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Abstract

The study developed links between regional input-output analysis and the current research methodology utilised. In addition, this paper introduced and examined, two general regional growth strategies – industrial specialisation and industrial diversification.

The study empirically investigated these strategies within the Coffs Coast region, utilising the Regional Economic Modelling and Planning System (REMPLAN). Utilising the input-output methodology linked with REMPLAN, the study examined the employment, income, and value added impacts of the two regional growth strategies from exogenous increases in demand on the Coffs Coast regional economy. The exogenous increases in demand were strictly from a hypothetical view.

The findings of this research revealed that the Coffs Coast region is an already specialist regional economy – with specific focus on the retail industry which was found to be the largest industry employer within the region. In addition, the findings revealed that the industrial specialisation strategy provided the greatest industry employment, income, and value added impact to the Coffs Coast region compared to the industrial diversification strategy.

Introduction

Regional economic growth strategies have become an extremely important means to sustain and grow regional economies (Kruitlla 1955). Indeed, regional economic growth, especially economic development has become a significant economic and political concept (Stern 1991), with policy makers increasingly conscious of the impacts to outside regions (McGovern 1985). Regional economic growth strategies have become essential, not only in terms of regional income, but in improving regional education, employment, and industry statistics.

Despite common perceptions regarding the under-performance of industry specialist regional economies, some research has shown that regional industry specialisation in fact generates greater economic impacts to a regional economy than the more conversant, industrial diversification strategy (Diamond & Simon 1990). This paper is a further exploration of that theme. Indeed, the analysis within this paper not only suggests that the Coffs Coast region is an already specialist regional economy, but additionally suggests that a regional industrial specialisation strategy would create a greater employment, income and value added impact to the regional economy compared to an industrial diversification strategy. This paper furthermore highlights the significant industries within the Coffs Coast region and offers evidence as to why the region should specialise in these defined industries.

The Coffs Coast regional economy is defined to incorporate three Local Government areas within New South Wales; these include the Coffs Harbour, Nambucca and Bellingen Local Government Areas. The economic impacts (employment, income and value added impacts) from an exogenous increase in demand based on an industrial specialisation and an industrial diversification strategy will be examined. This study will utilise a regional input-output model; Regional Economic Modelling and Planning System (REMPLAN 2006), to quantify the economic impacts to the Coffs Coast region. The REMPLAN model is a regional input-output model developed by Ian Pinge of La Trobe University, Australia.

Industrial Specialisation versus Industrial Diversification

There is thought to be four methods of obtaining regional growth for policy makers, these include (Picton 1951):

1. attracting new firms to the region

2. expansion of firms already established within the region, by adapting products to serve the needs of varying markets or by adding new products with new markets

3. physically shifting of firms already located to the region, and

4. the establishment of branch factories within the region by firms already located elsewhere.

The industrial specialisation and industrial diversification strategies both were developed from this analysis of regional growth.

An industrial specialisation strategy attempts to expand an economy through promoting specific established industries in which the region has a competitive advantage (Diamond and Simon 1990). An industrial diversification strategy, conversely, attempts to expand an economy through growing its industry base, countering the localisation in specific regions of industries of similar and complementary types (Skyes 1950).

Industrial specialisation was founded upon the economic argument of economies of scale, whereby industrial specialisation lowers the cost of production (improved efficiency) (Skyes 1950). Industrial specialisation advocates state that the low costs of production attainable are diminished by industrial diversification strategies. This is achieved by causing the removal of a portion of the specialised industries elsewhere or by leaving them intact and introducing into the regions, differing industries (Skyes 1950). In the latter case, Skyes (1950) suggests that competing demands for the factors of production by the newly introduced industries may curtail their supply and drive up their costs to the specialised industries. Valuable external economies, such as industrial and commercial linkages, transport facilities and other specific service facilities; may be impugned.

Industrial diversification advocates state, that it would be rare for industrial diversification to raise the costs of specialised industries and cause these industries to relocate to inferior locations, for such industries ordinarily do not lead themselves to transfer. Many of the specialised industries are suggested to be 'chained to the spot' because they are extractive industries with other specialised industries depending on existing factors of production which could not be provided elsewhere (Skyes 1950). Skyes (1950) although perceives the possibility of additional costs by stating that increased demand for factors of production could raise the prices for specialised industries.

Industrial specialisation advocates also note that industrial specialisation will in itself create diversity, suggesting that the history of industrial growth shows that after a certain point, specialisation itself generates diversity (Diamond and Simon 1990). This is

achieved by attracting industries subsidiary to the main industry, and later on these subsidiary industries enter upon production of goods and services.

This paper will provide hypothetical evidence that an industrial specialisation strategy would indeed create a greater employment, income and value added impact to the Coffs Coast region compared to an industrial diversification strategy.

