

# **Understanding Local Competitiveness**

Briefing Paper 7: Identifying Key and Strategic  
Industries, Broome 2001-2011

**PAUL PLUMMER RACHEL CHAPMAN  
& FIONA HASLAM McKENZIE**

---

**CENTRE FOR REGIONAL DEVELOPMENT  
SCHOOL OF EARTH AND ENVIRONMENT**

---



**THE UNIVERSITY OF  
WESTERN AUSTRALIA**

# **Understanding Local Competitiveness: Identifying Key and Strategic Industries, Broome, 2001-2011**

**PAUL PLUMMER, RACHEL CHAPMAN  
& FIONA HASLAM MCKENZIE**

---

**CENTRE FOR REGIONAL DEVELOPMENT  
SCHOOL OF EARTH AND ENVIRONMENT**

---



**THE UNIVERSITY OF  
WESTERN AUSTRALIA**

*Understanding Local Competitiveness: Identifying Key and Strategic Industries, Broome 2001-2011*

The views expressed and the conclusions reached in this publication are those of the author(s) and not necessarily those of persons consulted.

**Authors**

Professor Paul Plummer  
Co-Director, Centre for Regional Development  
School of Earth and Environment  
The University of Western Australia  
Crawley WA 6009

Email: [paul.plummer@uwa.edu.au](mailto:paul.plummer@uwa.edu.au)

Website: <http://www.crd.uwa.edu.au/>

Professor Fiona Haslam McKenzie  
Co-Director, Centre for Regional Development  
School of Earth and Environment  
The University of Western Australia  
Crawley WA 6009

Email: [fiona.haslam-mckenzie@uwa.edu.au](mailto:fiona.haslam-mckenzie@uwa.edu.au)

Website: <http://www.crd.uwa.edu.au/>

Rachel Chapman  
Centre for Regional Development  
School of Earth and Environment  
The University of Western Australia  
Crawley WA 6009

Website: <http://www.crd.uwa.edu.au/>

**Centre for Regional Development Contact Details**

Centre for Regional Development  
School of Earth and Environment  
The University of Western Australia  
35 Stirling Highway  
Crawley WA 6009  
Australia

Phone: 08 6488 8029  
Fax: 08 6488 1054  
Email: [admin-crd@uwa.edu.au](mailto:admin-crd@uwa.edu.au)  
Website: <http://www.crd.uwa.edu.au/>

Published in August 2015

## Table of Contents:

1.	Executive Summary.....	5
2.	The Western Australia Regional Capitals Alliance.....	7
3.	Job Creation, Economic Diversity, and Local Competitiveness .....	8
4.	Unpacking the Dynamics of Local Competitiveness.....	9
5.	Data Description: Employment by Industrial Classification.....	12
6.	The Structure and Dynamics of Job Creation: Broome.....	13
7.	Implications for Local Economic Policy.....	21
8.	Appendix A: ANZSIC Industrial Classification.....	23
9.	Technical Appendix.....	24

## 1. EXECUTIVE SUMMARY:

This briefing paper shows that since 2001 Broome has had a growing, and diverse economic base. The 2006-2011 data in particular suggests that Broome has a number of industry sectors which are growing and are important industries and thus are specialised activities, giving Broome a **competitive** and **comparative advantage**. Several of these are large employers thus contributing to the economic base of Broome.

Over the 10 year period, the highest employing industries increased to include healthcare and social services, in addition to accommodation and food services and education and training. The only sector to lose jobs in Broome, relative to the Western Australian benchmark was information, media and telecommunications. Of relevance for the diversification of the local economy, the data showed that the smaller industries grew more quickly over the periods than the established industries, suggesting that during the resources boom, the competitive advantage was being spread across a diverse range of industries in the Broome economy, thus contributing to economic resilience.

In the **2001-2006 period**, Broome had **comparative advantage** in the following sectors:

- Agriculture
- Accommodation & food services
- Rental, hiring & real estate services
- Public administration & safety
- Mining
- Education and training
- Construction
- Electricity, gas, water & waste services
- Transport, postal & warehousing
- Other services
- Industries inadequately stated

In the same period, Broome had **competitive advantage** in the following sectors:

- Accommodation & food services
- Construction
- Transport, postal & warehousing

- Agriculture
- Rental, hiring & real estate services
- Mining
- Electricity, gas, water & waste services, and
- Industries inadequately described

In the **2006-2011 period**, Broome had **comparative advantage** in the following sectors:

- Agriculture
- Accommodation & food services
- Administrative & support services
- Rental, hiring & real estate services
- Public administration & safety
- Mining
- Arts & recreation services
- Health care & social assistance
- Education & training
- Construction
- Electricity, gas, water & waste services
- Transport, postal & warehousing
- Industries inadequately described

In the same period, Broome had **competitive advantage** in the following sectors:

- Accommodation & food services
- Construction
- Transport, postal & warehousing
- Agriculture
- Rental, hiring & real estate services
- Mining
- Arts & recreation services

- Public administration & safety
- Education & training
- Health care & social assistance
- Electricity, gas, water & waste services, and
- Industries inadequately described

## **2. The Western Australia Regional Capitals Alliance**

This is the latest in a series of reports into the dynamics of competitiveness across the Western Australian settlement system. This research is conducted as part of a strategic collaboration between the *Western Australian Regional Capitals Alliance (WARCA)* and the *Centre for Regional Development* at the *University of Western Australia*. The objectives of this ongoing collaboration are:

- To gain a clear understanding of the opportunities and barriers to regional growth and resilience across Western Australia.
- To facilitate evidence-based policy, indicating specific areas of policy-making that may require revision.

In this report, we explore the local competitiveness of Broome by identifying the key and strategic industries that have been driving job creation over the 2001-2011 resource boom period. We address two key questions about the dynamics of growth:

- What are the most important industries in Broome in terms of employment and job creation?
- What industries constitute the economic base of the Broome economy?

Using the analysis of this report it is possible to target local economic policy by identifying those industries that are the most important drivers of growth, those that are potentially emerging industries, and those that are most vulnerable.

The information contained in this report is supported by the following documents:

1. UWA/Regional Capitals in the WA Settlement Hierarchy Research:
  - a) Briefing Paper 2 - Employment Change and Job Creation
  - b) Briefing Paper 3 – Employment Diversity and Growth
  - c) Briefing Paper 4 – Endogenous Growth and Local Competitiveness
  - d) Briefing Paper 5 – Identifying Regional Capitals
2. Academic Papers:

Plummer, P., Tonts, M. Martinus, K (2014) “Endogenous Growth, Economic Restructuring and Local Contingency in the Evolution of a Patchwork Economy: Regional Western Australia, 2001-2011” *Journal of Economic and Social Policy* 16(1) 1-31.

