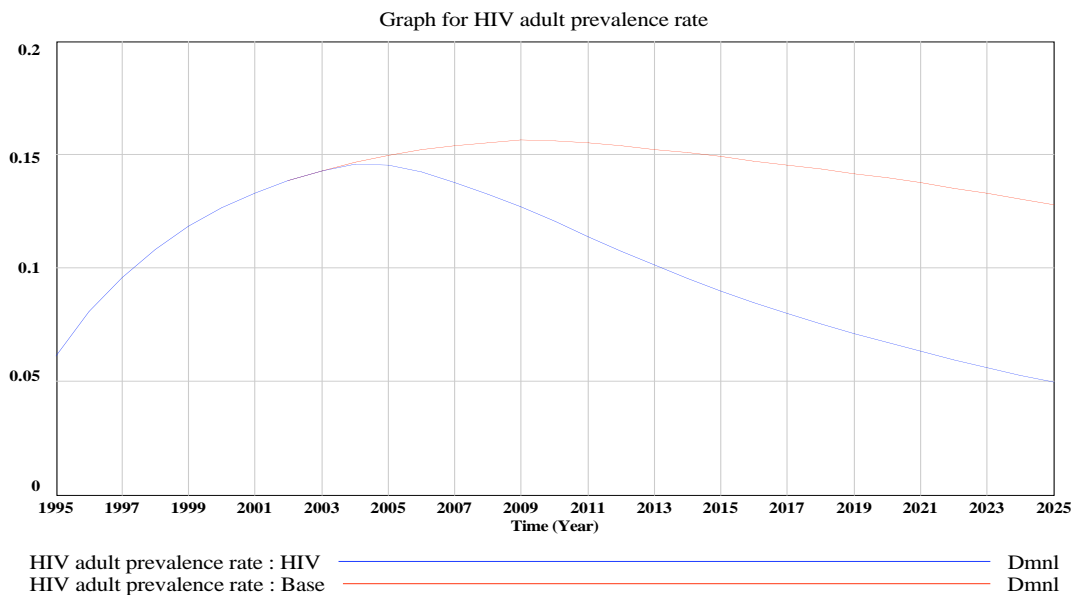


Figure 11: Population pyramid comparison between the HIV and Base cases

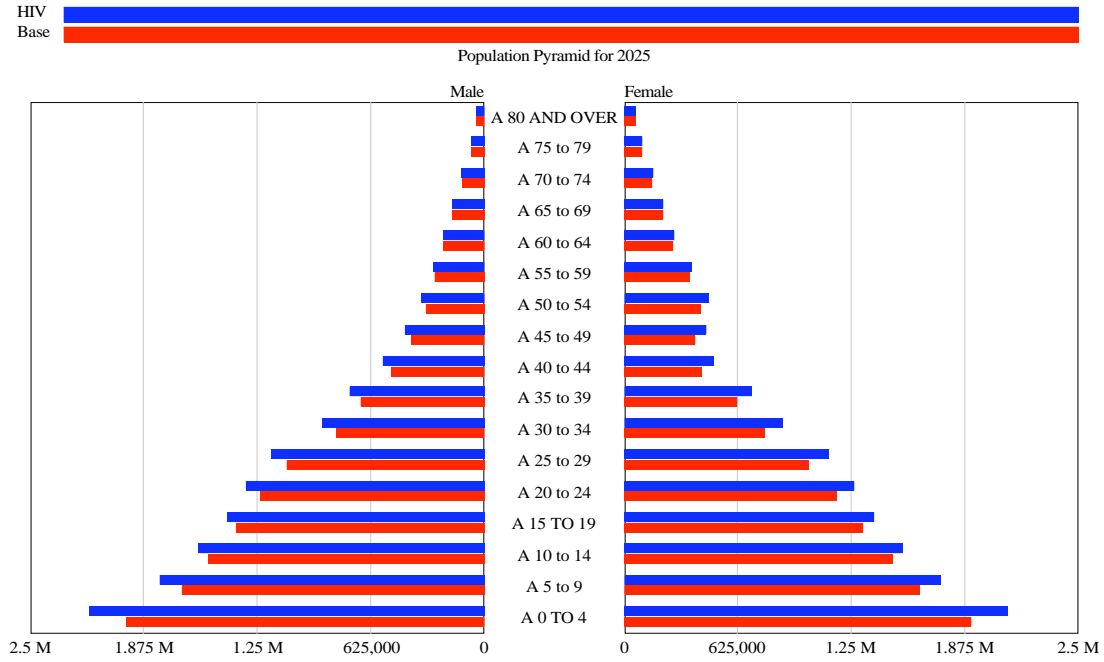


