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T W E E D

**ECONOMIC DEVELOPMENT
CORPORATION LTD**

Ready for Business

**An Introduction To
The Tweed Economic Development
Corporation
And
The Tweed & Northern Rivers Economic
Model**

August 2005

The Tweed Economic Development Corporation Ltd

The Tweed Economic Development Corporation Ltd (TEDC) is an independent company limited by guarantee, established by Tweed Shire Council in 1997, to give leadership and direction to job-creating investment growth and business attraction in the Tweed Shire.

The TEDC is governed by an independent Board of Directors, consisting of nine (9) autonomous people of diverse private and public sector backgrounds, qualifications and experience.

Development of the Tweed & Northern Rivers Economic Model

For some years the TEDC had been confronted by massive change throughout the NSW Northern Rivers region, particularly in terms of rapid population growth and coastal population intensification. Growing tourist visitation had altered the historic agricultural dominance of the regional economies with service sector industries becoming increasingly more important.

By 2003, TEDC recognised the need for the introduction of reliable and accurate tools which would allow TEDC and the Northern Rivers local councils to better achieve their responsibilities in terms of planning and management and best support sustainable development throughout the region. A robust understanding of the local and regional economic structures, and the ability to manipulate and test various change agents and scenarios, was seen as imperative.

To this end, TEDC in 2004 obtained substantial funding from the Australian Government Department of Transport and Regional Services under the Sustainable Regions Programme. TEDC then commissioned, through the Sustainable Tourism Cooperative Research Centre, a research team from The Centre for Economic Policy Modelling at the University of Queensland to undertake the project which is now called "An Economic Model for the Tweed and Northern Rivers".

The original project, completed in 2005, included the local government authorities (LGAs) of Tweed, Byron, Ballina, Lismore, and Kyogle. This was extended in late 2005 to include, at the request and cost of the NSW Government Department of Infrastructure, Planning & Natural Resources (DIPNR), the Richmond Valley Shire LGA.

An Economic Model for the Tweed and Northern Rivers

The economic modeling system, which was specially designed and developed for regional level use, involves innovative, best practice, robust, accurate and dynamic computer generated planning tools.

At an LGA level, it consists of two main components: 1) a regional database (or transaction table) specially collected for each LGA and 2) a computer based modelling

system, based on input-output methodology, capable of analysing the database. In addition, TEDC manages an interregional table which is comprised of all the individual tables.

One of the strengths of the project was that the funding allowed for a data collection system of both primary and secondary data, with the primary data being collected over ten months by surveying businesses, individuals and industry associations across the six local government authorities (LGAs) by the on-the-ground University research team. The process also incorporated other published data available at a local, regional, state and national level in the construction of the regional sets of accounts (the regional databases). This allows for an unusually accurate and detailed understanding of each local economic structure, comparing most favourably with more traditional economic models which rely on more macro data and are most often constructed on a one-off basis.

The regional set of accounts is updated annually, which ensures the data remains current. At present, the Tweed transaction table has been updated to 2004/05, and the Richmond Valley Shire table is also that of 2004/5. The update to 2004/5 of the four other Northern Rivers LGA tables will follow shortly.

The system designed and implemented for TEDC and the local Councils allows a range of socio-economic modelling options. These vary from a first level understanding of the local economic structure in terms (for example) of industry output, value added and employment to a highly sophisticated input-output industry analysis. TEDC has maintained the capacity and expertise inhouse to run a range of economic analyses for a variety of end users.

Appendix 1 to this report gives further details on the input-output methodology underpinning the modelling systems.

The Research Team

The Research Team contracted by TEDC in 2004 to undertake the original project was headed by Professor Guy West and involved various members of the Centre of Economic Policy Modelling (CEPM), including Ms Barbara Bayne.

The Centre for Economic Policy Modelling (CEPM) is a centre for academic and contract research located within the School of Economics at the University of Queensland. It's focus is the development and application of economic modelling techniques, particularly in the fields of policy analysis and economic forecasting.

The CEPM, which is well recognised both nationally and internationally, has developed into a comprehensive research centre providing economic research and applied services including policy advice to a range of private and public sector enterprises.

Both Professor West and Ms Bayne are now contracted by TEDC on an ongoing consultancy basis. Their responsibilities include economic analysis using the model as well as training and mentoring of TEDC and Council staff. Ms Ainsley Currie, a full time

member of TEDC staff, is working with Guy and Barbara to gain practical experience in economic modelling and analysis.

Appendix 2 to this report gives further details on Professor West, Ms Bayne and Ms Currie.

Applications of the Model

The Tweed & Northern Rivers Regional Economic Model has a significant number of applications for both the public and private sector.

