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The intellectual capital needs of a transitioning economy: A case study exploration of Australian sectoral changes

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Abstract

Purpose – Developed economies with high-cost environments face industrial transitions from scale-based manufacturing (MAN) to knowledge, technology and intangible asset-based sectors. The purpose of this paper is to examine the changes in employment and value-adding profiles of transitioning industry sectors in Australia and discuss the implications for policy that influences the intellectual capital (IC) profile of industrial sectors in transition.

Design/methodology/approach – The approach borrowed concepts from the firm-level strategic management literature and applied them to a macro level of industry analysis. In this paper the authors examine the transitions in the Australian economy which, due to a rising cost base, is experiencing a decline in its value chain-oriented MAN sector. The authors contrast four industry sectors with the MAN sector and examine the different value creation models.

Findings – The findings clearly show how the contribution to employment and value added (termed Economic Value Contribution) of the different sectors vary. The authors extend these findings to a discussion on policy and the dimensions of IC that may have a role to play in facilitating transitions within an economy. The main conclusion is that a more rapid transition and higher value may be created if innovation and entrepreneurship are facilitated by targeted policies in transitioning sector.

Research limitations/implications – This work is based on a single country analysis of selected industry sectors. Further work needs to be done across many more countries to contrast the findings across nations/regions that differ in industrial complexity and to refine the analytical framework to improve construct validity and increase analytical power.

Practical implications – This work has implications for policy-makers facing the challenges of a transitioning economy, whether national or regional. Governments that are hands-on with respect to interventions to salvage and/or extend the life of sectors are at risk of missing opportunities to build the capacities and capabilities of emerging sectors while those governments that are hands-off, deferring to market mechanisms, risk transitions that are too little and/or too late to maintain a national or regional competitiveness.

Originality/value – To the authors knowledge, this is the first attempt to integrate the specific firm-level strategic management perspectives, used in this paper, with the macro-policy level to examine industry sectors with the twin metrics of economic productivity and employment in transitioning economies.

Keywords Innovation, Value analysis, Industrial revolution, Entrepreneurship

Paper type Research paper

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1. Introduction

Some economists argue that developed economies with high-cost environments will need to transition to industries based on knowledge, technology and intangible assets to remain competitive in a globalised trade environment (Jensen, 2012; Reuver and Bouwman, 2012; OECD, 2007). In the latter part of the twentieth century and into the twenty-first, rising costs are continuing to force the Australian economy to progressively move away from industrialised production and scale-based manufacturing (MAN) industries that compete primarily on cost to more knowledge-intensive and service-based industries that compete on value. In this paper we draw comparisons from the MAN sector with two service and two knowledge-based sectors through analysis of data from Australia over the period from 1990 to 2013. We show a change in profile in some economic sectors in terms of value added and employment. In particular we focus on three models of value creation that have emerged in the strategic management literature and apply these at the level of the national economy to assess the extent of proportional change in value-add and employment exhibited by these different models, one physical product output driven, MAN and two service-based sectors, namely, the transport, postal and warehousing (TPW) sector and the health care and social assistance (HCSA) sector. We then further examine two knowledge-based sectors for comparison to these value creation models, namely, the education and training (ED) sector and the professional, technical and scientific services (PTSS) sector.

Based on the ratio of total employee compensation and value added in the five sectors, we find that as Australia experiences industry transition there may not be an increase in the total value added in the economy due to the differences of profile and value-adding capacity among the different models of value creation. Further, the employment profiles reveal risks in growth in under-employment. If not accounted for, these long-term trends could eventually diminish the living standard of a nation's people. To avoid demise in the value retained in an economy, a major implication of this analysis is that economies with transitioning industries need to strengthen innovation and entrepreneurship dimensions of intellectual capital (IC) in specific sectors serving an economy to increase the firm-level focus on value added outputs. This finding fits with the findings of Hausmann *et al.* (2011) and Abeles and Rivas (2011) as to the importance of a rich industrial commons and high economic complexity for the economic value creation prospects of an economy (for a deeper discussion of this see Roos, 2014a).

The paper is organised as follows. The following section, Section 2, discusses the management of national and/or regional economies in transition and the extent to which IC tools have been applied to this task. This review suggests that there is scope for development of IC-based tools in order to assist policy-makers to manage industrial transitions in developed economies. Section 3 introduces the models for firm-level value-adding. Section 4 discusses the Australian case as the unit of analysis while Sections 5 and 6 detail the analysis of the model sectors including the MAN sector, the two services sectors TPW, and HCSA, and the two knowledge-intensive sectors ED and PTSS. Section 7 draws out the findings with respect to the product-intensive, service-intensive and knowledge-intensive industry dynamics by conducting a proportional analysis that accounts for employment and value added in the sectors over the extended time period. Section 8 brings together a discussion of the findings and Section 9 draws out the policy implications. Section 10 concludes the paper.

2. Managing policy in transitioning economies

Among the many macroeconomic issues that policy-makers seek to manage[1], forming economic policy around the issues of industry transition draws attention to two primary macroeconomic matters. The first is the rate of jobs supported and/or created and the second is productivity and the rate of value being added by industry sectors back to the broader economy. Each of these matters has specific challenges. For instance workers in the labour force of a declining sector can only maintain employment in the sector by reducing their wages until they ultimately lose their positions. They then must update their skills and look for new work in alternate sectors (Caselli, 1999). At the same time technological change in transitioning industries are likely to generate a transitory productivity slowdown (Galor and Moav, 2000). The twin effects of both these issues can be to severely decrease the living standard of nation or region as both full-time employment and productivity decline. This may particularly be the case in economies with a heavy reliance on a single sector or with limited industrial diversity.

Looking to manage these issues with a focus on supporting the single troubled sector can, potentially, divert a policy-maker's attention away from the much broader issues of the portfolio of industries during transitions. This may have three affects. First, it can cause an over-zealous attempt to stop the inevitability of decline in the sector. Second, there may be a failure to lay down transitioning human and other forms of capital development pathways for the transitioning sectors and third, the emerging sectors may be ignored meaning they develop too slowly and are under-resourced to capitalise on growth prospects. The implication flowing from these points is that government spending on the declining sector can be inefficient, chronic unemployment issues can arise from the displaced workers in the declining sector and the net economic value added from the declining and emerging sectors diminish reducing the total wealth of a country over time. It is in response to these implications that we seek to explore the Australian case in this paper to verify the extent to which these circumstances may evolve.

To develop an analysis of these issues we turned first to the field of IC. The IC assessment in regional or national aggregated form has been considered in the context of communities of innovation (Grimaldi *et al.*, 2012), emerging clusters (Jaron and Martos, 2012) and at national levels (Hervas-Oliver and Dalmau-Porta, 2007; Lin and Edvinsson, 2008) and for developing and developed nations (Abeysekera, 2007). However, studies such as these are either an analysis of relatively homogenous groups of firms with similar value creating strategies or they are assessments of the aggregated heterogeneous groups of firms that share the location of a region or nation. Neither of these types of studies consider the different types of value creating models that are inherent in the business practices behind the heterogeneity of firms[2] among the aggregated data and nor do they account for the dynamics of change and transition between industry sectors. This research therefore takes a different approach and moves towards understanding the dynamics experienced between different sectors and presents an argument for the application of IC analysis and development that will both support and enable better management of economies that are facing change and transition.