Static Input-Output Analysis

Static input-output analysis essentially traces out the transactions in dollar terms between the industries and sectors of an economy for a given year. The analysis summarises the inter-sectoral flows in the period and presents the data in a matrix form, which provides a concise, descriptive snapshot of the economy at a particular point in time (REMPLAN 2006).

The original static input-output matrix developed by Leontief (1956) outlined the sets of direct capital and labour coefficients displaying the amount of capital and labour employed in each, per unit of output. The computations reflected the internal structure of the economy, with the interdependence between individual industry sectors of the system described by a set of linear equations. The simple linear input-output equation was described by (Leontief, 1965):

$$X_i = AX_i + Y_j$$

Whereby:

X_i = sum of the total output of all sectors,

Y_j = total final demand for the output of sector j, and

$A = (a_{ij})$, the matrix of input-output coefficients.

by transposition Leontief found:

$$X_i (I - A) = Y_j$$

by solving the above system Leontief derived the general solution:

$$X = (I - A)^{-1} Y$$

Each industry's output consisted of summing its sales to all other industries and to final demand that is, to ultimate consumers rather than other producing industries. The amount of each product consumed in each industry therefore depended upon the level of output for that industry. According to the model, equilibrium was attained within the economy when each industry's output equalled its total purchases (i.e., inputs); these were determined by the output of all other industries (Leontief, 1965).

The REMPLAN model utilised within this paper is based on this original concept and is described by the following matrix equation (Nichol 2005):

$$X = AX + Y$$

Where:

X is the vector of sectoral gross outputs,

A is the matrix of regional intermediate input or regional purchase coefficients, and

Y is a vector of total final demands by sector.

The coefficients a_{ij} of A are defined as the amount purchased by sector j from sector i per unit of output of sector j. The equation states that gross output of each industry equals immediate demand sales (AX) to other industries for further processing plus final demand sales (Y) of end products to consumers, including households, government, and for export. By rearranging and converting to differences, this equation can be rewritten as:

$$\Delta X = (I - A)^{-1} \Delta Y$$

This equation permits the analyst to calculate the change in industry production levels (ΔX) in response to the change in industry final demands (ΔY). ΔY can incorporate any element of final demand expenditure (Nichol 2005).

The REMPLAN input-output matrix can be divided into four segments. These segments are shown in the following Table 1.

Table 1: The Structure of the Input-Output Transaction Table

Industry Sector	*Q1. Intermediate Sector*			*Q2. Final Demand Sector*				Total Output
	1.	2.	3.	H'holds	Govt	Investment	Exports	
1. Agriculture.	20	40	0	20	0	0	20	**100**
2. Manufacturing	20	20	10	75	10	10	55	**200**
3. Services.	0	40	10	25	20	5	0	**100**
Payments for:	*Q3. Primary Inputs Sector*			*Q4. Primary Inputs Absorbed by Final Demand*				
H,hold Services	40	45	70	5	0	0	0	**160**
Govt Services	10	15	5	0	0	0	0	**30**
Imports	10	40	5	0	0	0	5	**60**
TOTAL INPUTS	100	200	100	125	30	15	80	**650**

Source: REMPLAN 2006

The transaction table is divided into four segments which will now be discussed using the example provided in Table 1 above. The table provides a transaction table for three industries, that is, the agricultural, manufacturing and services industries. In reality there are 17 industries defined within a region which have the ability to be segmented further in order to generate a transaction table comprising of 35 or 106 industries (Nichol 2005).

Quadrant 1
The intermediate sector is made up of transactions between firms in the local region. Working down the manufacturing column for example the analysis shows that the sector purchases $40 from agriculture, $20 from its own sector and $40 from the services sector. Working across the rows, the agricultural sector sells $20 to its own sector, $40 to manufacturers and nothing to the service sector (Nichol 2005).

Quadrant 2
The final demand sector, records sales of locally produced goods and services within the region (consumption and investment by households, government and firms) and to people outside the region (exports) (Nichol 2005).

Quadrant 3
This quadrant represents payments to households (wages and salaries), firms (gross operating surplus, although it is not included in the example in table 1), governments (taxes on goods and services) and to producers outside the region (imports) all of which provide primary inputs (labour and capital) (Nichol 2005).

Quadrant 4

The primary inputs for final demand is the smallest sector in terms of activity, as it represents the provision of primary inputs for final demand (Nichol 2005).

The columns and rows or the inputs and outputs, for the industry sectors (agriculture, manufacturing and services) will all balance. The total of the column for the manufacturing of $200 matches the total for the manufacturing sector's row and the same is shown for the remaining two sectors. It is also possible to compare regional exports ($80) and regional imports ($60) to determine a trading surplus of deficit. Outlays by the government sector in the above table by pure coincidence match the revenue collected in the region but this is not generally the case. It also should be noted that taxes on income and profits are omitted from such data (Nichol 2005).