3. Planning Documents:

Government of Western Australia (2014) “State Planning Strategy 2050” (<http://www.planning.wa.gov.au/publications/6561.asp>)



### **3. Job Creation, Economic Diversity and Local Competitiveness**

The contemporary Western Australian economy can be characterized by a multi-speed economy, driven by a strong and consistent pattern of job creation. Over the past decade, job creation across industries has not played out evenly across Western Australia. This has resulted in an increasingly ‘patchwork economy’, with larger and more economically diverse economies forging ahead of less resilient smaller settlements. Within this broader context, there is clear evidence that the Regional Capitals are making an increasingly significant contribution to the evolution of employment across the State. In particular, the economic performance of WARCA members relative to the other localities across Western Australia indicates that:

- Engagement in the global economy and broader socio-economic processes have been important in driving economic growth across WARCA members.
- Nonetheless, local competitiveness is critical in either allowing localities to overcome an unfavourable mix of industries or to capitalize on their industry structure.
- The relative importance of local competitiveness and the ways in which localities engage with broader socio-economic processes varies significantly across localities.

Overall, these findings have the following implications for the formation of local economic policy:

- The lived and practical experience of the WARCA members questions the efficacy of a ‘one size fits all’ policy stance.
- While it is true that local attributes are important in contributing to growth, it is important not to underestimate the importance of external demand in driving development.
- Caution needs to be exercised in focusing excessively on local competitiveness as a means of developing the economies of the regional capitals.

This briefing report is one of series of complementary reports which begin to unpack the growth experience of each WARCA member, exploring the local competitiveness through the propulsive industries (industries/sectors that are identified as the primary drivers of local economic and employment growth) thus driving the local economy.

## 4. Unpacking the Dynamics of Local Competitiveness

A recently published report by the *Western Australian Department of Regional Development* (2014) focuses on identifying the key drivers of local competitive and comparative advantage across the Western Australian economy. Similarly, the strategic blueprint reports submitted by the *Regional Development Commissions* in 2014 were required to identify those economic activities in which they have a comparative advantage. In this report we undertake a preliminary investigation of the dynamics of WARCA members, imputing competitiveness and comparative advantage from the underlying industrial structure and ability of these localities to create jobs.

### Understanding the Concepts

#### *(A) Local Competitive Advantage: the Ability to Create Jobs Locally*

Cities and regions compete with each other for global, national, and local ‘market share’.

Tracking the competitive advantage of a particular regional economy can be imputed, or calculated, from information on local job creation, specifically:

- **SIZE:** The importance of an industry in terms of the number of persons employed in each industry.
- **GROWTH:** The industries growing most rapidly over a particular period of time in terms of their ability to create jobs locally.

For a variety of reasons, industries perform differently in particular locations and, not surprisingly, local and regional economies perform differently to each other. Some of those reasons include natural resources, geographic advantages, access to transport, energy or information networks, local policies and human capital. Human capital brings knowledge, skills and competencies which have a productive value. Housing, education, amenity and services all shape the availability and employability of human capital.

Using the benchmark of the overall performance of the Western Australian economy, it is possible to categorize local industries in terms of **SIZE** and **GROWTH**:

- **FAST GROWING:** relatively large sectors that have exhibited rapid recent growth.
- **RESTRUCTURING:** relatively large sectors that make a significant contribution to the economic base but with little or no growth over the recent past.
- **UNDERDEVELOPED:** low levels of activity in terms of employment and the contribution to the local economy.

#### *(B) Comparative Advantage: Local Economic Specialization and Interregional-Trade Patterns:*

Conventionally it is assumed that localities specialize in those activities in which they have a comparative advantage. **Comparative advantage** is the principle that a country, region or

locality should specialise in producing and exporting goods in which it has comparative or relative cost advantage over others, and import goods in which it has a cost disadvantage. Factors which may influence comparative advantage are natural resources but also development of technology and human skills, economies of scale and access to advantageous trade opportunities (transport, markets etc).

A comparative advantage provides the opportunity to sell goods or services at a lower price than the competitors and thus realise positive margins.

The comparative advantage of a particular economy is imputed, or calculated, using information on:

- **SPECIALIZATION:** The importance of an industry in terms of the degree to which the local economy specializes in that economic activity.
- **ECONOMIC BASE:** A measure of the degree to which economic activity and employment is related to servicing local demand as against servicing demand external to the region.

Determining the pattern of local economic SPECIALIZATION using location quotients identifies the industries that drive and underpin the local economy (see technical appendix). Location quotients (LQ) measure the concentration of an industry or economic activity in a particular location, compared to the State or nation overall. It therefore identifies the specialisation(s) of a particular place or region in relation to the bigger jurisdiction. Put differently, location quotients also indicate the proportion of people employed in an industry in a locality relative to the proportion of people employed in that industry in the larger, reference or benchmark economy (for example, the State economy or that of the nation overall), in this instance Western Australia. If a particular industry's share of regional employment is greater than that industry's share of State employment, i.e. the location quotient is greater than one, (or unity), then the locality is assumed to specialize in that economic activity.

For example, if ten per cent of a region's workforce is employed in agriculture, but only eight per cent of the overall State population is employed in agriculture then the LQ is  $(.10/.08)$  1.25 meaning that agriculture is twelve and half times more concentrated in that region than for the State overall. A LQ greater than one suggests that the particular industry outputs are exported and hence bring income to the region.

Since local economic data on trade flows does not exist, location quotients have also been widely used to infer regional trade patterns:

- **BASIC Sector:** The greater the location quotient above one (or unity), the larger the economy's net sectoral exports from that sector (i.e. the greater the proportion or share of the local economy of a particular industry, and therefore exports from that region).
- **Non-BASIC Sector:** The greater the location quotient below unity (or one), the larger the economy's net sectoral imports from that sector (i.e. the proportion or share of the local economy of a particular industry is less than the overall State proportion, and therefore imports into that region).

- **NEUTRAL Sector:** For a location quotient of unity, (or one), the economy is neither a net exporter nor a net importer for that sector.

The level of **ECONOMIC BASE** in a local economy can be calculated by aggregating export oriented employment across all industries in which the locality is specializing in terms of employment (see technical appendix). A region with a healthy economic base is likely to be one that specializes in industries with **high LQ and high employment**.