There are differences in the way different types of firms create value and exploit their IC for competitive advantage (see Roos *et al.*, 2005). More specifically studies have also illustrated that product and service-oriented firms need to approach both their stock and the management of their IC differently (Kianto *et al.*, 2010) and this is discussed in the context of MAN firms that introduce services into their product

portfolio (sometimes referred to as servitisation, see, Roos, 2014b). There are also differences found between the macro and micro view of various aspects of IC (Molloy *et al.*, 2011) which will potentially confound the macro-policy level achieving particular objectives that may be grounded in different micro-level performance issues at the firm level. These range of issues suggest that more attention is needed and more detailed perspectives are required if IC is to inform policy-makers on the shifts in economic patterns (Hervas-Oliver *et al.*, 2011). This further suggests that strategic sectoral policy (i.e. meso-level policy) initiatives are needed to target the twin parameters of employment and productivity when dealing with a portfolio of sectors in transitioning economies (see the discussion in Spoehr, 2014 and the discussion paper from Business Council of Australia, 2014)

3. Applying models of firm-level value creation to industry sectors

To examine the sectoral differences we apply three conceptualisations of value creation developed in the strategic management literature. Stabell and Fjeldstad (1998) offered a view of value creating configurations that included value chains, networks and shops (refer Figure 1) which is also useful for considering industry sectors. The value chain is the traditional model originally proposed by Porter (1985). A value chain is a linked sequence of activities that a firm operating in a specific industry performs in order to deliver a valuable product or service for the market. It assumes that value is created by a sequential set of primary activities that each in turn adds value to a final product. This is typical of a MAN firm but it is not representative of all firms.

The Value Network model of value creation is an intermediation value proposition. In other words the value for the customer is the ability of the firm to provide a set of connected relationships and services. The US business Ebay or the Australian equivalent gumtree are good examples of businesses whose primary role is to provide the service platform that connects both the customers who seek to buy and the providers who seek to sell. The value of the firm is in the provisioning of service, maintenance of infrastructure and managing the service provision that enables the connections between both the buyer and seller.

The Value Shop model of value creation is based upon a different set of assumptions. In this model, value is created by the potential of the firm to diagnose and rectify a customer problem, much as is practiced in a doctor's surgery. Value is not created from the routine tasks but by the customised task specific to a particular customer. The value to the customer is the expertise, knowledge and skills of the problem solver and their ability to implement solutions.

Our analysis is grounded in the transitioning economy of Australia. Four variables are selected to describe the trends: the number of full time employees and the number of non-full time employees in the sector, both measured in thousands. The total compensation of employees, and industry gross value added after employment, in millions in Australian dollars, both taken as current prices. Both pairs of data are then presented as proportional data to observe the year on year trends. We expect that a strengthening sector will demonstrate a declining proportion of non-full time employees or inversely an increasing proportion of full time employees, meaning that the sector is creating more full time job opportunities over time, and the proportion of value added to total employee compensation will increase over time, indicating that the sector is becoming a more valuable contributor of total value added to the broader economy over time. A positive result in both indicators would suggest the sector

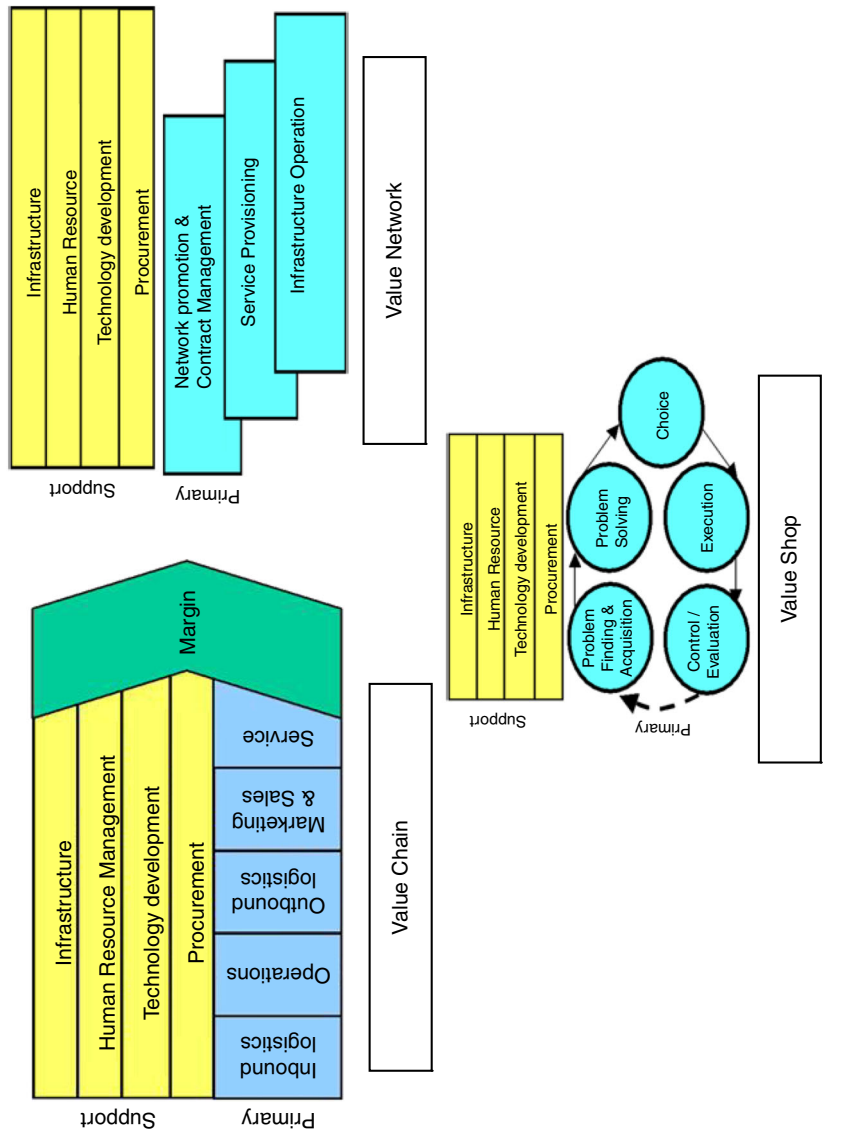

Figure 1.
Three value configurations

is a net contributor to the growth in national wealth and standards of living. To confirm that our selection of these sectors conform with the above propositions, we refer more specifically to descriptions and definitions provided by the institutional source of the data, the Australian Bureau of Statistics (ABS), in the analysis section on below. The data is extracted from publicly available original datasets consisting of all sectors that appeared to have records from the ABS (2013a, b).

4. The Australian economic context

Before moving to the analysis this section outlines the economic context of Australia to illustrate its transitioning status. As Ford announced the closure of its plants in Broadmeadows and Geelong by 2016, Australia was cited as no longer providing a viably competitive MAN environment. General Motors Holden too will be closing its production plant in 2017 and Toyota will follow by closing its operations in the same timeframe. The automotive industry and its closely linked MAN sector in Australia faces virtually a complete shut-down with all four of the only Australian motor MAN plants closing their doors by 2017[3]. The prospect for some Australian cities, such as Adelaide and Geelong, of facing similar challenges to Detroit's economy in the USA, is looming large in the minds of some in local communities as well as local, state and federal government. The imperative has never been greater for Australia to migrate towards a diverse base of high value-adding flexible businesses and industries, competing on the basis of value for money instead of cost, driven by knowledge, services, digitisation (and other productivity improving technologies[4]) and globalisation. In this paper we examine specifically the knowledge and service sector changes over a period of nearly 25 years and discuss the implications for policy-makers in managing the IC changes for transitioning economies that can be drawn from an analysis of the Australian economy.

5. The first-order analysis of the model sectors: MAN and two services sectors

Using these conceptions of value adding to characterise industry sectors, for our first level of analysis we examine data from three chosen sectors that feasibly and predominantly operate under one of these value configuration models; the MAN sector for value chain, representing firms that create value through the production and sale of products; the TPW sector for value network that includes firms that primarily create value through intermediating between buyers and sellers or senders and receivers, and; the HCSA sector for value shop whereby the firms of this service sector primarily create value through the expertise and client responsive service provisioning to address the needs of individual clients or customers. An interesting and most relevant fact for this study is that according to data from ABS, around 84 per cent of total small business private sector employment in 2011 was in the services sectors, compared with only 6 per cent in MAN sector[5].

The objective of the first-order analysis is to observe and confirm the expected trends of decline in the MAN sector[6] and to examine whether the alternate value creation models reveal any signs of transitioning impacts through observable changes over the same time period in employment profiles and proportional value added after employment compensation are accounted for. We would expect that the services-driven models of value network and value shop should reveal stronger full time employment patterns and growth in value added if the economy was to successfully transition towards becoming a service-based economy.

