

THE DEVELOPMENT OF LEARNING REGIONS IN NEW ZEALAND: THE “6-I” FRAMEWORK

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ABSTRACT: This article introduces the “6-I” framework which has been developed in order to evaluate regional development. The “6-I” framework is based on the concept of the “learning region”. The ideal “learning region” is innovative and economically successful. Six key factors have been identified that can be used to measure the development of learning regions. This article explains how the “6-I” framework was developed and demonstrates its utility by showing how it was used to assess regional development in two regions of New Zealand over the twenty year period from 1985 to 2005. There is a particular focus on the potential contribution that information and communication technologies (ICTs) can make to the development of learning regions. Governments are increasingly making major investments in ICTs, such as ultra-fast broadband in the belief that they will facilitate regional development. However, little work has been done to assess the contribution of ICTs within a regional setting.

KEY WORDS: learning region, networks, ICT, social capital, New Zealand

1. INTRODUCTION

The relationship between telecommunications infrastructure and economic growth is well established, though the exact nature of that relationship is still under investigation (Adams, 2005; National Selection Committee, 2004; Parker, 2000). With the exception of a few cynics (Howell, 2006) there is a widespread belief that the introduction of high speed, affordable broadband will bring economic benefits, the “build it and they will come” approach (Kelly, Gray, & Minges, 2003; Zilber, Schneider, & Djwa, 2005). There is no doubt that information and communication technology (ICT) does have a contribution to make to regional development, both in remote rural regions and in more centrally located urban regions. In order to investigate how best to achieve the full

value of ICT the concept of the “Learning Region” was adapted for this study.

The term learning region was first coined by academic authors (Florida, 1995; Morgan, 1997; Storper, 1995) working in the fields of innovation studies and economic geography. The concept of the “Learning Region” is ambiguous and found in a variety of different contexts. There is no single definition of a learning region, however, a common strand in the literature is that such regions have an explicit commitment to placing innovation and learning at the core of development (Larsen, 1999). A learning region will generally consist of a network of inter-firm relationships, supported by social capital and trust, and kept dynamic by a continuous process of interactive learning. A learning region will remain economically successful over a significant period of time, and will be able to successfully adapt to changed circumstances. ICTs have the potential to make an important contribution in each of these areas.

This research sets out to establish the role that ICTs play in the development of learning regions. The location for this research is regional New Zealand; as a remotely located country with a low population density New Zealand stands to gain great benefits from the effective utilisation of ICTs. In order to obtain a broad understanding of the contribution that ICTs make across the country two contrasting regions were selected; the rural region of Southland and the urban region of Wellington.

In order to assess to what extent these regions could be classified as learning regions, a model of an ‘ideal’ learning region was developed. The sociologist Max Weber (1978) developed the concept of the “ideal type” and argued that it was impossible for any scientific system to replicate reality. Therefore, whether it was explicit or not, all science involved selection as well as abstraction. Concepts need to be selected. However, if the concepts selected are too general their distinctive features may be left out, and if one particular example is used, it is difficult to compare it with other phenomena. In contrast, the ideal type constructs certain elements of reality into a logically precise conception. For this research, the concept of the ideal type was used to build a framework highlighting six features that an “ideal” learning region would possess. This framework was used as basis for organising and analysing the data collected. The two regions were then evaluated using the framework.

2. BUILDING THE FRAMEWORK

In order to construct an ideal type of learning region common terms and themes were identified in a number of articles that covered the concept of the learning region. The results were combined to identify five key characteristics of learning regions. Twenty three key references¹ which discussed learning regions in some depth were selected for analysis. Keywords that were used to describe the features of learning regions were identified, and the number of times they occurred across the different references was tallied up. Terms that were used in one article only were discarded and the remaining 22 terms were ranked according to the number of references, which mentioned them. Details of which of the key terms were found in which of the articles are shown in Appendix A.

The top six most mentioned features of learning regions are; the ability to innovate, the presence of partnerships and networks, the existence of embedded local knowledge, well developed regional norms and conventions, good transport and telecommunications infrastructure and strong social capital within the region. The 22 terms were grouped into five different categories as shown in Table 1. There is an assumption that the more frequently a feature is mentioned the more significant it is for learning, however, it should be noted that it is possible that the literature could simply be reflecting the enthusiasms of the moment.