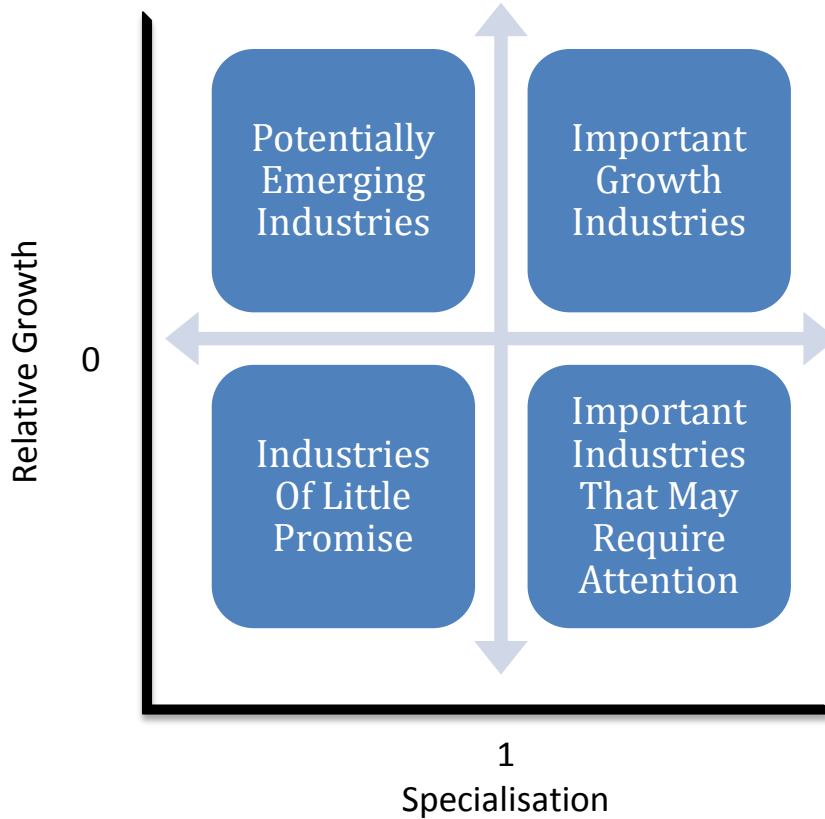
### *(C) Classifying Industrial Activities*

Combining the information on an economy's ability to create jobs locally and identifying the patterns of specialization and inter-regional trade within sectors of the economy, it is possible to classify industries in terms of their growth potential and comparative advantage. Figure 1 classifies the economic structure of a local economy with relative growth measured on the vertical axis and relative specialization measured on the horizontal axis:

- **IMPORTANT GROWTH INDUSTRIES:** characterized by above average employment growth, relative economic specialization, and export orientation.
- **IMPORTANT INDUSTRIES THAT MAY REQUIRE ATTENTION:** characterized by below average employment growth, relative economic specialization, and export orientation.
- **POTENTIAL EMERGENT INDUSTRIES:** characterized by above average employment growth, but currently oriented towards servicing local demand.
- **INDUSTRIES OF LITTLE PROMISE:** characterized by below average employment growth and currently oriented towards servicing local demand.

The potential significance of each industry in terms of size is represented by the corresponding size of the graduated circle representing the industry on the graph.

**Figure 1: Classification of Industrial Activities in a Locality**



## 5. Data Description: Employment by Industrial Classification

This report uses Australian Bureau of Statistics (ABS) Census of Population and Housing time series profiles, which count the number of persons in each industry of employment (based on place of enumeration) for all 138 local government areas (LGAs) in Western Australia for the census periods 2001, 2006, 2011. The members of the *Western Australia Regional Capitals Alliance (WARCA)*: Albany, Broome, Greater Bunbury<sup>1</sup>, Kalgoorlie-Boulder, City of Greater Geraldton, Port Hedland, and City of Karratha. Boundaries for all LGAs are according to the ABS 2011 definition. To identify the key and strategic industries for each member of WARCA, employment is disaggregated by industrial sector, as defined by the Australian and New Zealand Standard Industrial Classification (ANZSIC) industry coding<sup>2</sup>. It should be noted that one limitation widely reported by regional local governments is the likely undercount of employees by the ABS. This arises out of the difficulty in capturing fly-in/fly-out workers and other temporary residents. There is no immediate means of overcoming this data limitation, except to use ‘place of enumeration’ (in other words, the place where the census participant actually filled out the census form, as opposed to their place of usual residence, which may or may not be different on the particular night of the census), data as has been done here.

<sup>1</sup> Greater Bunbury is an amalgamation of the LGAs of Bunbury, Capel, Dardanup, and Harvey.

<sup>2</sup> Found at <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2901.0Chapter5802011>

## 6. The Structure and Dynamics of Local Job Creation: Broome

### *(a) Local Competitive Advantage: the Ability to Create Jobs Locally*

Figure 2 summarizes the distribution of employment across Broome's industrial sectors for 2001, 2006, and 2011.

- In 2001, the highest employing industries were public administration and safety (951 people, 13% total employment), accommodation and food services (757 people, 10% of total employment), and education and training (730 people, 9.6% of total employment).
- In 2006, accommodation and food services remained an important industry, employing 827 people (10%), but was surpassed by healthcare and social services, which employed 903 people (11%). Retail trade also employed 827 people that year (10%).
- Healthcare and social services maintained its position as the highest employing sector in 2011, employing 1132 people (12%). Accommodation and food services also remained a highly important industry, employing 870 people (9.4%). Education and training was, once again one of the top three sectors, employing 863 people (9.3%).

Figure 2: Broome employment by industry for 2001, 2006 and 2011.