5.1 MAN sector

The MAN sector includes businesses mainly engaged in the physical, chemical or biological transformation of materials, substances or components into new products (except agriculture and construction). The materials, substances or components transformed by these businesses, are raw materials that are products of agriculture, forestry, fishing and mining, or products of other businesses. Assembly of the component parts of manufactured products, either self-produced or purchased from other firms, is considered MAN. For example, assembly of self-manufactured prefabricated components at a construction site is considered MAN, as the assembly is incidental to the MAN activity. Conversely, when undertaken as a primary activity, the on-site assembly of components manufactured by others is considered to be construction. Given the sequential nature of linked activities and the output of value added product, this sector generally well represents a Value Chain model.

As a sector, MAN has in the past served Australia well in terms of supported jobs (accounting for around 15 per cent of full time jobs in the 1990s) and adding substantial value into the economy. As Australian MAN forcibly shrinks and diversifies it raises the question about what sectors are in a position to replace and/or supplement the value added and employment that may be lost in the industrial transition. Exhibiting a value chain model, MAN portrays a declining full time employment trend and an increased non-full time workforce which is consistent with the current pressures on the industry sector. However, the rising trend in value added is reasonably proportional to the rising wage costs. In effect the growth in value added coincides with rising wage costs reflective of an economy with high-living standards which is to some extent off-set by increased efficiencies which explains the falling full time employment numbers. However, in the last few years both employment and the value added have shown signs of weakening suggesting that the sector has reached a tipping point whereby the sector is becoming increasingly less competitive on global markets (Figures 2 and 3).

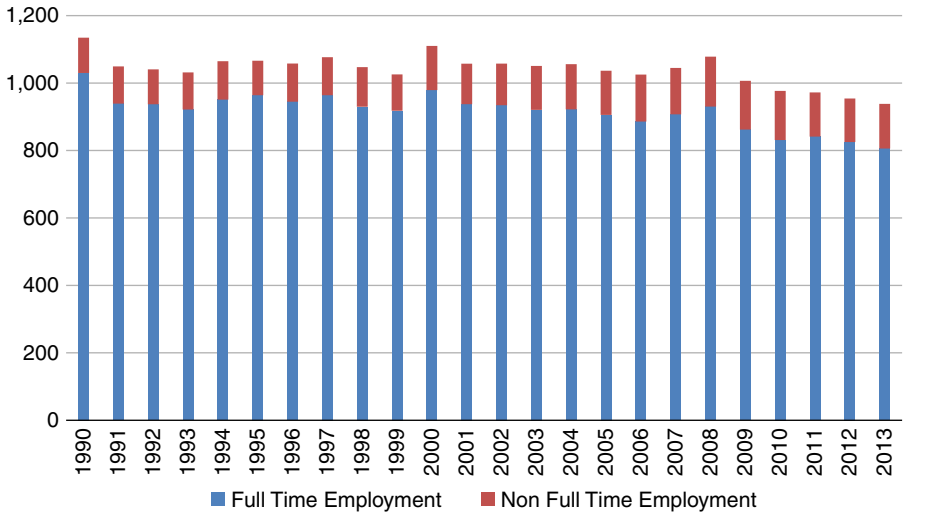

Figure 2.
The number of full time and non-full time positions in the MAN sector

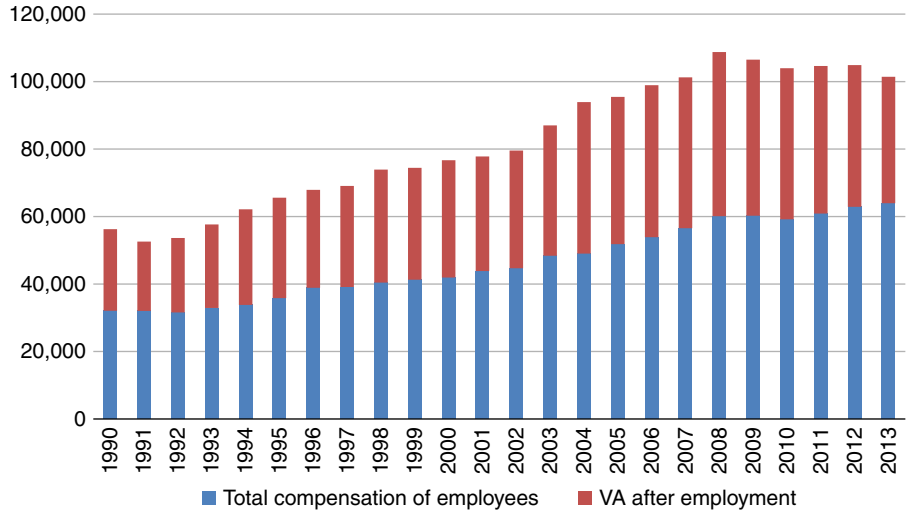

Figure 3.
Total employment compensation and value added in the MAN sector

5.2 TPW sector

The TPW sector includes firms mainly engaged in providing transportation of passengers and freight by road, rail, water or air. For example, firms engaged in providing goods warehousing and storage activities or providing support services for the transportation of passengers and freight. This sector has displayed gradual growth in both full time and non-full time employment from around 400 thousand to more than 500 thousand. At the same time value added has also steadily increased ahead of growth in wage costs suggesting that efficiencies in the sector are being exploited. This in some ways is curious in an age when digital communications are prolific among the population and perhaps it reflects a change in the nature of the goods being moved and the increased mobility of a population. Regardless the sector shows good signs of being resilient in Australia's high-cost environment. As there are no physical product outputs that captures value and the main activities of this sector are to move freight and people between locations, the value creation model conforms well with a value network model in that the value created is through the provision of a service, maintenance of service infrastructure and managing the assets and contracts that facilitate the movement of goods and people (Figures 4 and 5).

5.3 HCSA sector

The HCSA sector was chosen for analysis due to its perceived strong alignment with a value shop model of value configuration. The HCSA sector includes firms mainly engaged in providing human HCSA, such as hospitals, general practice medical services, ambulance services and specialist medical services. Health and social assistance is very much a diagnostic and individually tailored service provision sector. The firms providing their services apply common processes, where the labour inputs of practitioners with the requisite expertise and qualifications are integral to production of service delivery, confirming the close relatedness to a value shop model. According to Figure 4, the sector shows strong growth in both full time and non-full time