¹ (Christie & Hepworth, 2001; Cornford, 2000; Florida, 1995; Hudson, 1999; Keating, Badenhorst, & Szlachetko, 2002; Legendijk & Cornford, 2000; Larsen, 1999; Lever & Turok, 1999; MacLeod, 2000; Malecki, 2002a; Maskell, 1999; Maskell & Tornqvist, 1999; Morgan, 1997; Oinas & Malecki, 1999; Organisation for Economic Co-operation & Development, 2001a; Rio, 2001; Saxenian, 1994a; Schollman, O'Neill, Doczi, & Kelly, 2002a; Sokol, 2002; Storper, 1995; Thompson, 2002; Wolfe, 2000, 2002)

Table 1. Grouped List of Learning Region Features. Source: the Authors

GROUPINGS	KEY TERMS	NO. OF MENTIONS
NETWORKING (34) <i>(INTERCONNECTING)</i>	Partnerships and networking	14
	Input of universities and consultants	5
	Critical customers	4
	Clustering	3
	Access to external economies	3
	Social entrepreneurs	3
	Presence of competent suppliers	2
LEARNING (33) <i>(INFORMING)</i>	Embedded local knowledge	12
	Lifelong learning	6
	Presence of knowledge workers	5
	Ability to “unlearn” and be flexible	4
	Transfer of best practice	3
	Bottom up approach	3
INNOVATION (23) <i>(INNOVATING)</i>	Innovation	15
	Entrepreneurship	4
	Competitive culture	4
SOCIAL CAPITAL (20) <i>(INTERACTING)</i>	High social capital	7
	Trust	6
	Quality of life	4
	Common regional culture	3
SOFT & HARD INFRASTRUCTURE (18) <i>(INFRASTRUCTURE)</i>	Regional norms and conventions	10
	Good infrastructure	8

The first group of terms relates to networking, whether through region-wide networks, the clustering of certain business sectors or through specific partnerships. For example, organisations may form research focused partnerships with their local university.

The second group of terms are related to factors associated with learning in one form or another. The geographical proximity of organisations within a region offers the advantage of being able to utilise local knowledge. This knowledge is unique to the region, and offers the potential for the region to gain a competitive advantage. A commitment to lifelong learning, both at the level of the individual and at the organisational level is also critical. The availability of skilled workers within a region is important, particularly if these workers move from one organisation to another, passing on their skills as they move. Regions need to develop the ability to reinvent themselves by “unlearning” out-of-date behaviours, and being flexible enough to respond to new opportunities.

Innovation leads to economic success and evidence of innovation in the form of patents and copyright applications helps to prove that a region is successful. The diffusion of innovation can be judged by the number of conferences, conventions, and exhibitions held in the region, and how well these are attended. Entrepreneurship can be assessed by the numbers of new companies that are set up, and how many of these new companies make a profit over a sustained period of time.

A region that has high social capital will benefit on a number of levels. The fact that it is perceived as a pleasant place to live with high quality of life will mean it should be able to retain a large proportion of its existing residents, and also attract new skilled migrants. If organisations within a region have built up strong, trusting relationships, it will result in lower transaction costs in their dealings with each other. Organisations within a region will share a common culture, and have similar economic goals.

A well-developed physical infrastructure in terms of road, rail, and air links is felt to be an essential prerequisite for the economic development of a region by a number of researchers (Christie & Hepworth, 2001; Cornford, 2000; Florida, 1995; Lever & Turok, 1999; MacLeod, 2000; Malecki, 2002b; Schollman, et al., 2002a; Wolfe, 2002). Telecommunications networks are often developed alongside existing transport links, once present telecommunications increase the level of transactions and negotiations, and stimulate the mobility of people and goods. Wheels and wires have a symbiotic existence in industrial economies (Christie & Hepworth, 2001). As well as these hard networks,

soft networks in the form of regional norms and conventions that are shared by all the players within a region are also critical.

After reviewing the literature (Cooke & Memedovic, 2003; Morgan, 1997; Saxenian, 1994b, 2000) which compared successful and unsuccessful learning regions a sixth category, income, was added to the framework to take into account economic factors such as per capita income, employment levels and investment in the region. The six categories were renamed to produce a “6- I” framework of the ideal type of learning region. The six categories used in the framework are interconnecting, informing, innovating, interacting, infrastructure and income. A definition of each of the six characteristics is given below.

Interconnecting – Active networks will exist within the region in a number of areas. There will be research focused partnerships between tertiary education providers and organisations. Organisations in the same sector will have formed clusters. There will be linkages between organisations and both their customers and suppliers. There will be interactions between businesses and community groups. Region-wide networks will be present, facilitated by such bodies as the local council or the Chamber of Commerce. These networks will be strong within the region, and will also extend beyond the region, giving access to external economies. There will be, or will have been, key individuals or organisations within the region who facilitate the development of these linkages.