Figure 12: Real GNP comparison between the HIV and Base cases

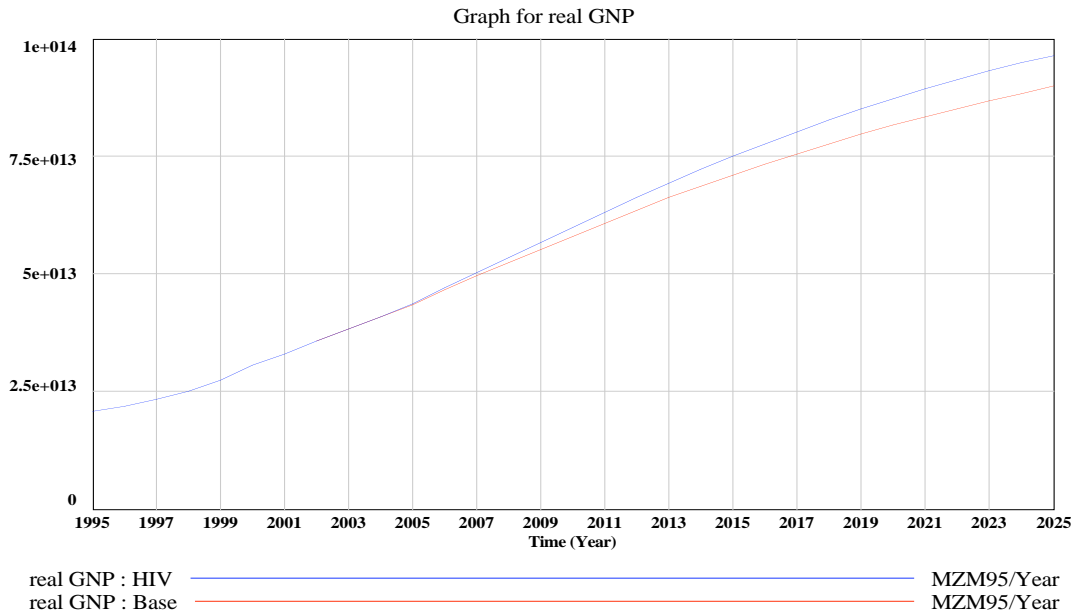
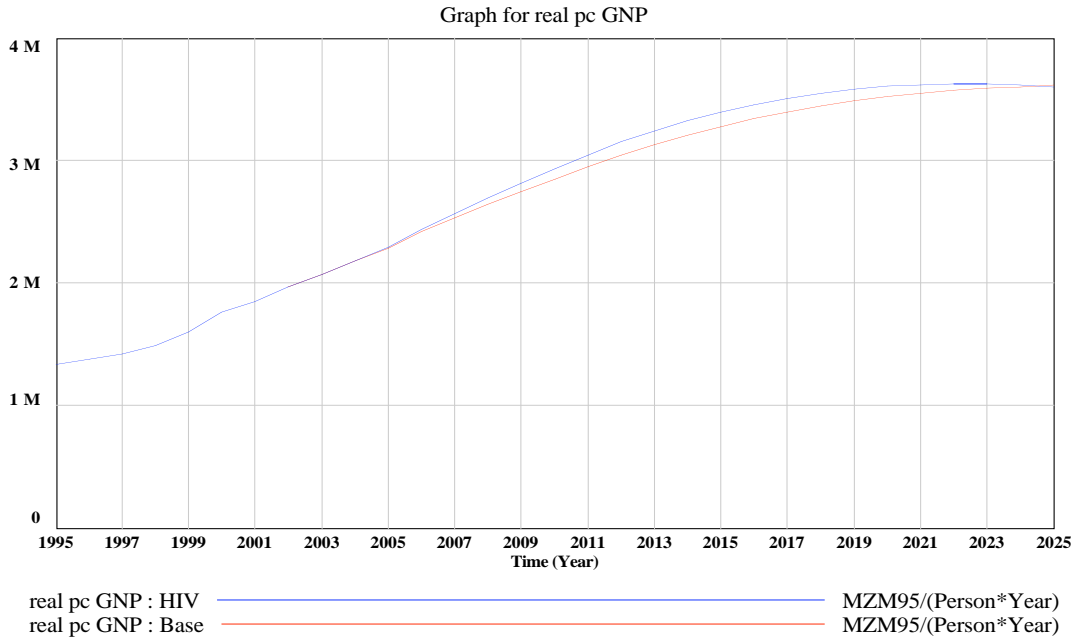