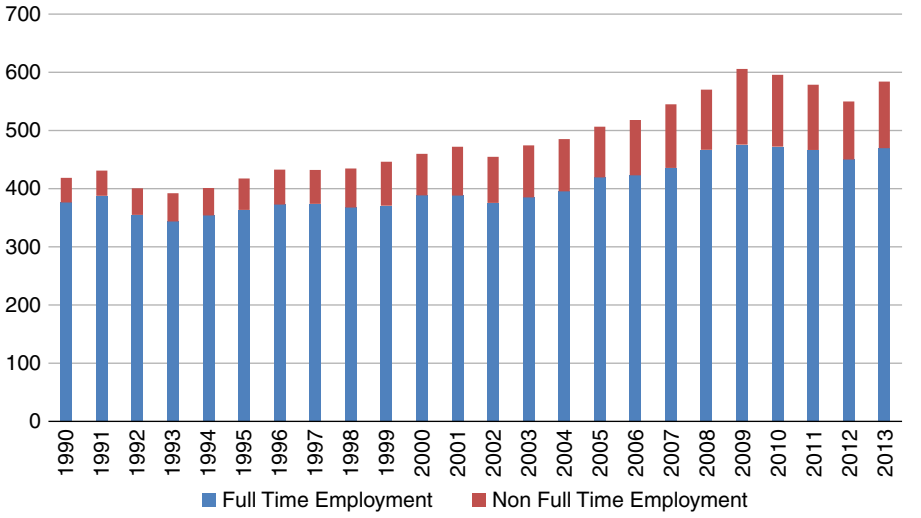

Figure 4.
Number of full time and non-full time positions in the TPW sector

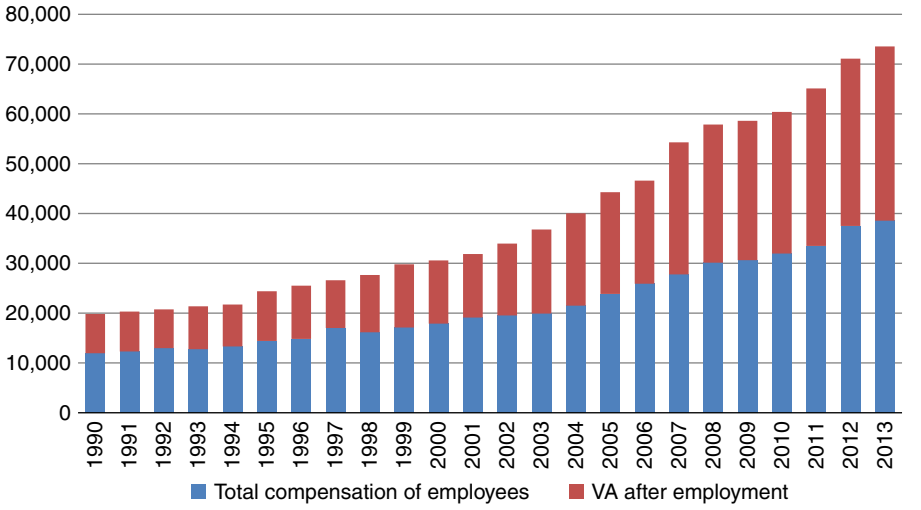

Figure 5.
Total employment compensation and value added in the TPW sector

employment which is consistent with the scenario of an ageing population requiring greater levels of service. The employed full time positions have increased from 400 thousand in 2009 to almost 800 thousand in 2013. Based on the data from ABS, the non-full time position in this sector has increased by three times from 200 to 600 thousand up to 2013. The growth in value added though is proportionally related showing no signs of any significant change in productivity. To some extent this is to be expected given the nature of health care services being highly reliant on human capital for individual clients. Efficiency from scale advantages is not generally feasible in this type of value model (Figures 6 and 7).

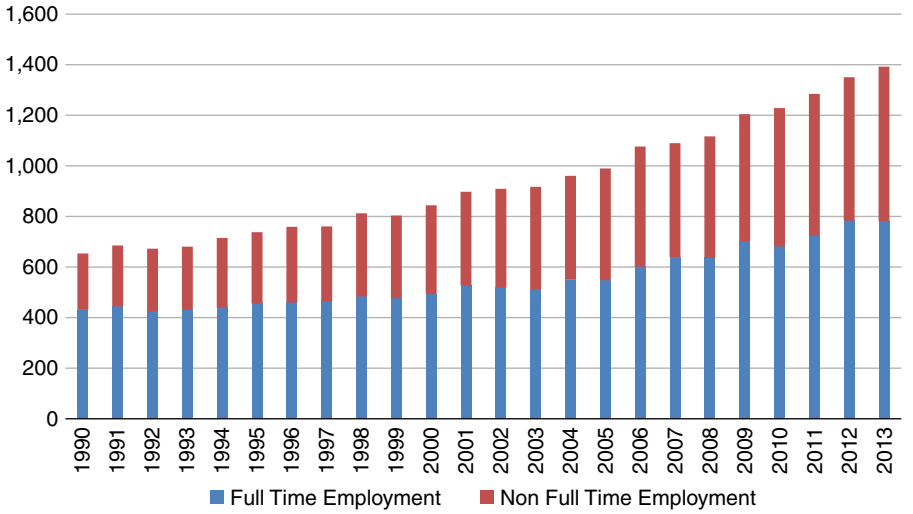

Figure 6.
The number of full time and non-full time positions in the HCSA sector

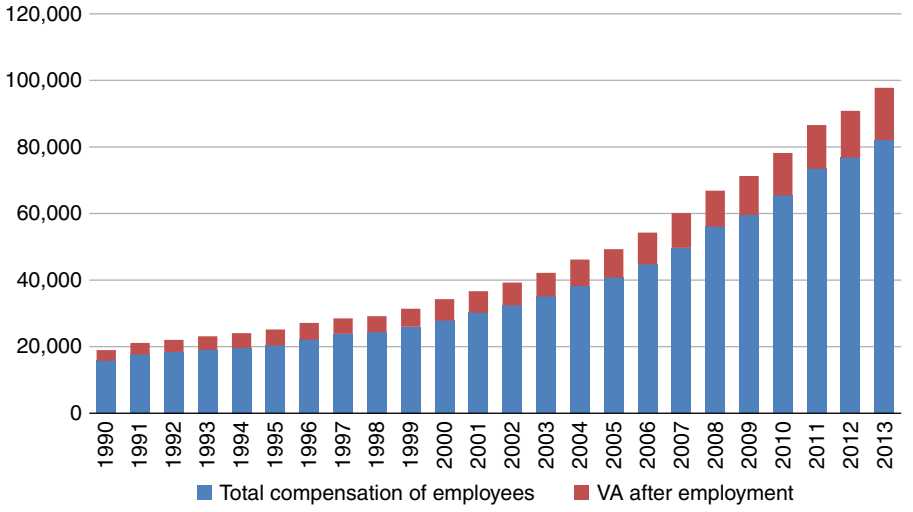

Figure 7.
Total employment compensation and value added in HCSA sector

6. The second-order analysis: two knowledge-intensive sectors

Following the advice of economists for transitioning economies to grow and strengthen the knowledge-intensive service sector, we next turn to examine two knowledge-intensive sectors, namely the ED and the PTSS sectors, to establish whether there is any similarity and/or differences in value added and employment pattern to one of the models explored above. For example, ED services are delivered by teachers or instructors who explain, tell or demonstrate a wide variety of subjects. This sector then closely resembles a value shop model in that value is created by the expertise and knowledge of the teaching fraternity. We examine these sectors to test the suggestion of economists that knowledge will be a key to future value creation in transitioning

economies and similarly to the services sectors we would expect to see higher growth in full time employment patterns and stronger value added contributions over time.

6.1 ED sector

The ED sector includes institutes mainly engaged in the provision and support of ED, such as pre-school education, primary education, secondary education and technical and vocational education or training[7]. In this sector, the commonality of processes involved, such as the labour inputs of teachers and instructors, and their subject matter, knowledge and teaching expertise, uniquely distinguishes this industry from other industries.

According to Figure 8, the employment provided by this sector increased from around 550 thousand in 1990 to more than 900 thousand in 2013. Carefully studying this trend, most of the increase is from a growth in non-fulltime employment, which has almost doubled during this period of time. Being knowledge-based and therefore a human capital dependent service sector, one may expect that a value shop may be the dominant pattern of value configuration. If so, the high reliance on human capital might reduce the value added efficiency per employee relative to wage costs. From this we also may expect growth in employment and the value add to be on a fairly proportional basis similar to the HCSA sector. The trend in Figure 9 supports our expectation. In 1990, value added after employment was less than $2 billion, after which a dramatic rise to nearly $9 billion was found in 2013 revealing a similar pattern as seen in the HCSA sector. During the same period of time, the total compensation for employees increased from less than $20 billion to more than $60 billion. This would call into question the logic of transitioning to a sector that has low potential to replace the lost value and employment from MAN.