Informing – There will be a bottom-up approach to knowledge sharing developed within the region, which will be made visible by the transfer of best practices between organisations. There will be evidence of an on-going commitment to learning at the individual, organisational, and regional levels. A highly skilled workforce, mobile within the regional setting, will be present. Organisations will have demonstrated the ability to adapt to changing economic circumstances.

Innovating - Organisations within a region will have demonstrated an innovative approach. There will be a significant number of entrepreneurs operating within the region, and the local culture will encourage the presence of interfirm competition. There will be openness to new ideas and change in local businesses.

Interacting – Individuals and organisations within a region will share a common set of cultural and economic goals. The region will be perceived as an attractive place to live, and will retain its own population whilst also being appealing to migrants. Social capital will be strong, but also welcoming to new ideas and alternative lifestyles. Crime rates will be low, and transactions between organisations will be conducted on the basis of trust. There will be active social networks operating through work, schools, churches, sports associations, cultural groups, community groups and other interest groups.

Infrastructure – The region will have a well-developed transport infrastructure that facilitates movement of goods and people within the region, and allows good access to markets and suppliers outside the region. Access to telecommunications services, such as mobile telephony and broadband, will be at a high standard in all parts of the region. The region will demonstrate institutional thickness by the presence of lively interactions between firms, development agencies, innovation centres, education providers, and voluntary groups

Income - It will have been consistently economically successful over time, as indicated by high per capita income and low unemployment rates.

An alternative model

A similar but slightly different framework to the “6-I” model was developed by Philip Cooke, an economic geographer who writes widely on regional innovation systems (Cooke & Memedovic, 2003). He builds on work carried out by Freeman (1995) to attempt to categorize key innovation system indicators; in Table 2 he identifies six key innovation indicators which he uses to assess national innovation systems in Korea and Brazil.

Table 2. Divergence in national systems of innovation, 1980s. Source: Cooke & Memedovic (2003)

INNOVATION SYSTEM INDICATORS	REPUBLIC OF KOREA	BRAZIL
Education	Expanding universal system, high tertiary and engineering graduate output	Deteriorating education system with low output of engineers
Knowledge transfer	High imports with local integration and rising firm R&D	High imports from United States but weak local integration and firm-level R&D
Business R&D	Rising to >50% of all R&D	Remains below 25% of all R&D
Linkages	Strong science & technology infrastructure linked to R&D	Weakening science & technology infrastructure and poor company linkages
Investment	High and supplemented by Japanese inward FDI. High learning from Japan	Decline of United States investment, low internal investment and low learning from abroad
Communications	High investment in advanced telecommunications infrastructure. High growth in electronics, high exports and user-feedback.	Slow development of modern telecommunications. Weak electronics, low exports, low learning.

These six indicators can be compared with the indicators used in the “6-I” model as illustrated in Table 3.

Table 3. Comparison of Cooke/Freeman and “6-I” models. Source: the Authors

COOKE/FREEMAN MODEL	“6-I” MODEL	COMPARISON
Education	Informing	Partial match. Both focus on education, Cooke model concentrates on statistical information about numbers and types of graduates, 6-I model looks at learning more broadly
Knowledge transfer	Interacting	Partial match. Both include professional networks for transfer of best practice, 6-I model also includes embedded tacit knowledge, and presence of knowledge workers
Business R&D	Innovating	Close match. Both are concerned with new products and processes
Linkages	Interconnecting	Partial match. Both are concerned with networks, Cook model concentrates on science and technology networks, 7-1 model also considers networks within the broader community
Investment	Income	No match. Cook model considers money invested in the region, 7- 1 model considers income and employment levels
Communications	Infrastructure	Partial match. Both focus on hard infrastructures such as transport and telecommunications, 6-I model also considers soft infrastructures such as regional norms and conventions

The first indicator is “Education” which matches up with “Informing”, though Cooke’s indicator is narrower in focus, looking mainly at graduate output in disciplines such as engineering. The concept of “Informing” covers this, but also includes factors such as the presence of embedded tacit knowledge and transfer of best practice. Cooke has “Knowledge Transfer” as his second category, which would cover issues such as transfer of best practice, but also includes issues such as the presence of professional networks, that are covered under the category “Interacting”. There is a close match between “Business R & D” and “Innovating”. Both are concerned with the development of new products and processes. Also the category “Linkages” is very similar to the “Interconnecting” indicator in the “6-I” model. Cooke’s category of “Investment” covers the amount of money invested in the economy both by the national government and international governments. This has a different focus from “Income” which focuses on data about income and employment levels. Investment was identified as a significant issue by many of the interviewees and it was decided to bring this factor into the model. “Communications” links up well with “Infrastructure” though in Cooke’s classification only hard communications infrastructure such as telecommunications networks are considered, whereas the “6-I” model also includes soft infrastructure such as regional norms.