Regional Input-Output Analysis

Regional input-output analysis is relatively similar to national input-output analysis except that the comparison is between regions, rather than nationally (Isard 1960). The major difference between national input-output and regional input-output is not in the interpretation and analysis of the tables but rather in the construction of the transaction tables themselves (Jensen, Mandeville and Karunaratne 1979). The construction of the regional transaction table has been one of the most controversial and debated subjects surrounding regional input-output analysis.

Early contributions to the construction of regional input-output tables were from Miernyk (1967), Isard and Langford (1971) and Polenske (1970). These early works constructed the regional transaction table by mainly personal interview (Miernyk 1967), and surveys (Isard and Langford 1971, Polenske 1970) which entailed utilising the input-output model to simulate impacts on output and employment.

In order to construct a regional input-output transaction table, the procedure required at least two sets of input-output data over time. These two sets of data included national and regional input-output data (Jensen, Mandeville and Karunaratne 1979). While consecutive annual national input-output data is now common, data constraints and financial limitations have made similar occurrences at the regional level less frequent (Forster and Garlick 1986).

A brief summation of the three most common methods in the constructing regional input-output transaction tables will now follow.

The survey approach (outlined above) to the construction of regional transaction tables relies on direct surveys to obtain data for the measurement of interindustry flows (Jensen 1980). The survey approach is perceived as the most accurate and desirable method of constructing regional transaction tables, however, it is effectively limited by the expense and time factors associated with it (Chase, Bourque and Conway 1993).

The non-survey approach to constructing regional transaction tables allow the development of regional transaction tables from existing sets of input-output tables at the national level (Hewings, 1985). The national tables are complemented by regional census of manufacturing, wholesale and retail trade, transportation, and agriculture data as well as supplemented by data at the regional and state levels. From this data regional transaction tables can be constructed (Hewings 1985).

The non-survey technique is criticised for not adequately allowing for the differences in industry and product mixes among regions. In addition, the method is criticised because the analyst must estimate regional coefficients from national coefficients, which creates an aggregation problem (Miernyk 1976).

Jensen, Mandeville and Karunaratne (1979) however, state that the non-survey approach is the most attractive both on the grounds of theory and intuitiveness, allowing the construction of regional input-output tables in a relatively short time and at a relatively low cost.

The final method is the hybrid approach, which combines the non-survey techniques for estimating regional direct-requirements tables with the insertion of superior data (Lahr 1992). The superior data is obtained from experts, surveys, and other reliable sources (primary and secondary), and can be added into the model at any stage.

The hybrid method mixes the advantages of the survey and the non-survey methods for constructing regional input-output tables while avoiding the limitations (Muhammad, 2000). Accuracy is considered the main advantage of the survey method while speed and low cost are characteristics of non-survey methods for the construction of regional tables. High cost and time requirement are the main limitations of the survey method. In contrast, less accuracy is the central limitation of non-survey methods (Muhammad, 2000).

The REMPLAN (2006) model utilised in the current research adopts the hybrid approach to the construction of the Coffs Coast regional input-output transaction table. This technique was chosen due to the support it has gained from regional input-output

researchers (West and Gamage 2001, Muhammad 2000, Lahr 1992, Jensen, Mandeville and Karunaratne 1979, Pinge 2005).

Methodology

The REMPLAN model is based on the GRIT (Generation of Regional Input-output Tables) methodology and is a top down approach which uses state input-output tables to produce the Coffs Coast regional input-output tables by utilising a mechanical regionalisation technique; location quotient. The construction of the Coffs Coast regional transaction tables essentially adopts the hybrid approach.

The input-output transaction tables for the Australian economy are collected by the Australian Bureau of Statistics (ABS). The national input-output tables illustrate for a product; its origin or source of supply divided into domestic production and imports, its destination classified into usage by various industries and final demand categories, and the difference between the basic price and the purchaser's price for each product or margin (ABS 2000 (5216.0)). State matrices adjusted for the latest estimates of Gross State Product (GSP) without the application of location quotients are derived from the national matrices (Nichol 2005).

To construct the Coffs Coast regional transaction tables from the state tables, special techniques were utilised. These techniques involved the estimation of various quotients. In operating with the non-survey techniques, an assumption is made to the affect that (Hewings 1985):

$$a_{ij}(r) = a_{ij}(n)$$

Whereby:

  A_{ij} = technical coefficient,
  r = regional level, and
  n = national level.

This assumption thus precludes possible differences in the age of capital stock, the size mixture of firms within a sector, differences in technology, and possible variations in product mix.