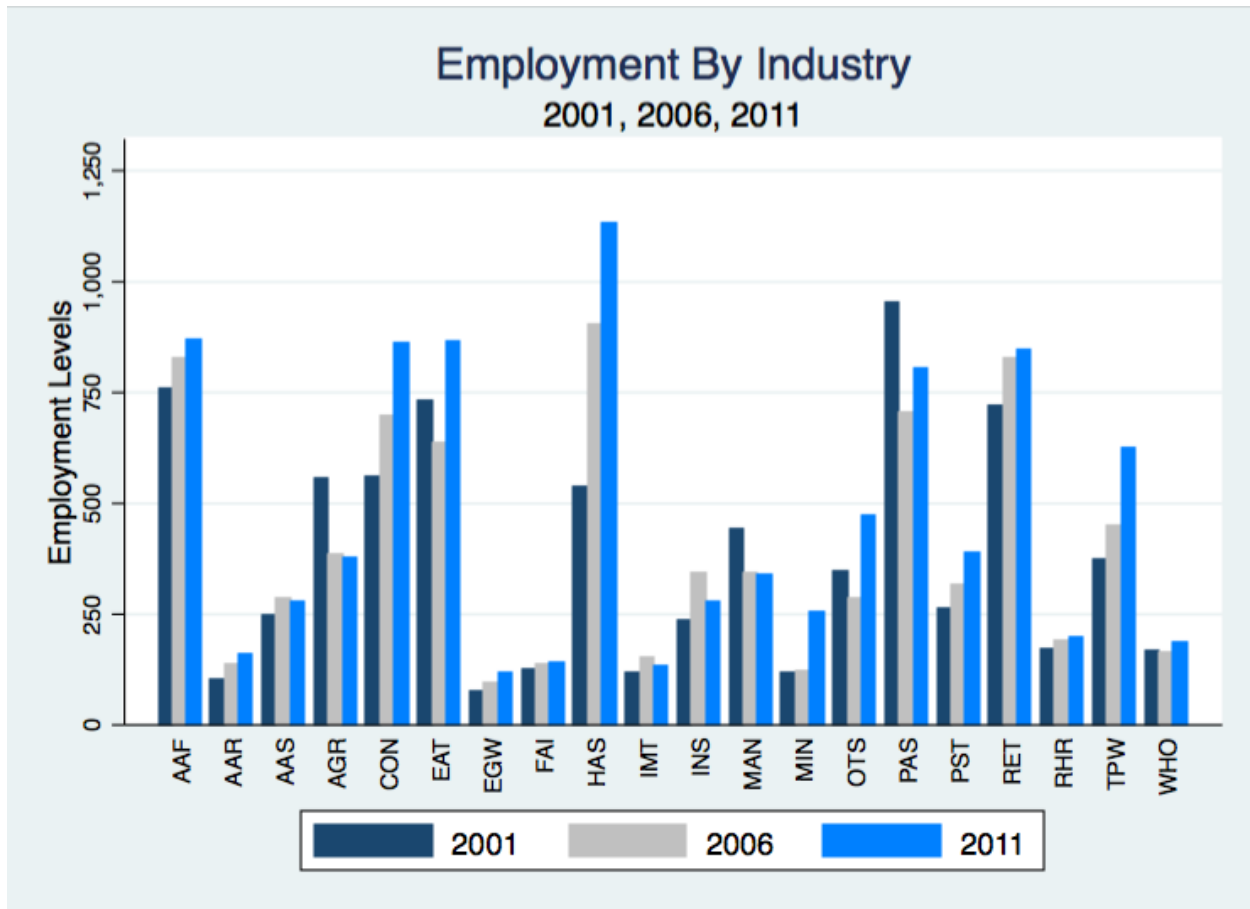


Figure 3 summarized job creation by industrial sector for Broome relative to the average growth of the same sector across the Western Australian economy:

- Over the 2001-2006 period, the fastest growing industries in Broome, relative to Western Australia were manufacturing, health care and social assistance, arts and recreation services, and administrative and support services.
- Over the same period, the slowest growing industries in Broome, relative to Western Australia were education and training, information media and telecommunications, and other services.
- Over the 2006-2011 period, the fastest growing industries relative to Western Australia were in job that were either inadequately described or not stated. Of those jobs that could be meaningfully classified, other services and wholesale trade experienced the highest rates of relative job creation.

- Over the same period, the only industry that lost jobs in Broome, relative to the Western Australian benchmark was information media and telecommunications.

Figure 3: Growth rates of Broome industries relative to Western Australian growth rates.

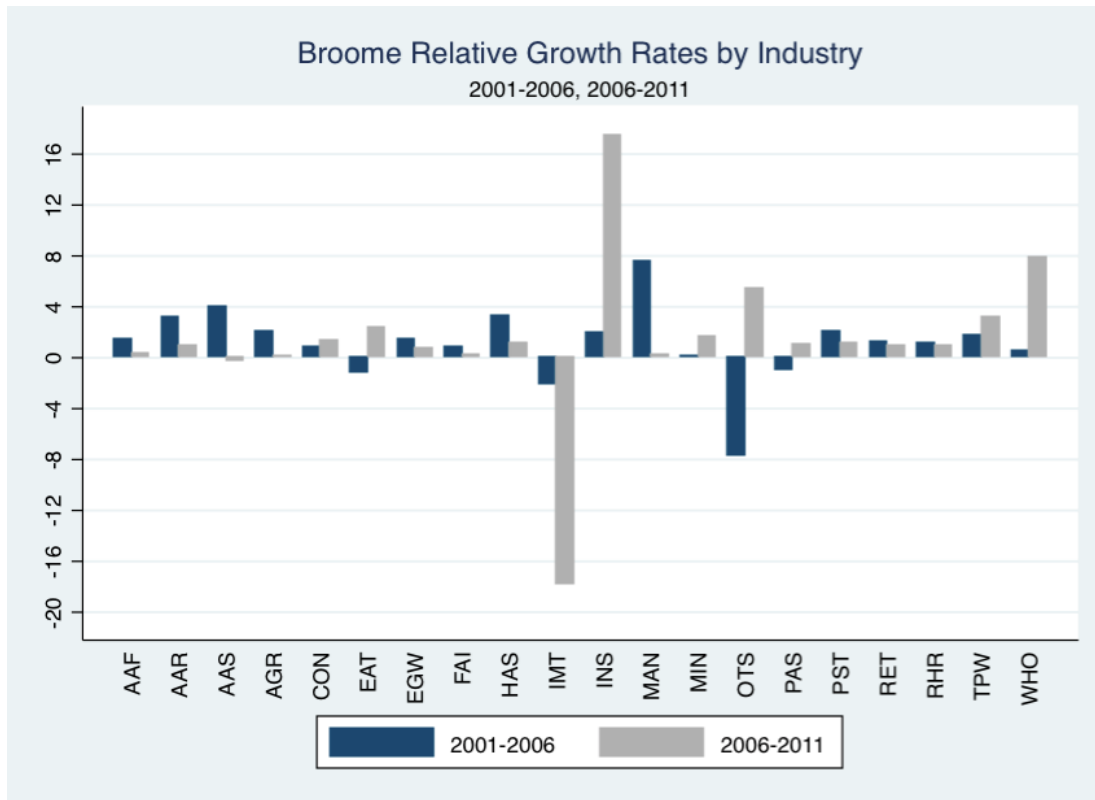
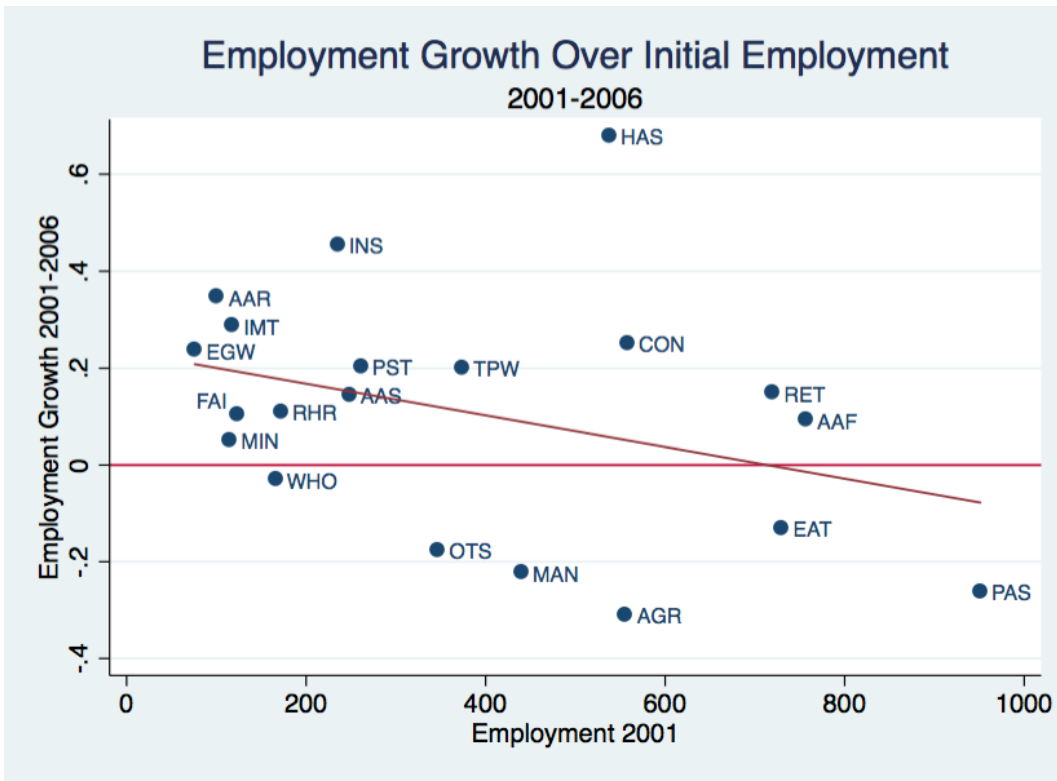