After considering Cooke’s framework it was decided to refine the “6-I” model. The scope of the category “Income” was widened to include money invested in the region, for example by the government or philanthropy, as well as income and employment levels. The scope of the category “Infrastructure” was initially narrowed to concentrate on hard infrastructure only, in line with Cooke’s framework. The intention was that issues about soft infrastructures such as regional norms and conventions would be covered in the “Interacting” category. However, as data collection proceeded this view was revised; there was a large amount of data about local and regional government which seemed to be most relevant to “Infrastructure”, so the decision to exclude soft infrastructure was reversed.

This model will be used to answer the central research question: *What role do information and communication technologies play in the development of learning regions?* Each individual category of the model acts as a sub-question, for each of the six factors the situation in Southland and Wellington will be compared against the “ideal” to assess how it measures up.

3. Research Method

The research was carried out under the interpretive paradigm; the overarching emphasis was on obtaining a deep understanding of the research problem. Historical methods were selected as the most appropriate methodology to address the research question. The use of historical methods enables the researcher to understand the changes within a region over a substantial period of time. Their use leads to an in-depth understanding of the context in which the patterns of connection within a region emerge.

Two contrasting regions were selected, one urban region, Wellington and one rural region, Southland. A period of time with a defined start and end date was chosen in order to tease out underlying patterns. The date selected as a starting point for data collection was 1985, shortly after David Lange’s labour government introduced the sweeping economic changes known as “Rogernomics” (Clifton, 2004). The end date for data collection was 2005, when New Zealand became the first country in the world to launch a Digital Strategy (Ministry of Economic Development, 2005).

Southland is located at the southern end of the South Island, and Wellington at the southern end of the North Island as shown in Figure 1. Southland is a remote rural area; the region’s major city is Invercargill. Farming is the mainstay of the local economy; the region also has the country’s only aluminium smelter at Tiwai Point near Bluff. Southland Frozen Meat is also a major employer. Southland has many areas of great natural beauty, such as Stewart Island and tourism is of increasing importance to the region. Southland also contains methane gas, oil and lignite deposits with commercial potential.

The Greater Wellington Region (hereafter referred to as Wellington) includes the capital city, Wellington, as well as a mix of suburban and rural areas. The region includes a wide range of different socio-economic groups; there are some high income areas but also areas of deprivation. As Wellington is a capital city, the public sector is of particular importance, as is the service sector. Wellington is the second most important centre for the IT industry in the country after Auckland. The Hutt Valley’s economy was traditionally based around manufacturing though this was declining throughout the period studied. As in Southland, tourism is of growing importance to the region, and is often associated with events such as the Rugby Sevens or the Arts Festival.



Figure 1. Regions of New Zealand. Source: Statistics New Zealand www.stats.govt.nz

Ohmae (1995) defines region states as having a population of between 5 and 20 million, small enough that the citizens share common interests, but large enough to justify the infrastructure required (e.g. an international airport and a good harbour). This raises the question of whether the focus of the current study, New Zealand, with a population of about 4 million, can be meaningfully sub-divided into smaller regions. For example one study of learning regions (Sokol, 2002) used Slovakia and Scotland as its sample regions. In a similar vein Cooke and Morgan

(1998) argue that though learning is generally best organised at a regional level, in the case of small countries such as Denmark it might be more practical to view the nation state as a region. Because of this data collection operated at two levels, the national macro level and the regional meso level. The data collected at the regional level will complement the data collected at the national level, by providing information about both urban and rural New Zealand.

New Zealand’s major exports are primary products and the rural sector has traditionally been the most important area of the economy. As a rural region Southland will provide data about how the rural economy changed over the twenty year period studied. At the same time the country was attempting to diversify its export base, and IT and biotechnology were viewed as offering great potential. As an important centre for the IT industry, Wellington will provide data about changes during the period studied.

The second reason for selecting these two regions was that they both had a strong reputation throughout the country for being innovative adopters of ICT networks. In 1995, Wellington was one of the first cities in the world to set up a broadband network in its central business district, and in 2003 Southland made a bold decision to implement a wireless broadband network throughout the region.