The Modelling system will allow government authorities to:

- Improve planning and management of a range of issues through a better understanding of the local and regional economic structure;
- Provide detailed assessment of the industries that drive the local economy to identify optimal industry development initiatives;
- Identify existing economic strengths, weaknesses, opportunities and threats;
- Evaluate and compare alternative policy initiatives;
- Measure the significance of existing economic activities and industries on the socioeconomic fabric;
- Monitor, analyse and evaluate the structural changes that are occurring over time in the economy;
- Undertake “what-if” scenario projections; and
- Identify, evaluate and quantify the benefits of proposed development projects and business initiatives.

The Model will also allow private sector decision makers, on a cost-recovery basis, to:

- Analyse the regional economic impact of potential developments, strategic investment proposals or industry closure;
- Determine the size, contribution and economic relativity of any industry and quantify the direct and indirect economic impact of that industry in terms of its effects on the local economy;
- Analyse the impact of changes in economy policy, especially in taxes, tariffs, environmental regulations and competition;
- Undertake “what if” scenario projections;
- Add weight to feasibility studies, grant applications and lobbying; and
- Augment an industry’s financial reporting with information on the economic impact of that industry on the local/regional economy.

Independent Economic Impact Assessments

Using the Tweed & Northern Rivers Economic Modelling Tool, the TEDC has the capability in-house to undertake industry and economic impact assessments to assist in TEDC’s economic development activities and conduct policy analyses.

However, the TEDC also has the capacity to undertake independent economic impact analyses of the impact of proposed developments in the region of the Tweed and/or Northern Rivers for external agencies, including the NSW Road & Traffic Authority's Assessment of the Ballina/Byron Motorway Bypass and various state-significant Tweed commercial interests.

National Award Winning Economic Modelling Tool

In 2005, the TEDC was awarded the inaugural "AusIndustry National Award for Innovation in Economic Development Excellence" for the development of the Tweed & Northern Rivers Economic Model, judged by industry peers as an innovative, best-practice economic modelling tool, which provides a robust foundation for the identification, measurement and evaluation of socio-economic development projects that best support sustainable development of the Tweed and Northern Rivers in an environment of rapid change.

APPENDIX 1: An Overview of Input-Output Modelling

The methodology described in this Appendix is consistent with state, national and international guidelines for conducting economic impact studies for the various governments and funding bodies using input-output analysis.

Economic Impact Assessment

Economic impact analysis work often depends on the ability to estimate the total effect on a local or regional economy from changes that take place within a particular industry or industries. These estimations frequently depend on input-output models that quantify the interactions between firms and industries within a particular study region.

Impact analysis is one form of analysis often undertaken within the input-output framework, and requires the calculation of multipliers. While it is possible to compute multipliers for a wide range of economic variables, those of most interest (as in this study) are typically output, value added, income and employment.

Direct (or Initial) Effects

Direct economic effects are the changes in local business activity occurring as a direct consequence of public or private business decisions, or public policies, programs or projects.

Indirect (or Flow-on) Effects

In general, the broader indirect or induced economic effects that follow from any type of direct effect are sometimes referred to as "multiplier effects", and they frequently make the overall economic impacts substantially larger than the direct effects alone.

These indirect or flow-on effects extend beyond the initial round of purchases and employment, and represent the additional value adding, income and employment generated resulting from second, third, and subsequent-round purchases flowing throughout the local and regional economy.

In most studies, the importance of a particular industry as an economic sector within the Northern Rivers NSW economy stems not only from its own size in terms of employment and output, but also from its linkages to other industries in the region.

The regional economy is composed of many industries and/or sectors that buy and sell from each other. These inter-industry purchases can be measured to show the relative strength of interindustry linkages for each industry in the regional economy.

For example, agricultural industries and farms and employees purchase goods and services that stimulate economic activity in other industries; macadamia farmers in the area purchase goods and services from contract harvesters, as well as fuel and parts from local suppliers. Economic impact analysis makes it possible to estimate the dollar value of these linkages within the local economy.

Total (Direct plus Indirect) Effects

The total effect on the local or regional economy is the sum of the direct (or initial) impact plus the indirect (or flow) effect.

Input-Output Model

Regional modelling has undergone substantial change over the last two to three decades, with a broad range of economic models having been developed to assist analysts and decision-makers understand a variety of issues as they deal with increasingly complex economic and social matters. These often include likely future outcomes as well as the implications of alternative policies.

The choice of model depends on a number of criteria, primarily on the requirements of any particular use and on the data available. An input-output modelling system was selected as the most appropriate for this project.

Input-output revolutionised the study of economic structure. The first empirical interindustry model was developed by Leontief in the 1930's in his study of the American economy. Since then, input-output has developed from a relatively simple and naïve tool to one with a seemingly infinite variety of modifications and adaptations.

For many years, input-output was regarded as the workhorse of the regional macro modeller, and in some ways, this has not changed substantially; input-output still remains the core component of many models. What has changed is that the science of modelling, including input-output, has become more complex both in terms of trying to capture a wider subset of reality and in terms of its mathematical structure.