Figure 4 shows the evolution of the overall pattern of competitive advantage for Broome in terms of the relationship between absolute employment growth rates and the size of each industrial sector. Overall, in the period 2001-2006 and 2006-2011 there was a negative relationship between the size of an industry in terms of employment and the growth rate of that industry. This means that the smaller industries in Broome grew more rapidly, catching up with larger and, hence, previously more important industries. This is not unusual and not necessarily something to cause alarm. For example, if an industry of five components grows by 20 per cent the increase in one component, but if a larger industry of 50 components grows by only 10 per cent the increase is five components, five times greater than the smaller company's net growth.

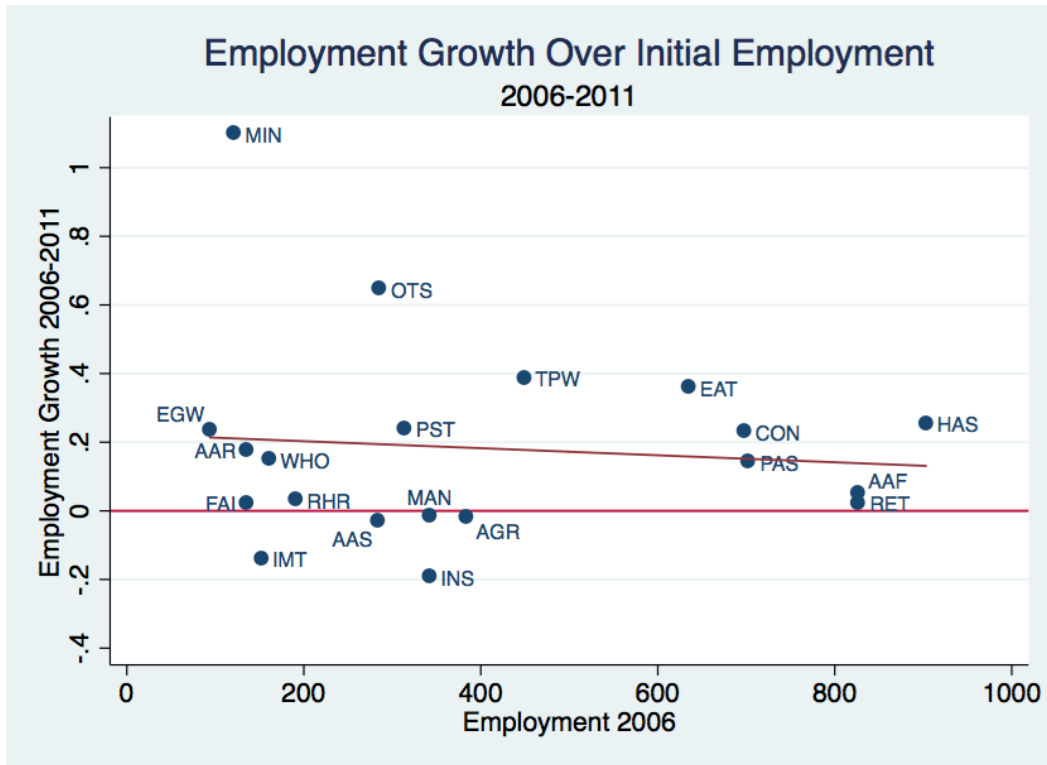
Indeed, this catch-up means that over the resource boom the competitive advantage of Broome is being spread across a more diverse range of industries.



Figure 4: Employment growth rate, relative to initial size of employment for (a) 2001-2006 and (b) 2006-2011. (Note the different employment growth scales)



a.



b.