The REMPLAN technique modifies the state technical coefficients to produce a set of regional requirements coefficients (Hewings 1985):

$$R_{ij} = a_{ij}(n) \, q_j$$

Whereby:

      q_i = a quotient of the same kind.

This quotient is applied uniformly across all entries in a row.

The formulae used for the estimation of the location quotient for industry i within the Coffs Coast region is shown as (Hewings 1985):

$$Lq_i = (X_i(r)/\textstyle\sum_i X_i(r)) / (X_i(n)/\textstyle\sum_i X_i(n))$$

In essence, the proportionate share of industry i in the region is compared with the share of i in the state. The data used for the Xs constitute the four digit Australian New Zealand Standard Industry Classification (ANSIC) region specific employment data. Once the quotient has been obtained, it is applied in the following fashion (Hewings 1985):

$$r_{ij} = \begin{cases} a_{ij}(n) & \text{if } lq_i \geq 1 \\ a_{ij}(n)\, lq_i & \text{if } lq_i < 1 \end{cases}$$

The reasons for this application is stated in terms of the expectation that any industry, i, will be able to supply the demands placed upon it by all other industries in the region. The share of the total demands supplied locally is thus reduced in accordance with the size of the location quotient.

In summation the REMPLAN model produces variable-interference non-survey based tables, essentially hybrid in nature with the model relying on a series of mechanical steps to produce regional coefficients from the state tables.

Multiplier impacts from exogenous increases in demand

All regional input-output models that have been developed to trace the impact of demand on a region's income and employment have all involved some framework of 'regional accounts'. These 'regional accounts' describe transactions between the region,

the outside world and activities within the region (Chase, Bourque and Conway 1993). In order to trace the impact all regional input-output models must include some type of multiplier ratio that determines the relationship between an initial increase in demand and the ultimate effect on regional income or employment (Hoover and Giarratani 1985). Essentially, Chase, Bourque and Conway (1993) suggested that, "an input-output multiplier is essentially a summary measure of an industry's impact on the economy" (p. 43).

In any economy, the addition of new (exogenous) output or employment for a particular sector will usually lead to an increase in the gross product for that economy (Jensen, Mandeville and Karunaratne 1979).

The total increase in the gross product of the economy will be greater than the exogenous output due to the effect of 'economic multipliers'. An increase in output or employment will induce additional multiplier effects throughout other sectors. Those sectors will in turn require inputs from other sectors, and 'multiplier' rounds will occur. Through the use of input-output matrices, a series of coefficients can be determined. These coefficients allow the modelling of impacts to the economy. Such impacts can be measured not only in terms of the direct impact (the new output) on the sector which is expanding, but the total impact on all sectors and therefore the total impact on gross product for the region (Jensen, Mandeville and Karunaratne 1979).

In 1979 Jensen, Mandeville and Karunaratne described the input-output multiplier formula as:

$$X1 = X1\,1 + X1\,2 + \ldots + X1\,n + Y1$$
$$X2 = X2\,1 + X2\,2 + \ldots + X2\,n + Y\,2$$

$$\vdots \qquad\qquad\qquad \vdots$$

$$X\,n = X\,n\,1 + X\,n\,2 + \ldots X\,n\,m + Y\,n$$

Whereby:

      Xi = total value added of intermediate sector i,

      Xij = output of sector i purchased by sector j, and

      Yi = total value added for the output of sector i.

By dividing the Xij by Xj, one can derive coefficients, which represent more clearly the purchasing pattern of each sector. These coefficients are termed 'direct' or 'input-output' coefficients, or 'technical coefficients'. Technical coefficients are noted as aij, and represent the direct or first round requirement of inputs from each sector i following an increase in unit output of any sector j, therefore, $aij = Xij / Xj$ (Jensen, Mandeville and Karunaratne 1979).

This mathematical relationship suggests that the multiplier would in fact indefinitely 'multiply' itself creating infinite additions to the one change. Hoover and Giarratani (1985) explain however why the multiplier is not infinitely large; identifying demand leakages from the regional economy. A common demand leakage found by Hoover and Giarratani (1985) occurs when one of the intermediate activities experiences an increase in sales. The sector then has to allocate part of the extra revenue to purchasing inputs. These inputs are not from the other intermediate activities but from primary supply sectors. Money paid for additional imports leaves the region. Stimulus to regional demand for payroll, taxes, and depreciation drop out of the stream of 'new money' circulated among the processing activities. The stream gets smaller at each round and finally peters out altogether. Jensen, Mandeville and Karunaratne (1979) calculated that the additional units created after the fourth round were simply not significant.