6.2 PTSS sector

The second knowledge-based sector we selected is PTSS sector which includes firms mainly engaged in providing professional, scientific and technical services[8]. This sector is engaged in providing knowledge-based services and integrates common

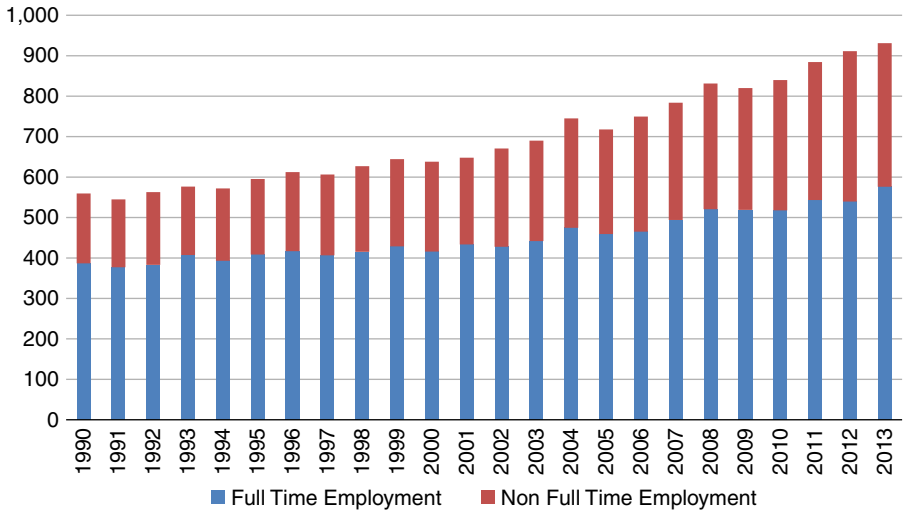

Figure 8.
Number of full time and non-full time positions in the ED sector

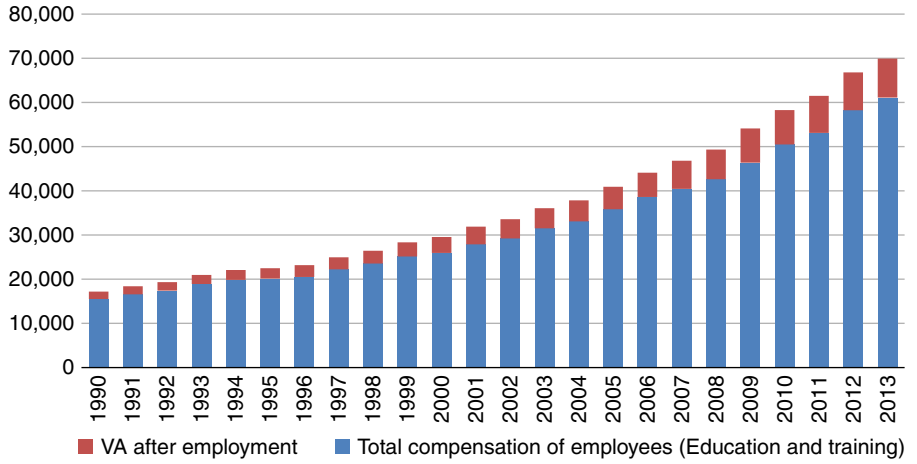

Figure 9.
Total employment compensation and value added in ED sector

processes with labour inputs for the production of service delivery. The firms specialise in selling their expertise, such as accounting firms, consulting companies, architecture firms or scientific testing and analysis service firms. Excepting for Big Four accounting firms[9], another example for the firms in this sector is GBG Australia[10], which is a specialist in applying non-destructive investigation techniques for a wide range of environmental and engineering applications. This company provides advanced subsurface solutions using a variety of non-destructive and geophysical techniques by employing engineers and geophysicists of considerable experience. In a similar fashion to the ED sector, the activities undertaken generally require a high level of expertise and training and formal (usually tertiary level) qualifications. In most cases, equipment and materials are not major inputs.

Upon analysis though, the profile of the sector is somewhat different to the ED sector. There has been a substantial steady growth in the employment (full time and non-full time) and the value added. For example, the full time position in this sector has grown to 700 thousand in 2013 from 300 thousand at the beginning and the non-full time employment has soared from 70 thousand to around 200 thousand as shown in Figure 10. However, the growth in employment seems not to be tied proportionally to the value added and instead efficiency has also increased (perhaps indicating a move towards a value chain logic in the sector – most likely in larger firms) whereby every dollar gained in value added has increased greater against every dollar spent on wages over time, as shown in Figure 11. Given that there are only two variables; wage costs and value added, and it is evident that wage costs have risen comparably across all sectors it is reasonable to assume that the value added in this sector hasexperienced a faster acceleration than wage costs.

7. The third-order analysis: proportional contributions in employment and value add in five sectors

In this section we present a proportional analysis of employment and value added trends. These two dimensions are important indicators of the changes in living standards and wealth within an economy. In employment terms the sectors' contributions in providing full time employment opportunities is part of maintaining the living standard

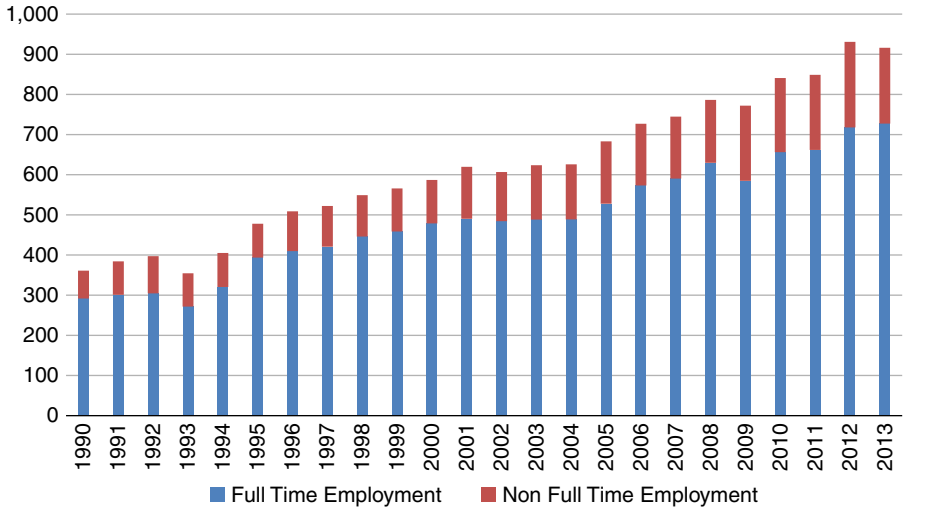

Figure 10.
Number of full time and non-full time positions in the PTSS sector

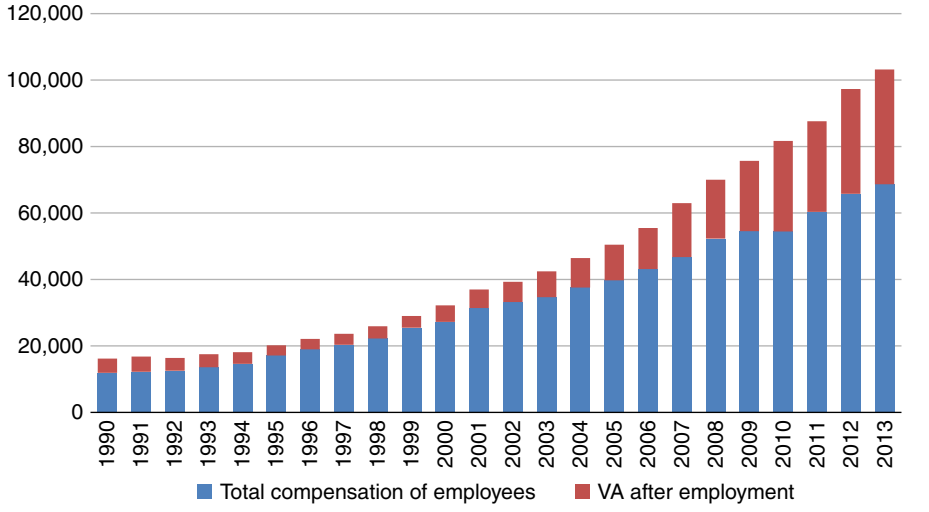

Figure 11.
Total employment compensation and value added in PTSS sector

of a nation. The more people in full time employment suggests more people are able to fully utilise their skill base and maximise their earning potential to provide a comfortable standard of living. On the value added dimensions it is expected that after the total employment compensation is accounted for that there should be a contribution back to an economy that circulates wealth, contributes to the government revenue and supports other contributing businesses in an industry's value chain. The greater the contribution to value added by a sector (after employment compensation) the greater the contribution to the broader economy and inversely the smaller the contribution the less the sector contributes to the economic wealth of a nation.