Input-output analysis remains without doubt one of the most powerful and comprehensive methods available for studying the impacts of industry activity. The strength of input-output is based on its detailed interindustry accounts and its ease of use and transparency.

Input-output models enable the derivation of sets of disaggregated multipliers, recognising that the total impact on output (income or employment) will vary according to the sector which experiences the initial increase in demand.

The main concept of the multiplier is based on the recognition that the various sectors that make up the economy are interdependent. This means that in addition to purchasing primary inputs, such as labour and imports, each sector will also purchase intermediate goods and services produced by other companies within the local economy.

Manipulation of the input-output tables allows estimation of different types of multipliers depending on the indicator of interest. The magnitude of these vary depending on the composite of the industry in which spending occurs and the size of the area economy as well as the spending patterns within the local economy and the portion that leaks out to outside areas.

Input-Output Tables

At the centre of any input-output analysis is the input-output, or inter-industry transactions, table. This quantifies in monetary terms the flows of goods and services between industries and sectors of the economy over a stated period of time.

The table shows, in a matrix form with rows (sales) and columns (purchases), the interactions and dependencies between industries within a (regional) system and with the outside (imports and exports).

Changes In Final Demand Modelling

This method measures the effect resulting from the loss of final demand sales by the activity or industry in question. This approach arises directly from the basic assumption of the input-output model that output is demand generated through final demand sales. The calculation procedure involves multiplying the simple input-output multiplier for the industry in question by the level of final demand sales of that industry.

This is simply an extension of the multiplier concept: the output data is fed into the input-output model and detailed results are generated in tabular format. The input-output structure provides the tools to allow the estimation of the final demand changes through the whole economy and estimate the total effect on the overall local and/or regional economy in question.

The results are auto-generated by the model and presented in terms of final demand (direct effect), industrial support, consumption, total (total effect), flow-on (indirect effect) as well as percentages.

Key Indicators

Impacts are most often measured in terms of four key economic indicators:

- *Gross output.* This represents the total value of production of the industries under consideration on all goods and services purchased in the chain of production by firms in the local and regional economy

- *Gross regional product (GRP) or Value Added.* Gross output measures are susceptible to multiple counting because they sum all the intermediate transactions over all stages of production during the production process. Consequentially, they can substantially overstate the contribution to economic activity. A preferred measure of the contribution to economic growth is value added. This is technically defined as wages and salaries and supplements paid to labour plus gross operating surplus plus indirect taxes on products and production less subsidies, but for practical purposes measures payments to factors of production (labour and capital), including net taxes on production. The sum of all industry value added is equal to gross regional product (GRP), so value added impacts refer to the contribution to GRP (or gross state product (GSP) at the state level and gross domestic product (GDP) at the national level). This is the accepted economic measure of what an economy produces
- *Household income.* This is the income earned by employees as part of the normal operations of the economy
- *Employment.* The number of full-time equivalent jobs generated.

Further Information

For further information on the methodology used in this study, please refer to the publication: *Introduction and Guide to Applied Input-Output Analysis*, TEDC 2005. A copy of this publication is available from TEDC.

APPENDIX 2: The TEDC Research Team

Professor Guy West is widely recognised as one of Australia's leading experts in input-output econometric modelling design development and application. One of his recent projects is the development of a multiregional, interindustry econometric forecasting and impact system. He is an accomplished computer programmer and has developed a number of specialised economic models for analysing structural change, as well as more generalised software for interindustry analysis. Experienced in regional economics with specialisation in applied quantitative economics. Current research interests include the theory and application of interindustry models particularly in an integrated spatial econometric framework, the nature of economic structure at the regional and national levels, and regional economic projection, planning and growth. This revolves primarily around the study and identification of economic structure, involving concepts such as fundamental economic structure, structural change and evolution.

Guy has had extensive involvement in over 80 collaborative government and industry research projects, both in Australia and internationally, in the area of economic impact analysis, planning, development and economic policy for federal, state and local government and the private sector.

Ms Barbara Bayne has a background in regional economics, economic modelling, training and marketing as well as aged care, disabilities and mental health. She has worked in both the private and public sectors. She has had substantial experience and expertise in the research and analysis of various research and consultancy projects, including policy and planning, evaluations, with particular emphasis on economic modelling, regional/urban development and policy, including regional structure, regional economic development approaches and analysis, regional and local strategic planning. She has been involved in many collaborative government and industry applied projects, both in Queensland and Australia, in the area of economic impact analysis, policy and planning as well as the development, implementation and training for services for federal, state and local government and the private sector.

She is a member of the Guardianship and Administration Tribunal of Queensland.

Ms Ainsley Currie has a Bachelor of Economics and a Bachelor of Business Management from the University of Queensland.

She has had several years experience both in a range of areas of economic development at a local government area and in business development within the education and training sector for private enterprise.

She has been a fulltime member of TEDC staff since 2004 and is currently involved in sustainable industry development initiatives, statistical research and land use planning and marketing.