Figure 13: Per capita real GNP comparison between the HIV and Base cases



6. Mega Project Sector

The Mega project sector in T21 includes Mozal Phase 1, Mozal Phase 2, Natural Gas project in Temane and Pande, the Chibuto Sand project, and the Moma Sand project. More Mega projects can be included later when data is available. Based on our data, Mozal Phase 1 was started in 1998 and completed in 2001, Mozal Phase 2 was started in 2001, Natural Gas project in Temane and Pande started in 2002, and the Chibuto Sand project and the Moma Sand project are yet to be started.

In the base case, it was assumed that the first three Mega projects are being implemented, as they have already begin, but that the last two Mega Projects are not implemented. In this Mega project case, we assume that the last two Mega projects will be started in 2003.³ Real GDP in the Mega case will be 5.8% higher than the base case in 2025, while the real GNP will only be about 3% higher. This demonstrates the extent to which about half of the benefits of these projects accrue outside of Mozambique. Since GNP is a little higher, and the projects may generate specific additional revenues to the government beyond the normal taxes generated by higher GNP, it may be worth considering them as a source of financing for the programs outlined above.

These choices would have to be carefully considered and one would have to be sure that the additional revenues were indeed spent of broadly beneficial projects and not simply on added infrastructure and other activities to benefit the project themselves. The model could be extended in a future modification to examine these options in more detail. In

³ As with other alternative scenarios, the year in which the new activity begins can be varied.

addition, the impacts of the Mega projects on environment need to be studied and then included in T21 in the next stages.

Figure 14: Real GDP comparison between Mega and Base cases

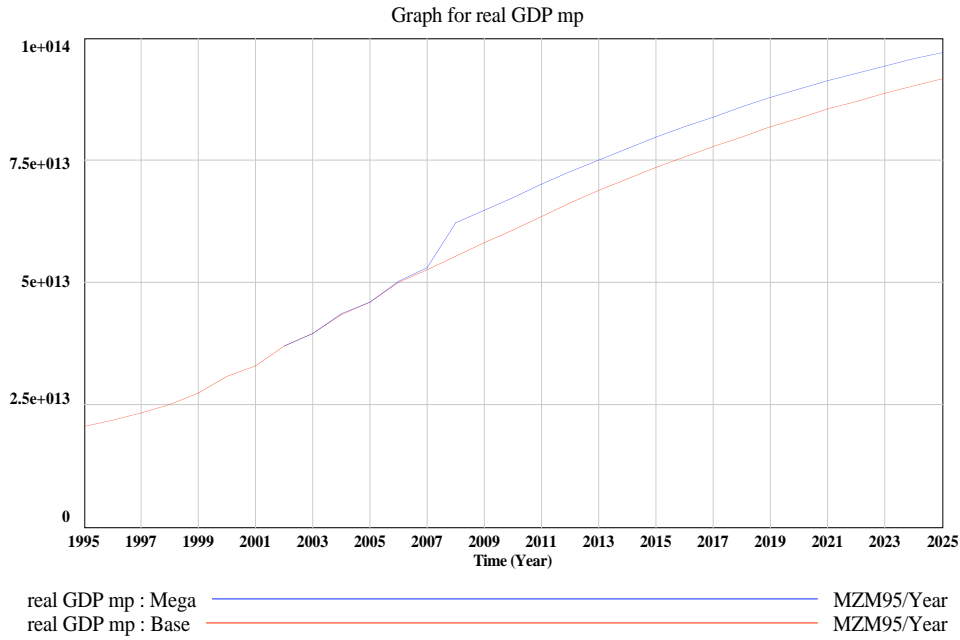
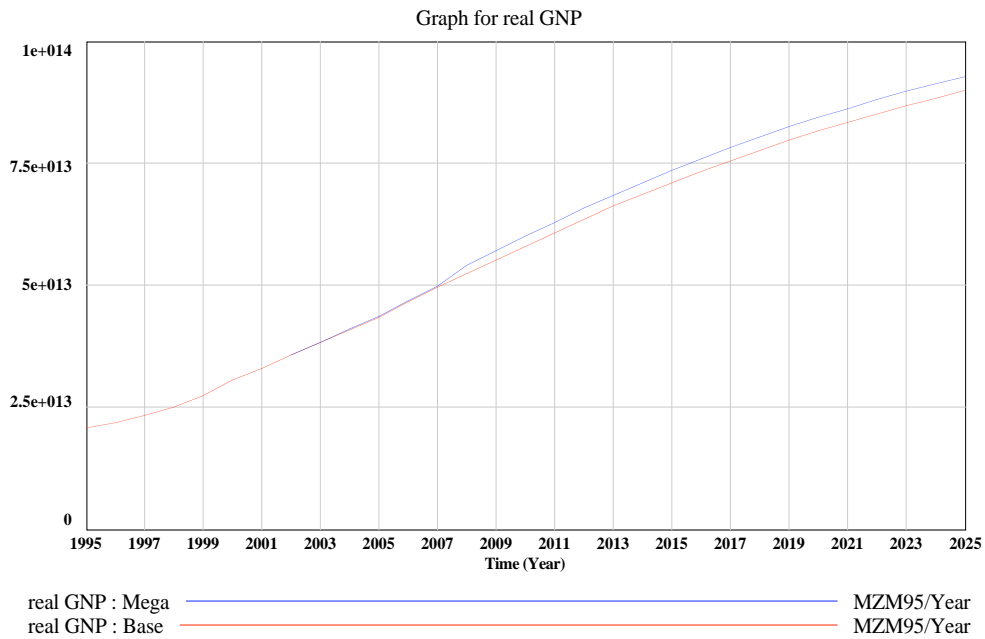