The first proportional analysis, given in Figure 12, is for the full time employment as a percentage of total employment. It can be seen from this analysis that the long-term

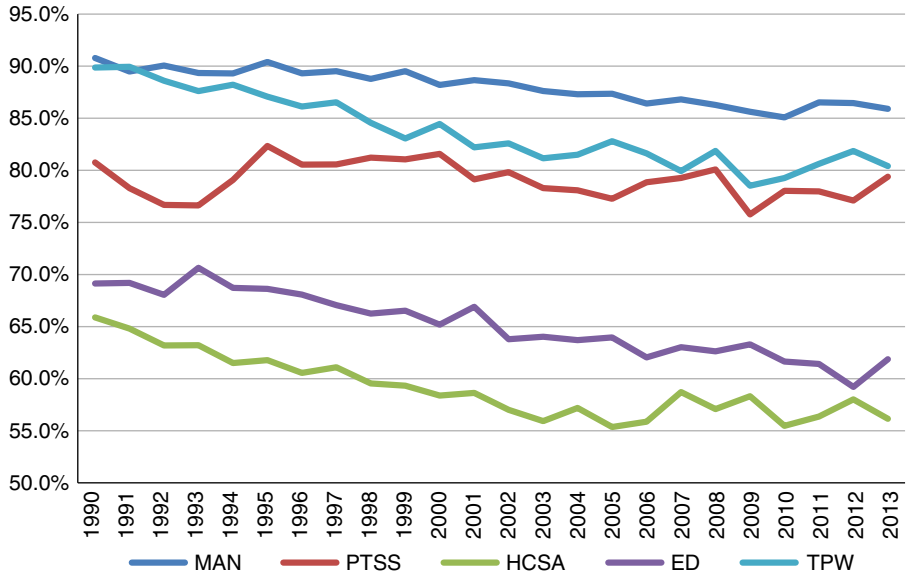

Figure 12.
Trend Full time employment/total employment (per cent)

trend across the sectors analysed is a declining ratio in every case. However, notably, the PTSS sector reveals a much slower decline and by contrast has been more relatively stable with full time employment as a percentage of total employment hovering in the 75-80 per cent range.

The second trend analysis of Economic Value Contribution (EVC), displayed in Figure 13 belowreveals some interesting sectoral differences. First, it is notable that

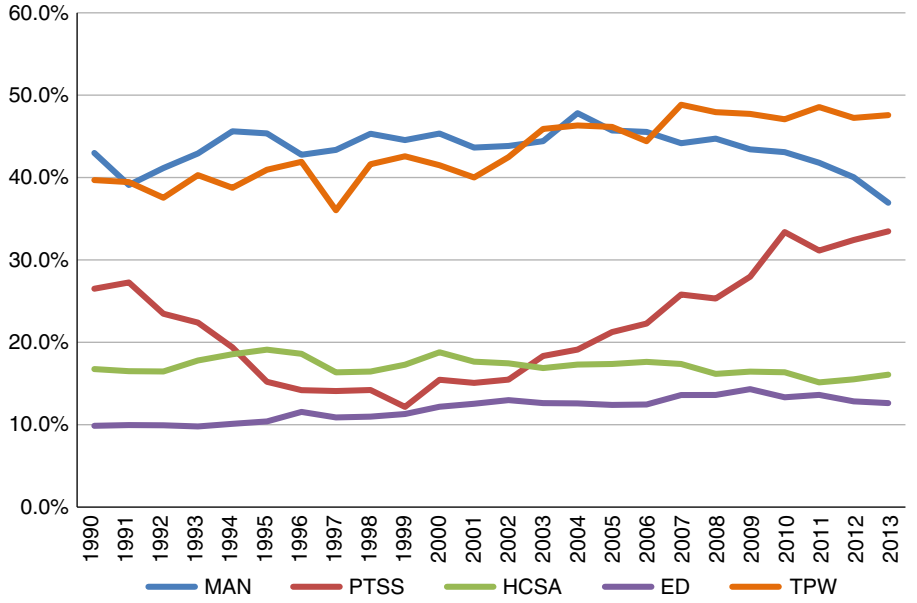

Figure 13.
Trend VA after employment/total VA (per cent)

while the PTSS sector has had a relatively more stable contribution in terms of full time employment opportunities, it has also experienced at first a significant decline followed by a substantial recovery of value added despite the high-cost circumstances of the Australian economy. This is in stark contrast to the MAN sector that reached a peak in EVC in 2004 and has been in a steady decline ever since while simultaneously decreasing the number of full time job opportunities. The TPW sector reveals different circumstances whereby there has been a gradual increase in proportional EVC but, consistent with other sectors, a gradual decrease in full time employment opportunities. The ideal model would have increases in both indicators but to have growth in value added without at least a stable employment indicator suggests that value is being gained at the expense of full time jobs in the sector and either technologies are causing a decreased need for full time jobs or that in general businesses are able to exploit a casual or contract workforce to reduce costs and increase profits.

The two remaining sectors, ED and HCSA, are also interesting cases. Both these sectors have the lowest proportional EVC of the five sectors analysed. This is probably not surprising as both these sectors also experience more government control and regulation to ensure affordability, equity and accessibility of the services provided by these sectors to a broad spectrum of the population. It would also seem though that in the face of this control that there is a cost to bear in respect to full time employment opportunities as non-full time employees appear to be more frequently used, presumably in a bid to control costs and/or are being replaced by technology.

8. Discussion

The analysis of the five sectors, within the constraints noted, provides some insight into how different types of value configuration respond to the current cost and globalisation pressures that Australia is currently experiencing. The value chain-oriented MAN sector is the most vulnerable and appears to reach a tipping point at which the rising cost structures are no longer off-set by the rate of efficiency improvement which effectively puts the sector into decline. Here a couple of caveats need to be inserted: first the speed and size of the increase in Australia's cost level have been unprecedented in the developed world – Australia has gone through a five year period of radical change from having a cost level lower than that of the USA to having one that is around 30 per cent higher than that of the USA. This means that even at very high productivity improvement levels (which most Australian firms have not exhibited) most firms would not be able to compensate this cost increase with ongoing productivity increases resulting in those firms competing solely on cost being knocked out of the economy, exemplified by an average of 44 small businesses closing their doors each day during 2013, according to ABS data (Herald Sun, 07 August 2013).

Second, MAN firms that have been competing on value for money, grounded in, for example, unique technology, design, etc., have used this period to strengthen their MAN base and grow their exports due to cheaper access to abandoned resources from the exiting firms as well as cheaper (due to exchange rate import advantages) access to high capacity, capability and quality capital equipment from, e.g. Germany and Switzerland. These types of firms can be illustrated by Redarc, the recent recipient of the 2014 Telstra Business of the Year award.

Third, MAN firms that have servitised their product portfolio have managed to retain or even increase their competitiveness based on a combination of increased value for money and a monopolistic relationship between the services provided and the products that they link to. In considering these three points it is apparent that there are

different developments in different sub-sectors of MAN and, recognising that an increasing number of these sub-sectors exhibit value creating models that are mixed (e.g. servitised MAN firms), we acknowledge that the MAN sector is not homogenous and not all firms are pure value chain firms. So too will this be the case for the array of firms in any sectoral analysis although our point has been to generalise sectors that roughly fit with the value logics to explore the agglomerated contributions on key measures of economic health given the set of characteristic inputs and outputs defined by the value logics.

In summary the MAN sector has decreased the proportional representation of full time employees meaning that this sector has a net declining contribution in both measures of employment and value add. Again caution is needed in considering the implications: In most mature sectors of the MAN industry productivity growth exceeds the associated demand growth resulting in the demand being able to be fulfiled with fewer employees. This is the opposite to some service sectors where productivity growth is much lower than demand growth resulting in a rapidly increasing employment number but with the associated pressure to decrease the individual incomes of those employed.