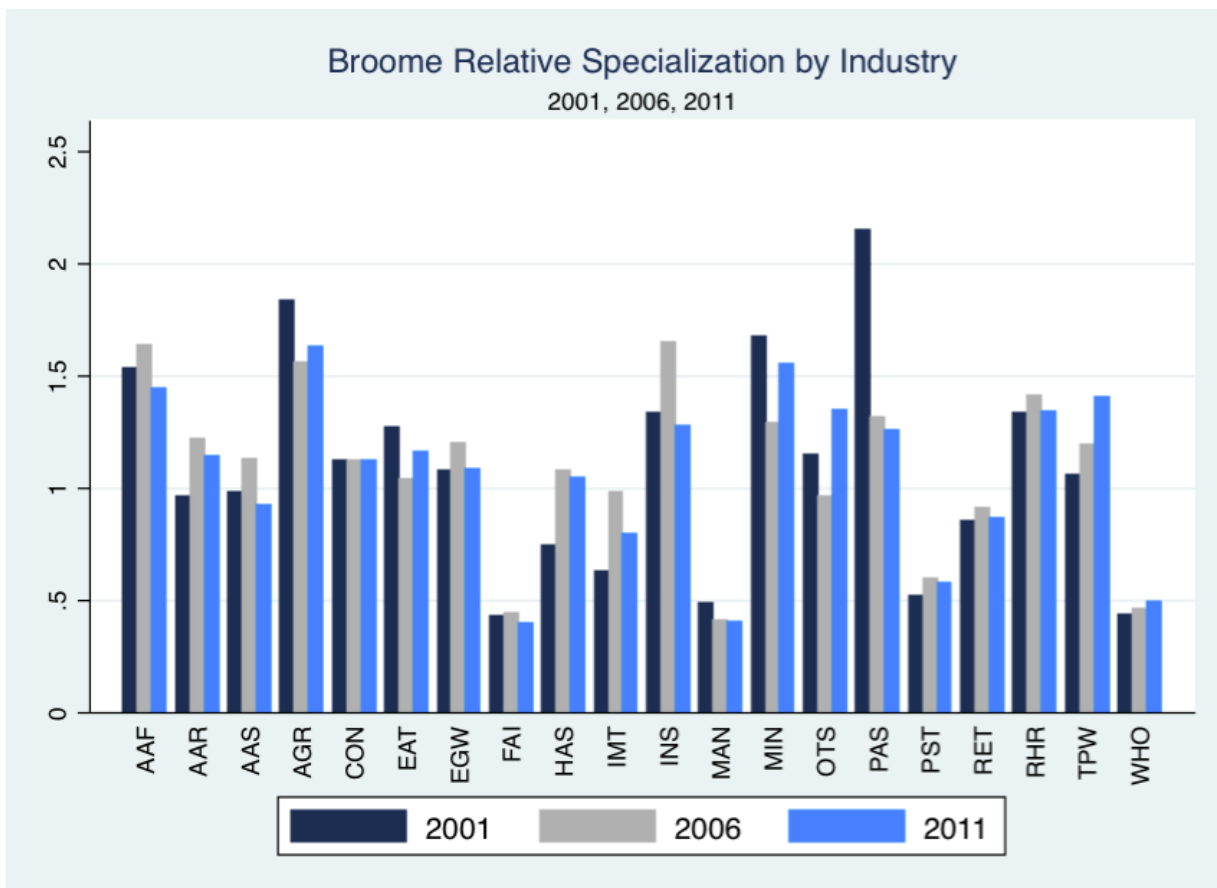
*Interpreting Figure 4(a) and (b).*

The steady red line at zero signifies the growth threshold. i.e. those industry sectors below that red line have not grown in the intercensal period. It follows then that those sectors above the line have grown. As explained above, of those sectors which grew, those which employed the largest number of people (moving across the horizontal axis), tended to grow less fast than the smaller industry sectors, as shown by the red line moving downward. The good news for Broome is that in the most recent intercensal period (2006-2011) the difference in growth rates between the bigger industry sectors and smaller sectors narrowed suggesting that employment growth increased overall. In the 2006-2011 period, there were fewer sectors below the red static line.

*(b) Local Economic Specialization and Interregional-Trade Patterns:*

Figure 5 show the pattern of local specialization for Broome across the 2001-2011 period. Overall, Broome has a relatively diverse economic base, specializing in an array of industries. However, the industries in which Broome is most specialized are Agriculture, Mining, Public Administration & Safety, Real Estate, and Warehousing.

Figure 5: The specialisation of each industry by employment, relative to levels of employment in Western Australia. Values greater than one demonstrate local specialization in that industry.