Data was collected from a variety of different sources, interviews, newspaper articles, government statistics and consultants reports. The most significant source for data was articles from regional newspapers which were collected for the years of 1985, 1995 and 2005, and organised into a database of over 2,400 items as shown in Table 4 (note that in 2005 one of the regional newspapers for Wellington was no longer in print which partly explains the drop in numbers). What is interesting to note is that even though the newspapers were regional, more than half the articles selected had a national rather than a regional focus. The fact that Wellington is the capital of New Zealand is also significant. Generally initiatives by the national government were categorised as national rather than regional even though they were located in Wellington. The articles were coded according to which of the “6-I” categories they best belonged to, and whether they referred to the national (Nat), the Southland (S) or Wellington (W) region. The numbers of articles collected for each category give a broad indication of the category’s importance. Though these numbers are of no hard scientific value, counting the number of times a point is mentioned is one of the techniques used to establish trustworthiness and generate meaning (Miles & Huberman, 1994).The

same story was often reported in a number of publications, and there were often multiple articles about the same event.

Table 4. Newspaper statistics for 1985 to 2005 (Nat – National, S – Southland, W – Wellington). Source: the Authors

	1985					1995					2005					Overall Total
	Nat	S	W	Tot	%	Nat	S	W	Tot	%	Nat	S	W	Tot	%	
Interconn	97	16	27	140	12.9	44	11	43	98	12.3	41	13	5	59	10.4	297
Informing	95	39	46	180	16.6	32	45	74	151	19	37	24	11	72	12.7	403
Innovating	123	21	38	182	16.8	104	18	34	156	19.6	112	28	32	172	30.4	510
Interacting	33	53	69	155	14.3	7	35	77	119	15	4	29	12	45	8	319
Infrastruct	53	45	58	156	14.4	8	43	56	107	13.5	58	40	23	121	21.4	384
Income	163	42	64	269	24.9	41	83	39	163	20.5	48	23	26	97	17.1	529
Total	564	216	302	1082	100	236	235	323	794	100	300	157	109	566	100	2442
%	52.1	20	27.9	100		29.7	29.6	40.7	100		53	27.7	19.3	100		

The abstracts and full print articles for each “6-I” category were printed out and pattern matching (Miles & Huberman, 1994) was used to establish sub-categories for each of the different categories. Once these sub-categories had been decided on for the 1985 data they were used to code the 1995 and 2005 data. In general the sub-categories identified in 1985 remained relevant for 1995 and 2005, though some new sub-categories were added and a few were removed. Once categories and sub-categories had been finalised, the articles relevant to each section were sorted into each region, i.e. National, Southland or Wellington.

After the searches had been carried out the next step was to build up a picture of the situation in each region for each of the three years using the “6-I” model as a framework. This was done by combining the results of the searches ordered by category, sub-category and year for each of the two regions and the national situation. This data was used as a basis to describe developments in that region during 1985 to 2005.

Cross case analysis is a technique used to deepen understanding and explanation (Miles & Huberman, 1994; Yin, 1984). The original data from the newspaper articles was used to build up six meta-matrices for each category in the “6-I” framework. These meta-matrices listed all the information for each region from 1985-2005, although they were a useful source of reference they were large and unwieldy, and the next step was to refine the data to produce a set of more streamlined matrices. This was done using two techniques, firstly the data was coded according to the major sectors involved, e.g. was it from the business, education or local government sector, did it illustrate cultural diversity or the use of ICTs? The second technique was to compare the degrees of influence of each sector was it high, medium or low? The sectors which only had a low

influence were discarded. This approach produced tables which allowed a finer grained comparative analysis of the outcomes, and helped in identifying patterns and themes (Miles & Huberman, 1994).

4. Results and discussion

The “6-I” model defined the characteristics that would be present in an “ideal” learning region; the actual regions were then evaluated using this ideal as a benchmark. The most positive findings were in the areas of interconnecting, informing and interacting. The two regions were found to have developed good international links, made progress in the areas of education and lifelong learning, and have high social capital. ICT was found to be making a contribution to positive developments in all three of these areas. The areas with the least positive findings were innovating and income, though there was enthusiasm for new ideas in both regions actual levels of innovation remained low or static, similarly there was no significant increase in economic development in either region. Infrastructure came out somewhere in the middle, there were substantial improvements particularly in terms of ICT infrastructure, but when compared to international standards, such as the OECD rankings, New Zealand was struggling to keep pace.

Interconnecting

As illustrated in Table 5, the cross case analysis for “Interconnecting” for the period 1985-2005 shows that in terms of building links for international trade (Int Trade) both regions were following a similar pattern, with local government, business and the education sectors all involved in developing overseas links. Evidence of the development of the networked organisation (Net Org) was found only in the Wellington region and mainly in national government. Both regions helped develop national and international networks (Int Network) by means of student exchanges; however, Wellington used the internet extensively to build national and international networks, whereas no similar data was found for Southland. Both regions provided evidence of networks (Networks & Clusters) that existed throughout the period in the business and local government sectors, and in Southland rural networks were particularly active. By 2005 local government in both regions had conducted surveys of local organisations to identify common needs and issues.