Our analysis goes at least part way to support the theory of economists that developed economies should invest in services and knowledge-based industries. However, one major caveat should be considered and that relates to the interconnectedness of sectors in the economy. The MAN sector has larger multiplier effects than services (Park and Chan, 1989; Pilat and Wölfl, 2005; Guerrieri and Meliciani, 2005). This is explained by the denser backward and forward linkages formed within and around the MAN sector, since MAN firms interact much more strongly with other sectors, both as providers and as users of intermediate inputs. Even though services now contribute as providers of intermediate input to the performance of other sectors, their role remains more limited than that of the MAN sector. This mutually dependent inter-sectoral relationship between MAN and service means that a country's capacity to develop its services sector is dependent on the specific structure of its MAN sector since MAN firms require different producers of services and tend to use them with different degrees of intensity. Based on this discussion we can say that in an economy with low sectoral interconnectedness the claim that developed economies should invest in services and knowledge-based sectors as a substitute for MAN is supported but in an economy with a diverse interconnected economy, i.e. one with high economic complexity, the claim that developed economies should invest in services and knowledge-based sectors as a substitute for MAN can be rejected. In the Australian case, with a low economic complexity (Hausmann *et al.*, 2011) the claim is supported whereas in an economy with high economic complexity, like Germany, Switzerland, Sweden and Japan it is rejected (where instead the investment should be to complement MAN).

We also find that not all services contribute equally and it is the knowledge-intensive services that seem to provide the best opportunity for employment and value add in a high-cost environment. Service sectors that are regulated and controlled by government in order to best serve the interests of a broad population, whether they are knowledge-intensive or not, will contribute less to an economy in terms of value add and are likely to shed full time employees as a response to cost pressures and draw more heavily on non-full time employment mechanisms and technology to reduce costs.

The TPW sector, as a value network sector, by contrast shows no sign of real stress through the recent period of change at the macro level of value added and rates of employment, although quite probably technology is reducing the need for full time

employees and there has been an increase in non-full time employment in the sector. Perhaps these circumstances arise due to the nature of demand in this sector being unabated and may be even increased with greater parcel and stock movement of imported lower cost goods, particularly enabled by internet transactions, and increased population mobility, coupled with advances in technology that provide a lower cost base for the sector. The net contribution of this sector could be considered marginally positive as its stronger economic contribution is to some extent off-set by the gradual decline in full time employment opportunities.

Interestingly, the HSCA sector as a value shop service sector shows little sign of impact by the changing cost dynamics. It would seem that the sector is less affected by global dynamics and responsive more to the local demand and controls. However, the sector appears to be a net negative contributor. While the sector is stable with respect to its EVC it is negative in its Full Time Employment Contribution (FTEC). Government control and regulation are likely causes of lower overall EVC although the sector has a social contribution that may be ranked more highly than its economic contribution.

The two knowledge-intensive sectors analysed here also reveal differing rates of contribution. The ED sector behaves similarly and is also similarly subjected to government controls, as the HSCA sector although the ED sector has marginally positive EVC but a negative FTEC making it a marginally net negative contributor to the economy. The PTSS sector on the other hand has shown strong resurgent growth in EVC and has held a relatively stable, although still declining, pattern of FTEC suggesting it may be a net positive contributor to the economy. Both sectors show little impact from a higher cost environment although the free market conditions seem to favour the PTSS. From among the five sectors examined, the PTSS sector shows the strongest net positive contribution and appears to have been resistant to the pressures of rising costs in the Australian market.

The ED sector in Australia provides an example of the slow pace of progress faced by a regulated industry as it undergoes change. This sector has been experiencing a gradual loosening of regulation and control by government since the early 1990s which has progressively opened the doors to more commercial education providers. However, in the face of sector competition, the commercial operators still compete among major providers that are subjected to price control, while there has been a modest and gradual increase in EVC from the sector it is unlikely to contribute in the same terms as the predominantly market-driven sectors such as MAN, TPW and PTSS when considering the macro-level effect until government control is replaced by market control mechanisms[11].

Figure 14 below plots each sector along the paired coordinates of FTEC and EVC to illustrate how each sector is behaving on a net contribution level. The worrying observation from this analysis is the predominance of sectors trending negatively in full time employment opportunities which suggests the longer term position of chronic under-employment. While this sounds troublesome it raises a number of questions. For instance, in a wealthy economy is non-full time employment something that the general population aspires to? If the wages are higher is there a perpetual need for a five day working week or does it become acceptable to work less but still earn sufficient to meet family and living expectations? Is this the ultimate position of work/life balance? By contrast, is it the case that more is expected within the working week and whether full time or non-full time, the working hours are in practice longer than is actually set-out in employment agreements and the distribution of work across a nation is unfairly loaded

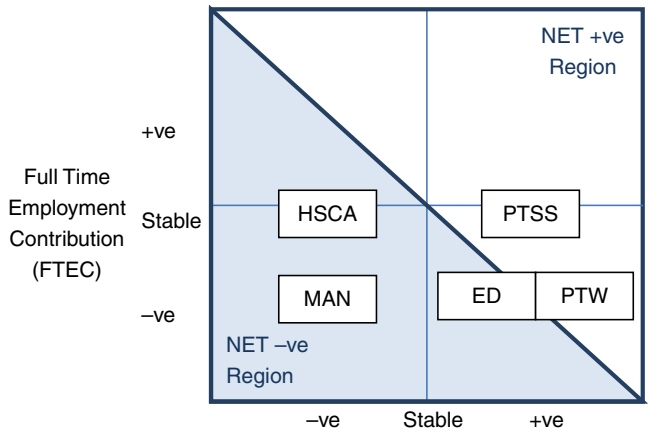

Figure 14.
Net contribution of economic value

upon those who have jobs? Or is it that low-paid jobs in low value-adding sectors like, e.g. tourism have to be filled primarily by part time employees?

Part of our motivation for this paper was to explore whether the sectors proclaimed by economists as being key to developed economy transitions, the knowledge and service sectors, actually delivered the value anticipated. Our findings, ignoring (the fairly fundamental) issues around statistical construct validity and interconnectedness of the economy to account for heterogeneity at greater levels, suggest that a knowledge-intensive service sector does provide a net positive contribution to the overall economy. If the caveats and construct validity issues are taken into account the conclusion becomes more complex and becomes related to the complexity of the economy. In Australia's case with a low economic complexity the conclusion will still be aligned with the previous one but in a highly complex economy this conclusion will have to be modified by saying that it is very difficult, if not to say impossible, to develop the knowledge and service sectors without the presence of a strong domestic MAN sector. However, this finding does not apply equally to all service sectors, whether knowledge-intensive or not there are points of consideration to be taken into account with respect to the level of government controls, openness to free market principles and the social equity contribution of the sectors.

Developing knowledge-intensive industries therefore we argue has a role to play in managing economic transition of a country. If the MAN sector continues its decline, it places considerable more importance for Australia on the need for robust alternate value-adding and employment-adding sectors to emerge. Both the value network and shop configurations offer potential although, invoking a deeper view of economic doctrine (see Roos, 2014a), we suggest that innovation and therefore entrepreneurship must thrive in the sectors to continually drive up efficiency, increase effectiveness and expand diversity in the face of global markets. In the following section we explore the policy implications that stem from the need to more rapidly advance the contributions from different sectors in a transitioning economy such as Australia.

9. IC, innovation and entrepreneurship: policy implications

Our analysis of the data suggests that shifts and changes have been inherent in the Australian industrial sector dynamics. These dynamics are driven by changes in

supply and demand in the context of global economic shifts (Roos, 2014a, b, c, d). It is impossible from this data to claim any causal link to innovation and entrepreneurship but instead we argue for a proactive policy stance that acknowledges the transition of sectors and the need for increased intensity of innovative and entrepreneurial activity.