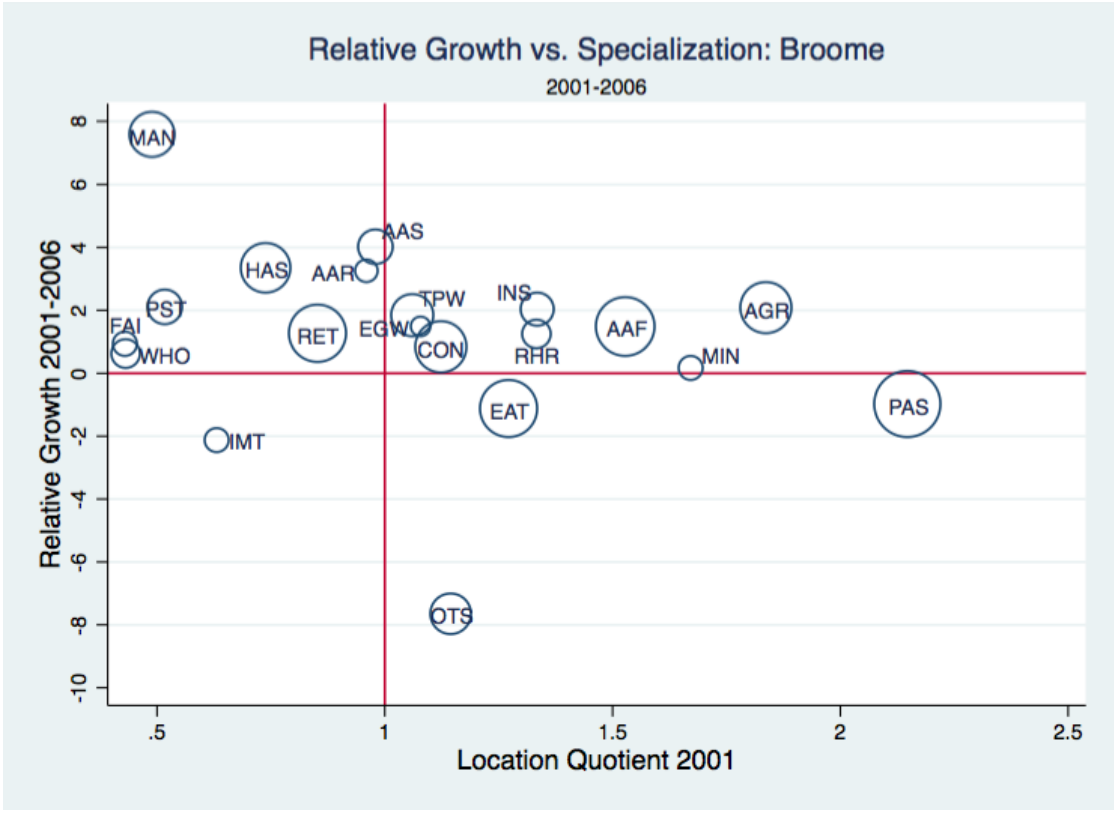


### *(c) Classifying Industrial Activities*

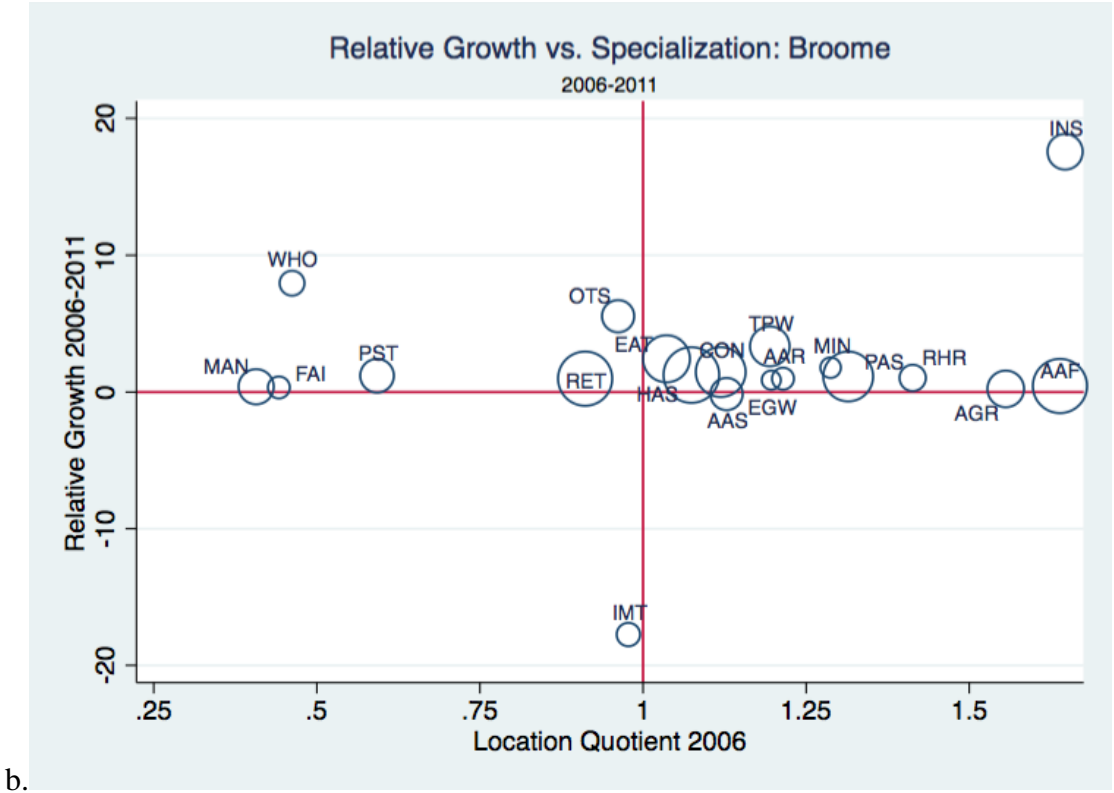
Combining the information on an economy's ability to create jobs locally and the sectoral patterns of specialisation, it is possible to classify industries in terms of their growth potential and comparative advantage. Figure 6 and Figure 7 classify the economic structure of the Broome economy into IMPORTANT GROWTH INDUSTRIES, IMPORTANT INDUSTRIES THAT MAY REQUIRE ATTENTION, POTENTIAL EMERGENT INDUSTRIES and INDUSTRIES OF LITTLE PROMISE.

- Broome has a relative diverse economy in the sense that it specializes in a wide array of economic activities.
- Of those industries in which it specializes, a large number are also growing rapidly relative to Western Australia.
- Accordingly, Broome has a comparative advantage in a diversity of economy activities.
- In terms of numbers employed and competitive advantage, Agriculture (AGR), Accommodation & food services (AAF), health care and social assistance (HAS), Manufacturing (MAN), Utilities (EGW), Retailing (RET) and construction (CON) were the most important growth industries throughout the 2001-2006 period.
- In 2001-2006 education and training (EAT) and public administration and safety (PAS) were identified as industries requiring attention and these had become important growth industries by the 2006-2011 period.
- Health care and social assistance (HAS) was a potentially emergent industry in 2001-2006 which became an important industry in the 2006-2011 period.

Figure 6: The relative growth of the industry based on level of local specialization for (a) 2001-2006 and (b) 2006-2011. The size of the circle demonstrates the proportion of that industry to total employment; the larger the circle, the more people employed in that sector compared to the whole.



a.



b.

Figure 7: Classification of industries based on their specialisation and relative growth for (a) 2001-2006 and (b) 2006-2011. Within each category, industries are ranked based on their level of employment (shown in brackets).

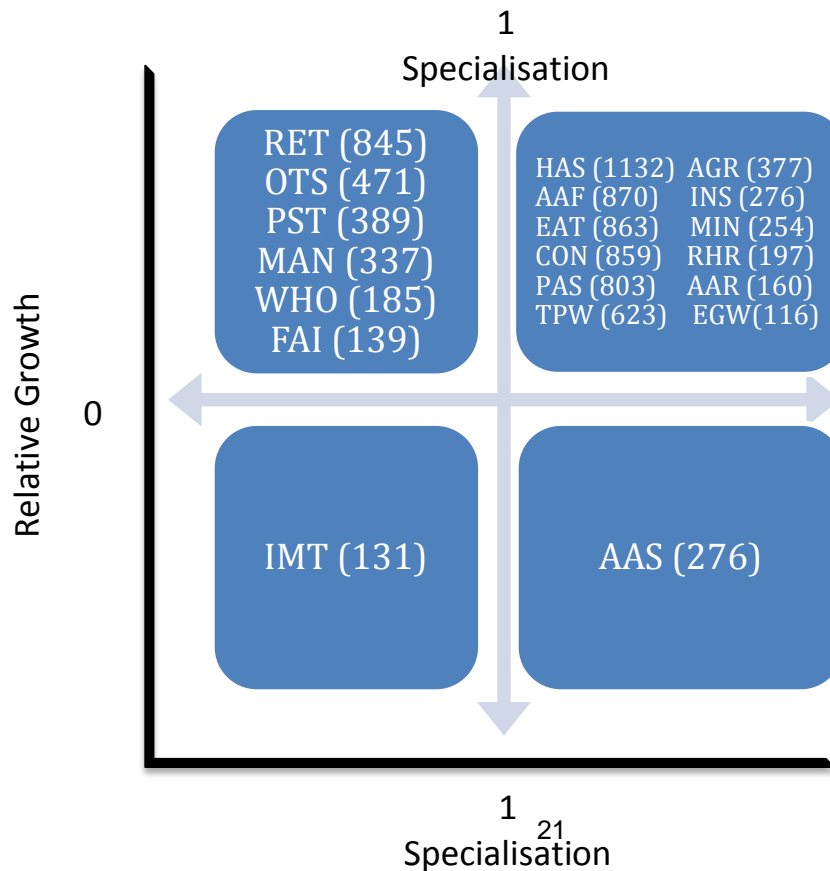
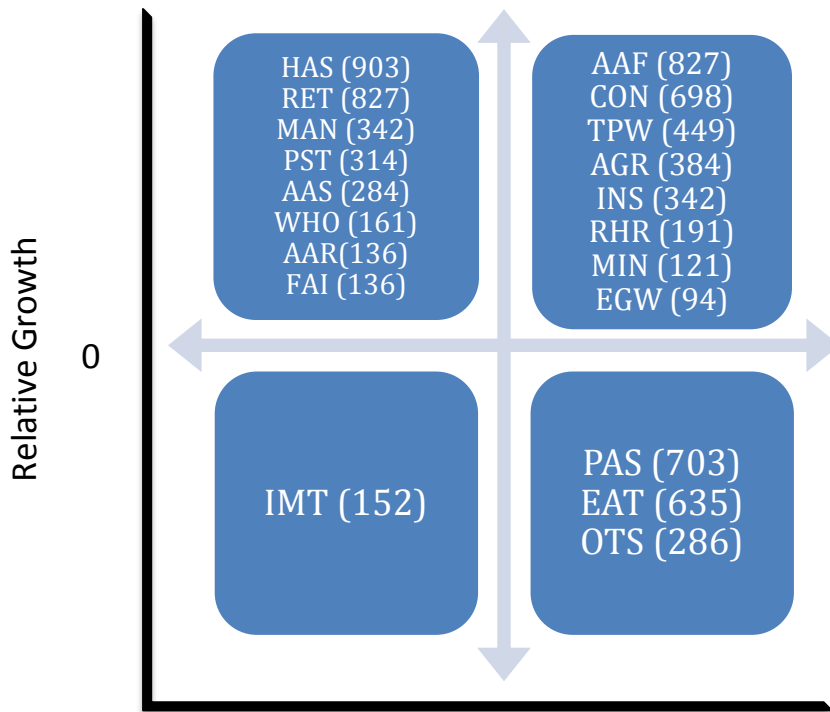