The REMPLAN (2006) model essentially provides input-output analysis at a regional level. The model provides the ability for impact analysis to be performed, with the ability to aggregate the Coffs Coast regional economy down to 17 and again to 35 Australian New Zealand Standard Industry Classification (ANSIC) industries. This essentially allows for the input of hypothetical exogenous increases in output or employment from industry specialisation and industry diversification strategies, permitting the examination of the economic impacts from these strategies.

Findings

This paper will analyse the employment, income and value added impact on the Coffs Coast region from a potential exogenous increase in demand ($20 million) on the two most significant industries in terms of value added identified, that is, the retail trade ($10 million increase in demand) and property and business services ($10 million increase in demand) industries. The retail trade and property and business services industries were selected as the two industrial specialisation industries as they were the most significant industries in terms of value added within the Coffs Coast region. This paper assumes that the retail trade and property and business services industries will have the greatest

likelihood of becoming specialist industries within the Coffs Coast region due to their current value added impact on the regional economy.

Employment

Figure 1: Industrial specialisation: impacts on regional employment

REMPLAN	REMPLAN 2.0 Impacts on Regional Employment (job numbers)			
SECTOR	Job Changes	Industrial Effect	Consumpn' Effect	Total Jobs
Agriculture Forestry Fishing	0	1.127	3.691	4.818
Mining	0	0.021	0.032	0.053
Manufacturing	0	4.195	8.359	12.554
Electricity, gas & water supply	0	0.570	1.120	1.691
Construction	0	0.333	0.207	0.540
Wholesale trade	0	3.125	5.077	8.202
Retail trade	119	9.520	44.199	172.406
Accommodation, cafes & restaurants	0	3.747	13.081	16.828
Transport & storage	0	1.580	2.796	4.375
Communication services	0	1.845	1.991	3.836
Finance & insurance	0	2.694	4.805	7.499
Property & business services	45	21.746	7.385	74.199
Government administration & defence	0	1.515	0.999	2.514
Education	0	1.415	7.756	9.171
Health & community services	0	0.197	12.095	12.292
Cultural & recreational services	0	2.316	6.581	8.897
Personal & other services	0	0.833	8.574	9.407
TOTAL	**164**	**57**	**129**	**349**
Multiplier		Type 1 1.347		Type 2 2.133

Source: REMPLAN, 2006.

Figure 1 illustrates the impact on regional employment caused by the $20 million exogenous increase in demand on the two specialisation industries; the retail trade and property and business services industries. The increase in regional employment is the total increase in the number of employees by industry sector, whose place of work is located within the region's boundaries.

The total changes in industry employment within the Coffs Coast region created from the exogenous change in demand in the retail trade ($10 million increase) and the property and business services ($10 million increase) industries is 349 jobs.

The first column headed 'Job Changes' illustrates the initial increase in jobs (164 jobs) created from the exogenous increase in demand on the retail trade and property and

business services industries. The second column headed 'Industrial Effect' outlines the Type 1 multiplier, that is, the employment effect on each individual industry (57 jobs) caused from an increase in spending from the retail trade and property and business services industries. The third column headed 'Consumption Effect' outlines the Type 2 multiplier that is, the effect on employment caused from increases in household spending due to new money entering the Coffs Coast regional economy (129 jobs). The Type 2 multiplier shows the effects any changes will have on total spending. The final column headed 'Total Jobs' tally both the industrial (Type 1) and the Consumption (Type 2) multipliers employment effect to show the total increase in each individual industry employment and the increase in total regional employment (349 jobs).

Income

Figure 2: Industrial specialisation: impacts on regional income

REMPLAN 2.0 Impacts on Regional Income ($M)				
SECTOR	Demand Change $M	Industrial Effect	Consumpn' Effect	Total ($M)
Agriculture Forestry Fishing	0.000	0.023	0.074	0.097
Mining	0.000	0.001	0.002	0.003
Manufacturing	0.000	0.186	0.371	0.558
Electricity, gas & water supply	0.000	0.035	0.068	0.103
Construction	0.000	0.011	0.007	0.018
Wholesale trade	0.000	0.137	0.223	0.361
Retail trade	3.342	0.268	1.244	4.854
Accommodation, cafes & restaurants	0.000	0.093	0.326	0.419
Transport & storage	0.000	0.079	0.140	0.219
Communication services	0.000	0.118	0.127	0.246
Finance & insurance	0.000	0.188	0.335	0.524
Property & business services	2.574	1.242	0.422	4.238
Government administration & defence	0.000	0.101	0.066	0.167
Education	0.000	0.068	0.372	0.440
Health & community services	0.000	0.008	0.490	0.498
Cultural & recreational services	0.000	0.074	0.210	0.283
Personal & other services	0.000	0.028	0.292	0.321
TOTAL	**5.916**	**2.661**	**4.770**	**13.346**
Multiplier		Type 1		Type 2
		1.450		2.256

Source: REMPLAN 2006.