Table 5. Cross case analysis for “Interconnecting”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Int. Trade	Business Local Government Education	Business Local Government Education
Net Org		National Government
Int Network	School	ICT Local Government
Networks & Clusters	Rural Local Government Business	Local Government Business Community School

Changes in global economic markets meant that New Zealand was under pressure to diversify its economy and build trade links with new economic partners. The country was very successful in reducing its dependence on the UK and developing new export markets in Asia. It was less successful in reducing the economy’s heavy dependence on primary products. New Zealanders exhibited a strong desire for improved connections to the rest of the world and were very fast adopters of any technology that would strengthen these connections.

Between 1985 and 2005, organisations became much more interlinked in terms of their ICT networks, and information technology opened up access to the rest of the world. ICT was also used to increase interconnection at the regional level, particularly in the dairy farming, education and community sectors. These interconnections opened up new opportunities for regional learning and innovation.

Though many examples were found of positive initiatives in both regions it was difficult for initiatives to gain momentum and achieve lasting change. At various points throughout the twenty year period, initiatives were set up around establishing business clusters, developing a regional strategy, setting up high technology zones or developing partnerships between education and business, but there was no evidence that such initiatives built steadily over the years. Proposed changes at a

regional level seemed to be met with infighting and local resistance, which inhibited any steady long-term development. Although the soft networks formed by clusters, joint ventures and networks were present, no clear pattern of development could be observed.

Informing

Table 6 summarises the findings for “Informing”. In 1985 skill shortages (Skill Shortages) were an issue right across the country and this is reflected in the findings for both regions, though problems were more severe for rural Southland, particularly in the school sector. In 1995 and 2005 the situation improved, though there were still staff shortages in some areas, notably the health sector in Southland and the ICT sector in Wellington. 1995 was a time of change for the education sector (Invest in Education) in both regions; Southland Polytechnic faced a funding crisis and there was intense competition between tertiary institutions in the Wellington region. More specialised schools were opening and the gap between rich and poor state schools was increasing. By 2005 the situation had stabilised. Southland Polytechnic was now the Southern Institute of Technology and had introduced a zero fees policy which improved enrolment numbers. In Wellington there had been rationalisation of the tertiary sector. Southland had also set up a number of retraining courses to address unemployment and partial employment in the region. ICT was generally heavily promoted (ICT Promotion) in the Wellington region, though there is a gap in the data for 2005. However, in Southland there was very little promotion of technology. In the education sector IT (IT in Education) was widely used in both regions. In Southland it was seen as a way of combining the resources of small rural schools. In 2005 Southland pioneered the use of interactive white boards in New Zealand.

Table 6. Cross case analysis for “Informing”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Skills Shortages	Rural Education Health Local Government	ICT National Government Business Education Health
Invest in Education	Population Polytechnic School Local Government Retraining Programmes	University Polytechnic Competition Diversification
ICT Promotion		ICT
IT in Education	Distance Education School Internet	School Internet

At both the national and the regional level there was a strong and consistent commitment to learning. ICTs were viewed as a useful tool that could facilitate learning, especially but not exclusively, in rural areas. The school sector stood out as a fast adopter of new technology, schools were keen to collaborate with each other using technologies such as videoconferencing. Government initiatives often used schools as a gateway to bring ICTs into local communities. For example, the national government hoped that making broadband available in rural areas to schools through a 2002 initiative known as Project PROBE would result in a “spill over” effect, with broadband being taken up by local businesses throughout each region. There was little evidence that this approach was working, there was good innovative use of broadband by schools, but this learning had not been passed on to different sectors within the regions.

Interacting

A summary of the findings for the “Interacting” category is shown as Table 7. Though crime was a common concern in both regions, with the other issues some clear differences emerged between urban Wellington and rural Southland. As might be expected, the urban region demonstrated more evidence of liberal values and cultural diversity, while the rural region had stronger traditional values and was less open to change (Regional Culture). However, the voluntary sector (Voluntary Groups), particularly rural women’s groups, was very significant in Southland. In both regions there was a growing awareness of the needs of Māori and Pacific Islanders (Māori, Pacific Islanders & Asians), with a revival of the Māori language and increasing involvement of ethnic groups in civic life. Evidence of racism was found in both regions, but in general progress was being made.