Figure 7 clearly shows that information media and communication (IMT) is an industry of little promise across the entire period 2001-2011. In the 2001-6 period, administrative and support services (AAS) was an important industry that may require attention in 2006-11, while the three sectors in this category in 2001-2006 (public administration and safety (PAS), education and training (EAT) and other services (OTS)) all transitioned to be either potential emergent industries (OTS) or important growth industries (PAS and EAT))

## **7. Implications for Local Economic Policy**

Competitive and comparative advantage are technically two separate, independent concepts which measure economic performance. However, when viewed together they have the potential to measure:

- multiple factors in the economy of a particular place;
- the relationship of a particular locality with other localities nearby ('neighbours');
- the interdependence between industries; and
- the performance of that economy with other local economies.

The degree of economic integration is also an important factor and this underpins the robustness of the Western Australian state economy. Consequently, in regional Western Australia, the links each regional capital has with its 'neighbours' can be important depending upon the relative location or proximity of a regional capital and/or the remoteness of the 'neighbours'. The strength of the direct and indirect impacts of a regional economy on its neighbours and also the direction and flows of the impacts are important to understand and this is best described as 'connectivity'. The links and connectivity also indicate accessibility. Factors which influence accessibility are numerous, including: transport networks, social capital, commodities, labour force, infrastructure and services.

Understanding the links, flows, connectivity and accessibility provide the necessary information to explain how competitive and comparative advantage and industry specialisation of a local economy will impact on neighbouring economies and the strategic positioning of regional capitals in the Western Australian economy overall.

The dynamics and drivers of local competitiveness and comparative advantage shape a regional economy's responsiveness to externalities and help explain the underlying forces triggering 'catch-up', 'falling behind' and 'forging ahead'. They also assist in forecasting economic impacts including:

- the direct and indirect effect of investing in regional capitals,
- the influence of local investment beyond the regional capitals, and
- the potential for diffusion of external shocks across the economic system.

In the case of Broome, there are indications there is a high level of dependence between Broome and its neighbours; investment in Broome has a flow-on effect on its neighbours. Future research,

through the Western Australian Regional Model (WARM) will explore the degree of connectivity and economic integration between Broome and its neighbours and Broome and the Western Australian economy overall.

## 8. APPENDIX A: ANZSIC INDUSTRIAL CLASSIFICATION

ANZSIC Classification	Mnemonic
Accommodation & food services	AAF
Arts & recreation services	AAR
Administrative & support services	AAS
Agriculture, forestry & fishing	AGR
Construction	CON
Education & training	EAT
Electricity, gas, water & waste services	EGW
Financial & insurance services	FAI
Health care & social assistance	HAS
Information media & telecommunications	IMT
Inadequately described/Not stated	INS
Manufacturing	MAN
Mining	MIN
Other services	OTS
Public administration & safety	PAS
Professional, scientific & technical services	PST
Retail trade	RET
Rental, hiring & real estate services	RHR
Transport, postal & warehousing	TPW
Wholesale trade	WHO



## 9. TECHNICAL APPENDIX:

### (1) *Relative Growth Rates:*

Let  $E_{ir,t}$  define the number of persons employed in industry  $i$  in region  $r$  at time  $t$ . It follows that the local growth rate  $g_{ir}$  can be defined as:

$$g_r = \frac{E_{ir,t+1}}{E_{ir,t}} - 1$$

Similarly, the average growth rate across the benchmark economy, in this instance Western Australia,  $g_{iWA}$ , can be defined as:

$$g_{iWA} = \frac{E_{iWA,t+1}}{E_{iWA,t}} - 1$$

It follows that the relative local economic performance,  $A_{ir}$ , in terms of job creation is defined as:

$$A_{ir} = g_{ir} - g_{iWA}$$

If  $A_{ir} > 0$  then industry  $i$  in region  $r$  is performing better than the same industry in the benchmark economy. Conversely, if  $A_{ir} < 0$  then industry  $i$  in region  $r$  is performing worst than in the benchmark economy.

### (2) *Local Specialization:*

Conventionally, basic sector employment is assumed to include Agriculture, Mining, Tourism, State/Federal Government and manufacturing (partially) whereas non-basic economic activities include retailing, commercial banking, local government, local public schools, services.

However, this rule-of-thumb can be augmented with a more objective measure of local specialization, the location quotient. An employment location quotient ( $LQ_{ir}$ ) is used to define the relative specialization of an industry  $i$  in a region  $r$  relative to the employment in the same industry in a benchmark economy:

$$LQ_{ir} = \frac{E_{ir}/E_r}{E_{iWA}/E_{WA}}$$

Where,  $E_{iWA}$  is the level of employment in industry  $i$ , in the benchmark economy and  $E_{WA}$  is the total employment in the benchmark economy, in this instance Western Australia.

Where local economic data on trade flows does not exist regional trade patterns need to be imputed from measures of local economic structure. Specifically, it is assumed that the patterns of trade can be imputed from the patterns of industrial specialization. In general,

- (a) the greater is the  $LQ_{ir}$  above unity, the larger will be there regions net sectoral exports
- (b) the greater is the  $LQ_{ir}$  below unity, the larger will be the regions net sectoral imports
- (c) for an  $LQ_{ir}$  of unity, the region is neither a net exporter nor a net importer.

## References

Department of Regional Development. (2014). Understanding the impact of Royalties for Regions. Perth: Department of Regional Development.

Government of Western Australia (2014) “State Planning Strategy 2050” (<http://www.planning.wa.gov.au/publications/6561.asp>)

Plummer, P., Tonts, M. Martinus, K (2014) “Endogenous Growth, Economic Restructuring and Local Contingency in the Evolution of a Patchwork Economy: Regional Western Australia, 2001-2011” *Journal of Economic and Social Policy* 16(1) 1-31.