While much of entrepreneurship research has sought to directly link entrepreneurship to economic growth, the evidence of this link has been inconclusive (see Bögenhold and Staber, 1991; Greene, 2002; Meager *et al.*, 2003; van Praag and Versloot, 2007).We argue that in developed economies, innovation and entrepreneurship may have a more important role to play in stimulating and sustaining industry transitions. Our analysis here shows a greater level of complexity among industry sectors that will confound the analysis of aggregated data when trying to show how innovation and entrepreneurship link to economic growth. A much more nuanced and refined approach is necessary. As value chain models of value configuration reach their limit, value network and value shop models are still able to survive and thrive. The question is whether there are enough business entries and survivals in these sectors and whether these new entries and survivals are sufficiently equipped with the human capital skills to capitalise on innovation and grow the value-added pie. Moreover, the interconnectedness between sectors needs to be taken into account meaning that sectoral analysis is not a zero-sum game but has embedded linkages that affect the overall economic performance (Roos, 2014a, d). Awareness of the importance of entrepreneurial activity for economic transition also brings into question the role of entrepreneurship development functions and how they perform specifically to bolster the transition of firms and industries and capitalise on sectoral interconnectedness to build more robust economic models.

From another perspective, the IC needs of the transitioning sectors also need to be taken into account. In the face of a reduction of FTEC and EVC from the MAN sector, the emerging sectors must evidence a high rate of innovation and entrepreneurship to expand rapidly on efficiency and effectiveness measures in the shadow of sectors that are experiencing threshold constraints to growth in the face of global competition. Audretsch and Feldman (1996) found that the link between knowledge spill overs in an industry and the spatial clustering of innovation activity is dependent on the knowledge externalities in industries that have higher IC needs[12]. By definition in the commercial sense, innovation is linked to the increased levels of value creation by firms that employ innovative activity as a strategic standpoint (Crossan and Apaydin, 2010; Sundbo, 1998). Combining these ideas suggests that innovation will occur at a more rapid rate in industries of higher knowledge-intensiveness and in industry sectors that are spatially in relative close proximity, and these firms will ultimately add more value to the economy. In order for industry transitions to occur without loss of value and employment in an economy there must be innovative industry sectors emerging that are characterised by knowledge-intensiveness and strong interconnectedness while the high-cost environment forces the traditional industry sector into decline. Without the emerging sectors, the diminishing returns from the declining industry sector will eventually reduce the overall living standards of the nation as the amount of value capture within a country diminishes. Given the need for knowledge-intensive industries to not only be innovative but also to grow FTEC and EVC it suggests entrepreneurship will be a vital characteristic of the sector's IC profile. This raises further questions about the development of emerging sectors and the role of entrepreneurship among the human capital that serve the sector.

There is to some extent recognition of the need for innovation and entrepreneurship in terms of regional economic disparities. For example, Huang *et al.* (2012) describe the

technology transfer policies that are being developed in China to reduce regional economic disparities. In particular, technology transfer policies focus on increasing the innovative activity in central China, in order to spur economic development and growth. Huang *et al.* (2012) show that one of the key policy approaches for mitigating these large economic development disparities is the advent of significant technology transfer policies. Through the Chinese technology transfer policies in the central region of the country, a shift is anticipated towards creating a knowledge-driven entrepreneurial economy in Central China that may ultimately emulate the growth rates achieved in the more successful parts of the country. We argue that this approach also holds for sectoral disparities not just geographic regional disparities and we urge the development of innovation and entrepreneurship policy platforms that will strengthen industries sectors and the interconnected ties among sectors especially in times of dynamic economic transitions.

10. Conclusion

In this paper we set-out to examine the change dynamics within different industry value configurations in terms of value added and employment. We found in the context of Australia, which is experiencing an industrial transition and an increasing high-cost economy, that the value chain model of value configuration of the MAN sector reaches a tipping point whereby the wage costs outpace the rate of change in efficiency which sends the sector into overall decline[13]. For value network value configurations, the sector appears relatively unaffected by the global pressures and can experience growth in wages, employment and value added and remain on a positive trend in increasing value added that outpaces wage cost rises through increased efficiencies. The value shop sector modelled by the HCSA sector also weathers the rising high-cost environment but at the same time makes little progress on efficiency and is relatively ineffective in contributing to economic value add.

Following the argument of Jensen (2012) and Reuver and Bouwman (2012), that developed economies need to transition to knowledge-intensive innovative services, we further analysed the PTSS and ED sectors. We found that these sectors conformed to the value shop model but behaved differently with respect to EVC and FTEC. The ED was similar to the HCSA sector and we propose that these sectors hold a social contribution expectation that is to some extent controlled and regulated by government at least in Australia during the period of analysis. The PTSS sector by contrast is open to much more free market conditions and despite the PTSS sector being human capital based the IC of the human services can return higher value and grow at a faster rate than the increase in wages and return greater net economic and full time employment opportunities. The transition to a knowledge economy therefore in Australia is underway.

We wish to acknowledge the limitations of this paper. This is a single country analysis and a small example of industry sectors. More could be done to analyse the full spectrum of industries across more national territories and account for construct validity and industry-level interconnectedness in comparison studies across different nations. However, our aim was to test an argument about transitioning economies and examine whether the strategic IC literature could make a specific contribution to policies in dealing with economic transition. We found that the economic argument about a transition to knowledge-intensive sectors for a developed economy held in at least the Australian case although there are constraints to consider within particular market sectors and the nature of differing economies we suggest will vary the extent to

which this finding are generalisable. We further find that emerging sectors need to rapidly expand to compensate for sectors in decline and therefore innovation and entrepreneurship has a particular and significant role to play, at least for transitioning economies, among industry sectors that will emerge as replacement sectors to those in decline. This suggests that further work is needed to develop IC tools and strategies that assist policy-makers to manage developed economies in transition.

Notes

1. Macroeconomics/macroeconomic objectives (url: http://en.wikibooks.org/wiki/Macroeconomics/Macroeconomic_Objectives, accessed on 16 June 2014).
2. A possible exception is Roos *et al.* (2005) that discusses these differences in three cases illustrating the three different value creating logics throughout the book.
3. Mitsubishi has already faltered and closed its Australian production operations in 2008.
4. Frequently summarised under the headline Key Enabling Technologies.
5. Small businesses make a significant contribution to the Australian economy, accounting for slightly less than one-half of private sector industry employment and contributing approximately one third of private sector industry value added in 2010-2011.
6. We will not here discuss the classification problems, and hence the reliability of public statistics, inherent in the ongoing structural change making the distinction between service activities and MAN activities increasingly irrelevant. For a discussion on this topic see, e.g. Roos (2014c). We will instead assume that the publically available statistics is a good reflection of the underlying reality.
7. The institutes may be publicly owned and operated, or privately owned and operated, either for profit or not for profit. However, these difference does not change the main trend in value added employment.
8. Based on the description from ABS, the firms in this sector provide scientific research services; architectural, engineering and technical services; legal and accounting services; advertising services; market research and statistical services; management and related consulting services; veterinary services; computer system design and related services.
9. Big four (audit firms), Wikipedia. Accessed 15 July 2014, available at: http://en.wikipedia.org/wiki/Big_Four_(audit_firms)
10. GBG Australia. Accessed 15 July 2014, available at: www.gbgoz.com.au/
11. This claim ignores issues of social equity which also should be accounted for in making a decision to de-regulate sectors such as health and education.
12. Audretsch and Feldman (1996) rely on the 1982 data from the US Small Business Administration's Innovation Database and the citation numbers in the state level to investigate the geography of innovation and production. They find that a key determinant of the extent to which the location of production is geographically concentrated is the relative importance of the intellectual capital (or "new economic knowledge" in their paper) in the industry.
13. Relying on the data from the compustat global vantage database from 2003 to 2008, Clarke *et al.* (2012) examine the effect of intellectual capital has on firm performance, such as return on assets, return on equity and revenue growth. They find that there is a direct relationship between the value-added intellectual coefficient and performance of Australian publicly listed firms.

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