Figure 2 illustrates the impact on regional income caused by the $20 million exogenous increase in demand on the two specialisation industries; the retail trade and property and

business services industries. The increase in regional income is the total increase in the value of wages and salaries paid by each industry in the region to its employees.

The total changes in regional income within the Coffs Coast region from an exogenous change in demand in the retail trade ($10 million increase) and the property and business services ($10 million increase) industries is $13.346 million.

The first column headed 'Demand Change $M' illustrates the initial increase in regional income ($5.916 million) created from the exogenous increase in demand on the retail trade and property and business services industries. The second column headed 'Industrial Effect' outlines the Type 1 multiplier, that is, the income effect on each individual industries wage and salary payments ($2.661 million) caused from an increase in spending from the retail trade and property and business services industries. The third column headed 'Consumption Effect' outlines the Type 2 multiplier that is, the effect on regional income caused from increases in household spending due to new money entering the Coffs Coast regional economy ($4.770 million). The Type 2 multiplier shows the effects any changes will have on total spending. The final column headed 'Total ($M)' tally both the industrial (Type 1) and the Consumption (Type 2) multipliers income effect to show the total increase in each individual industries wage and salary payments and the increase in total regional income ($13.346 million).

Figure 3: Industrial specialisation: impacts on regional value added

SECTOR	Demand Change $M	Industrial Effect	Consumpn' Effect	Total ($M)
Agriculture Forestry Fishing	0.000	0.078	0.256	0.335
Mining	0.000	0.005	0.007	0.012
Manufacturing	0.000	0.339	0.676	1.015
Electricity, gas & water supply	0.000	0.156	0.307	0.463
Construction	0.000	0.027	0.017	0.044
Wholesale trade	0.000	0.185	0.300	0.484
Retail trade	5.280	0.424	1.966	7.669
Accommodation, cafes & restaurants	0.000	0.164	0.573	0.738
Transport & storage	0.000	0.154	0.273	0.428
Communication services	0.000	0.285	0.308	0.593
Finance & insurance	0.000	0.398	0.709	1.107
Property & business services	4.552	2.197	0.746	7.495
Government administration & defence	0.000	0.109	0.072	0.181
Education	0.000	0.078	0.426	0.504
Health & community services	0.000	0.010	0.604	0.614
Cultural & recreational services	0.000	0.144	0.410	0.554
Personal & other services	0.000	0.042	0.428	0.469
TOTAL	**9.832**	**4.794**	**8.078**	**22.704**
Multiplier		Type 1		Type 2
		1.488		2.309

Source: REMPLAN, 2006.

Figure 3 illustrates the impact on regional value added caused by the $20 million exogenous increase in demand on the two specialisation industries; the retail trade and property and business services industries. The increase in regional value added is the total increase in regional output of final goods and services, including exports and excluding imports.

The total changes in industry value added within the Coffs Coast region from an exogenous change in demand in the retail trade ($10 million increase) and the property and business services ($10 million increase) industries is $22.704 million.

The first column headed 'Demand Change $M' illustrates the initial increase in regional value added ($9.832 million) created from the exogenous increase in demand on the retail trade and property and business services industries. The second column headed 'Industrial Effect' outlines the Type 1 multiplier, that is, the value added effect on each individual industry ($4.794 million) caused from an increase in spending from the retail trade and property and business services industries. The third column headed

'Consumption Effect' outlines the Type 2 multiplier that is, the effect on regional value added caused from increases in household spending due to new money entering the Coffs Coast regional economy. The Type 2 multiplier shows the effects any changes will have on total spending ($8.078 million). The final column headed 'Total ($M)' tally both the industrial (Type 1) and the Consumption (Type 2) multipliers value added effect to show the total increase in each individual industry's value added and the increase in total regional value added ($22.246 million).

Industrial diversification

This study utilised the REMPLAN (2006) industry multipliers in determining the industrial diversification industries used for the current research. The study assumes that the four industries which have the greatest value added multipliers (not including the two industrial specialisation industries; the retail trade and property and business services industries) will provide the greatest impact to the Coffs Coast regional economy from a potential exogenous increase in demand.