Figure 15: Real GNP comparison between Mega and Base cases



7. Combinations of cases

One of the strengths of the T21 presentation user-interface is that it allows comparisons of several individual scenarios on the same graph. It also allows one to combine several options to examine how they interact. In some cases, different options may reinforce each other. In others, they may offset each other in certain areas. It may be possible to combine scenarios that offset each other's negative impacts while maintaining most of the benefits of both. This requires careful work and experimentation with the scenarios. As an example, we have combined the first three cases (micro credit, new roads, and agricultural extension) and compared them to the base scenario.

This combination results in higher rates of growth in both urban and rural areas and lower poverty rates in both areas. Government revenues are higher for expenditures in other areas before the end of the period as well. While the population growth rate is somewhat lower than in the base case, it has not fallen as much as with the increase in social services. So per capita growth cannot be sustained through the whole period. This would suggest that some additional resources should be applied to family planning (case 4). As the Agenda 2025 participants and others work with the model, they will be able to undertake a wide range of experiments and see how various policies work together.

The examples presented above are to illustrate how the T21 model can be used to examine the impacts of individual policies and their combination. In developing a strategy, users would need to make many runs using slightly different variations in individual policy changes and different timing to understand how each policy affected other variables over a range of degrees of application and starting points. The users would then try many different combinations of policies to see what their aggregate effects would be, whether they would complement each other or interfere with each other. This work would help in developing a comprehensive and consistent strategy. Selected examples would then be used in consultations to gain reactions for stakeholders and further insights into the priorities of the public.

The project also called for a translation of the Mozambique T21 model into Portuguese to facilitate participation with non-English speakers. In collaboration with a technical person from the Agenda 2025 project and a Carter Center staff person, the Millennium Institute completed a translation of the model's interface for the Run-Only Version 3.3 and the associated user's guide into Portuguese. Although it would be technically very difficult to translate the model itself into Portuguese, the translated interface allows non-English speakers to use the model and experiment with scenarios to a significant degree. Both the English and Portuguese Run-Only Versions (and the guides) are available to be downloaded at www.threshold21.com/download.html.

VI. Conclusions

This commentary provides a brief summary of the work on the Mozambique T21 model completed to date. The model was adapted to the parameters, structure, and issues faced by the Mozambican economy to the maximum extent possible with the time and

resources available to MI and the Mozambique team. In its current form, it can be (has been? – next sentence uses this tense, so “can be” is confusing) used for initial discussions of strategic alternatives by the technicians trained by MI, and with some assistance from MI staff via the Internet. These consultations have been useful in preparing the Agenda 2025 strategy. More training is being provided by whom?, and the model will be used more extensively in additional consultations to assist in preparing the Action Plan that is now underway. These consultations will be valuable in generating feedback on the appropriateness of the assumptions and structure incorporated into the model up to this point. That feedback will contribute to further modifications of the model to better adapt it to the questions and challenges faced in Mozambique. We hope this is the beginning of a process that will continue indefinitely into the future, with the model, its use and modification being transferred to Mozambican authorities and civil society, and with the model and the discussion it supports leading to more sustainable development in Mozambique.

Please direct comments and questions to:

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