Table 7. Cross case analysis for “Innovating”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Regional Culture	Crime Traditional Values Liberalisation Local Government	Crime Liberalisation Community Local Government
Voluntary Groups	Community Women Issues Rural	Women Issues Business
Maori, Pacific Islanders and Asians	Maori Pacific Islanders Schools Polytechnic Racism	Maori Pacific Islanders University Local Government Racism

There were good examples of strong social capital in both regions, research into sustainable development in New Zealand has shown that rates of volunteering in the form of unpaid work are relatively high

compared to other OECD countries and have remained stable over time (Statistics New Zealand, 2008).

By 2005 community groups had become well aware of the contribution ICT could make to regional development. In 1985 and 1995 ICT networks were mainly used by the government and private business, but by 2005, ICT was widely used in the voluntary and community sectors. This trend was observed in both regions and was reinforced at a national level by the publication of the government's Digital Strategy (Ministry of Economic Development, 2005). Community groups were using hard ICT networks to complement and reinforce existing soft networks. However, though ICT networks were identified as playing a role in building interaction within a region they were seen as a complementary to rather than as a replacement for face-to-face contact.

Infrastructure

Table 8 details the results of the analysis of "Infrastructure". Interest in telecommunications (Telecommunications) was generally high throughout the period in both regions. Towards the end of the period, local and national government was playing an increasing role in promoting the development of telecommunications infrastructure in both regions. In terms of transport (Transport) the development of international air links was seen as important in both regions. Shipping links through ports were also significant. In 1985 there was a national restructuring of local government, which was strongly resisted in both regions (Regional Development). Change continued throughout the period, with the set up and dismantling of various regional development organisations and the production of various strategies and charters by local government bodies.

As a country with a low population and difficult terrain, New Zealand has more to gain from good telecommunications infrastructure relative to other countries. However, the population size and terrain make setting up such infrastructure more costly than in other countries. The importance of good telecommunications to the economy was recognised at both the national and regional levels, but the relatively high cost meant that New Zealand lagged behind other OECD countries.

Table 8. Cross case analysis for “Interacting”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Telecommunications	Telecommunications Mobile Local Government National Government	Telecommunications Local Government National Government
Transport	Ferry Airport Port	Airport Port
Regional Development	Local Government Restructuring Rural	Local Government Restructuring

In terms of infrastructure the general picture that emerged is of a clear linear progression in terms of the development of hard networks, but a more attenuated pattern in terms of soft networks where the same issues were revisited a number of times over the years. Though there was evidence of a relationship between the soft networks that existed at the regional level and the utilisation of hard ICT networks within a region, it was difficult to quantify.

Innovation

Factors relating to “Innovating” are shown in Table 9. As far as climate and culture (Climate & Culture) go the promotion of innovation in terms of seminars and expositions (among local government and business sectors) was present in Wellington but not Southland. Both regions provided examples of small scale entrepreneurs (Small Scale Entrepreneurship), but apart from one or two Southland examples entrepreneurship in the field of ICT (Entrepreneurship in IT) was only found in Wellington. The adoption of ICT (Adoption of ICTs) was also stronger in Wellington, but the difference was not so significant. By 2005, use of the internet was widespread in both regions. The data for the adoption of electronic commerce applications (Electronic Commerce

Applications) such as online and telephone banking, the Fencepost website for dairy farmers and the use of mobile phones shows that adoption was just as strong, if not stronger, in rural Southland as in Wellington. This indicates that when the rural community saw clear benefits from a technology, for instance, in terms of saving travel time to a bank, or having access to accurate weather forecasts, they were quick adopters. In both regions, but more notably in Southland, there was experimentation with different stock and produce lines in the agricultural sector (Rural Entrepreneurship).

Table 9. Cross case analysis for “Infrastructure”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Climate and Culture		Local Government Business
Small Scale Entrepreneurship	Business	Local Government Business
Entrepreneurship in IT		ICT
Adoption of ICTs	Internet	ICT Internet
Electronic Commerce Applications	Bank Mobile Rural	Bank Education Business Mobile
Rural Entrepreneurship	Diverse	

A learning region is typically characterised by high levels of innovation, which in turn lead to economic success. New Zealanders have a reputation for being innovative, and there was evidence of innovative thinking in both regions; two initiatives that stand out are the pioneering development of the CityLink broadband network in Wellington’s central

business district in 1995 (Huff, 1996), and the 2001 decision to introduce a zero fees policy at Southland Institute of Technology in order to attract more students and boost the local economy (Infometrics Consulting, 2000, 2002). New Zealand also stood out as a very fast innovative adopter of new ICT based technologies.

However, innovative products and processes were not being developed at the levels that would be expected in a successful learning region and neither region managed to develop anything close to a regional innovation system.