Table 2: Coffs Coast regional industry multipliers

Industry	Employment multiplier	Income multiplier	Value added multiplier
Agriculture, forestry and fishing	2.43	1.79	1.75
Mining	**2.89**	**3.75**	1.81
Manufacturing	2.49	2.73	**2.47**
Electricity, gas and water supply	2.51	**3.28**	1.63
Construction	2.49	2.28	**2.54**
Wholesale trade	2.45	2.58	**2.87**
*Retail trade	2.09	1.78	2.19
Accommodation, cafes and restaurants	2.30	1.82	2.33
Transport and storage	**2.54**	2.97	**2.36**
Communication services	2.22	3.04	1.87
Finance and insurance	1.99	2.70	1.82
*Property and business services	2.48	3.05	2.45
Government administration and defence	1.98	2.63	2.27
Education	1.63	1.80	1.93
Health and community services	1.69	1.73	1.95
Cultural and recreational services	2.30	2.08	2.17
Personal and other services	2.02	1.89	2.19

Source: *REMPLAN*, 2006.
* represents the industries utilised in the industrial specialisation examination.
** The figures in bold represent the industries with the most significant multipliers.

If a diversification strategy was to be utilised for the Coffs Coast region, the previous table suggests that the manufacturing, wholesale trade, transport and storage, and construction industries would provide the most significant value added multiplier impact to the Coffs Coast region.

This study will now analyse the employment, income and value added impact on the Coffs Coast region from a potential exogenous increase in demand ($20 million) on the four industries identified in table 2, that is, the manufacturing ($5 million increase in demand), wholesale trade ($5 million increase in demand), transport and storage ($5 million increase in demand), and construction ($5 million increase in demand) industries. The exogenous $20 million value is used so as the analyses is consistent with that provided in the previous analysis when measuring the industrial specialisation impact to the Coffs Coast region.

Employment

Figure 4: Industrial diversification: impacts on regional employment

REMPLAN 2.0 Impacts on Regional Employment (job numbers)

SECTOR	Job Changes	Industrial Effect	Consumpn' Effect	Total Jobs
Agriculture Forestry Fishing	0	2.432	2.867	5.298
Mining	0	0.110	0.025	0.135
Manufacturing	15	7.534	6.492	28.721
Electricity, gas & water supply	0	0.414	0.870	1.284
Construction	29	0.446	0.161	29.775
Wholesale trade	32	3.794	3.944	40.063
Retail trade	0	12.657	34.330	46.987
Accommodation, cafes & restaurants	0	2.993	10.160	13.154
Transport & storage	23	5.569	2.171	30.388
Communication services	0	1.268	1.546	2.814
Finance & insurance	0	1.849	3.732	5.581
Property & business services	0	13.883	5.736	19.619
Government administration & defence	0	1.424	0.776	2.200
Education	0	0.760	6.024	6.784
Health & community services	0	0.244	9.395	9.639
Cultural & recreational services	0	0.735	5.112	5.847
Personal & other services	0	0.396	6.659	7.055
TOTAL	**99**	**57**	**100**	**255**
Multiplier		Type 1		Type 2
		1.572		2.583

Source: REMPLAN, 2006

Figure 4 outlines the 'job changes' from the exogenous increase in demand on the four diversification industries; the manufacturing, wholesale trade, and transport and storage, and construction industries. The initial increase in employment was 99 jobs, with the industrial effect and consumption effect at 57 and 100 jobs respectively. The 'total jobs' created for the Coffs Coast regional economy is 255.

Income

Figure 5: Industrial diversification: impacts on regional income

REMPLAN 2.0 Impacts on Regional Income ($M)				
SECTOR	Demand Change $M	Industrial Effect	Consumpn' Effect	Total ($M)
Agriculture Forestry Fishing	0.000	0.049	0.058	0.106
Mining	0.000	0.006	0.001	0.008
Manufacturing	0.653	0.335	0.288	1.276
Electricity, gas & water supply	0.000	0.025	0.053	0.078
Construction	0.966	0.015	0.005	0.986
Wholesale trade	1.421	0.167	0.173	1.761
Retail trade	0.000	0.356	0.967	1.323
Accommodation, cafes & restaurants	0.000	0.074	0.253	0.327
Transport & storage	1.135	0.279	0.109	1.522
Communication services	0.000	0.081	0.099	0.180
Finance & insurance	0.000	0.129	0.261	0.390
Property & business services	0.000	0.793	0.328	1.121
Government administration & defence	0.000	0.095	0.052	0.146
Education	0.000	0.036	0.289	0.325
Health & community services	0.000	0.010	0.380	0.390
Cultural & recreational services	0.000	0.023	0.163	0.186
Personal & other services	0.000	0.013	0.227	0.240
TOTAL	**4.174**	**2.487**	**3.705**	**10.366**
Multiplier		Type 1 1.596		Type 2 2.483

Source: REMPLAN 2006.

Figure 5 outlines the regional income effect from the exogenous increase in demand on the four diversification industries; the manufacturing, wholesale trade, transport and storage, and construction industries. The initial increase in regional income was $4.714 million, with the industrial effect and consumption effect at $2.487 million and $3.705 million respectively. The total regional income created for the Coffs Coast regional economy is $10.366 million.

Value added

Figure 6: Industrial diversification: impacts on regional value added

SECTOR	Demand Change $M	Industrial Effect	Consumpn' Effect	Total ($M)
Agriculture Forestry Fishing	0.000	0.169	0.199	0.368
Mining	0.000	0.025	0.006	0.031
Manufacturing	1.189	0.609	0.525	2.323
Electricity, gas & water supply	0.000	0.113	0.238	0.351
Construction	2.363	0.036	0.013	2.412
Wholesale trade	1.910	0.224	0.233	2.367
Retail trade	0.000	0.563	1.527	2.090
Accommodation, cafes & restaurants	0.000	0.131	0.445	0.577
Transport & storage	2.213	0.544	0.212	2.969
Communication services	0.000	0.196	0.239	0.435
Finance & insurance	0.000	0.273	0.551	0.824
Property & business services	0.000	1.402	0.579	1.982
Government administration & defence	0.000	0.102	0.056	0.158
Education	0.000	0.042	0.331	0.373
Health & community services	0.000	0.012	0.469	0.481
Cultural & recreational services	0.000	0.046	0.318	0.364
Personal & other services	0.000	0.020	0.332	0.352
TOTAL	**7.674**	**4.509**	**6.275**	**18.458**
Multiplier		Type 1 1.587		Type 2 2.405

Source: REMPLAN, 2006.

Figure 6 outlines the value added effect from the exogenous increase in demand on the four specialisation industries; the manufacturing, wholesale trade, transport and storage, and construction industries. The initial increase in value added was $7.674 million, with the industrial effect and consumption effect at $4.509 million and $6.275 million respectively. The total regional value added created for the Coffs Coast regional economy is $18.458 million.

Concluding Comments

Table 3: Summary: Industry REMPLAN results

<table>
<tr><th colspan="5">Industry Specialisation and Diversification Statistics</th></tr>
<tr><th>Regional Economic Growth Strategy</th><th>Industry</th><th>Employment (Jobs)</th><th>Income ($M)</th><th>Value added ($M)</th></tr>
<tr><td><u>Industrial Specialisation Strategy</u></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">(exogenous increase of $M 20, divided into 2 industries)</td><td>Retail trade</td><td>119</td><td>3.342</td><td>5.280</td></tr>
<tr><td>Property and Business services</td><td>45</td><td>2.574</td><td>4.552</td></tr>
<tr><td>Multiplier effect (Type 1 + Type 2)</td><td>186</td><td>7.431</td><td>12.872</td></tr>
<tr><td></td><td>Total Impact to the Coffs Coast region</td><td>349</td><td>13.346</td><td>22.704</td></tr>
<tr><td><u>Industrial Diversification Strategy</u></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="5">(exogenous increase of $M 20, divided into 4 industries)</td><td>Manufacturing</td><td>15</td><td>0.653</td><td>1.189</td></tr>
<tr><td>Wholesale trade</td><td>32</td><td>1.421</td><td>1.91</td></tr>
<tr><td>Construction</td><td>29</td><td>0.966</td><td>2.363</td></tr>
<tr><td>Transport and Storage</td><td>23</td><td>1.135</td><td>2.213</td></tr>
<tr><td>Multiplier effect (Type 1 + Type 2)</td><td>157</td><td>6.192</td><td>10.784</td></tr>
<tr><td></td><td>Total Impact to the Coffs Coast region</td><td>255</td><td>10.366</td><td>18.458</td></tr>
<tr><td colspan="2">Impact Difference (specialisation – diversification)</td><td>94</td><td>2.980</td><td>4.246</td></tr>
</table>

Source: *REMPLAN* 2006

The current study found that a potential exogenous increase in demand ($20 million), distributed equally between two industrial specialisation industries (the retail trade, and property and business services industries) produced a total impact to the Coffs Coast region of 349 jobs, $13.346 million in wages and salaries, and $22.704 million in value added (regional income).

In addition, the current study found that a potential exogenous increase in demand ($20 million), distributed equally between four industrial diversification industries (manufacturing, wholesale trade, transport and storage, and construction industries) produced a total impact to the Coffs Coast region of 255 jobs, $10.366 million in wages and salaries, and $18.458 million in value added (regional income).

In conclusion, the current study found that a potential exogenous increase in demand ($20 million), distributed equally between two industrial specialisation industries, produced a greater impact on employment, income and value added than an exogenous increase in demand ($20 million), distributed equally between four diversification industries, within the Coffs Coast region. The measured difference in these two regional economic growth strategies was 94 jobs, $2.980 million in wages and salaries, and $4.246 million in value added (regional income).

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