Income

The final analysis is shown in Table 10, which lists the different factors for “Income”. In 1985 the economy (Economy) was in difficulty in both regions, but rural Southland was particularly hard hit. Later in the period the situation improved and Southland was able to steady its loss of population. However, by 2005, economic growth in both regions was lagging behind the national average. The rural sector (Rural Sector) in Southland managed to recover mainly by switching from sheep farming to more profitable dairy farming. In Wellington the IT sector (IT Sector) was a significant part of the local economy throughout the twenty year period. Unemployment rates (Unemployment rates) followed the national pattern in both regions, being high in 1985 then improving in 1995 and 2005. However, unemployment was generally lower than the national average in Wellington. There was some evidence of investment (Investment) in both regions but not at a significant level.

In 1984 New Zealand made a series of daring and controversial moves in order to deregulate its economy. Over the period studied the economy stabilised and employment improved. Both regions managed to hold their economies steady. In the early part of the period studied the out-migration of skilled workers was a major problem for rural Southland, but by the end of the period the population was stable. However, there was no evidence of the strong economic performance that would be the hallmark of a successful learning region.

Table 10. Cross case analysis for “Income”. Source: the Authors

COMPONENT	SOUTHLAND	WELLINGTON
Economy	Rural Business Slowdown	Business Hardship Confidence
Rural Sector	Hardship Rural Diverse	
IT Sector		ICT
Unemployment Rates	Unemployment	Unemployment Retraining Local Government
Investment	Investment	Investment

5. CONCLUSION

Two of the most important indicators of a learning region are evidence of innovation and consistent economic success. At both the national and the regional level New Zealand was failing to show a strong performance on either of these indicators. Despite this there were many positive factors; high social capital, a strong commitment to learning, fast adoption of new technologies and an increasing engagement with the global economy.

The findings of the research show that hard and soft networks evolve differently over time and that the relationship between the two is nuanced. Though good social capital existed in both regions, it was located in different interest groups and was not easy to bring together. This lack of co-ordination meant that the possibilities opened up by ICT infrastructure in terms of increasing innovation were not fully realised. Both regions did demonstrate a strong commitment to learning, but this learning had yet to be translated into economic success.

Both Southland and Wellington had developed ICT strategies (Otago Southland Broadband Communications Committee, 2001; Wellington City Council, 2006) and at the national level there was the Digital Strategy (Ministry of Economic Development, 2005). All three documents had a strong focus on the education and the community sectors. However, in terms of the potential contribution ICT could make to economic development they were lacking. Developing innovative uses of ICT in the education and community sectors will not necessarily lead to innovative uses of ICT in the business sector. At both the national and the regional level more direct effort needs to be put into developing the use of ICT by the business sector with the aim of increasing innovation.

What role is ICT playing in the development of learning regions? Is it assisting in the areas where regions are doing well, and does it have the potential to make a difference to areas where regions are underperforming? Though ICT contributed to positive developments in the areas of interconnecting, informing, interacting and infrastructure it did not operate in a vacuum. The existence of good social networks and strong local champions were critical to regional development. ICT could complement these social networks but was no replacement for them. ICT investment is a necessary, but not sufficient contribution to regional development. As well as “Infrastructure”, effective development requires most, if not all of the remaining “6-I”s to be in place, and even then more peripheral regions may never manage to become fully fledged learning regions capable of sustained economic growth. It may simply be too challenging to overcome the barriers to growth caused by remote location and thinness of population.

The New Zealand government is currently investing millions of dollars in two ICT projects; the ultra-fast and rural broadband initiatives, in the belief that this investment in infrastructure will bring improvements to education, business and the community. However, this research has used historical data to demonstrate that though ICT can make a significant contribution to regional development, investing in infrastructure alone is not enough to unlock the potential that exists within New Zealand’s regions. Fully supportive social networks need to be put in place alongside the ICT networks so that the learning that is taking place within education and community sectors can be leveraged in order to benefit the entire region, and help to create innovative and economically successful learning regions for New Zealand.

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APPENDIX A. Sources for references in Table 1

KEY TERM	REFERENCE
Innovation -15	(Florida, 1995; Keating, et al., 2002; Lagendijk & Cornford, 2000; Larsen, 1999; Maskell, 1999; Maskell & Tornqvist, 1999; Morgan, 1997; Oinas & Malecki, 1999; Organisation for Economic Co-operation & Development, 2001a; Rio, 2001; Saxenian, 1994b; Schollman, O'Neill, Doczi, & Kelly, 2002b; Sokol, 2002; Storper, 1995; Wolfe, 2000)
Partnerships and networking - 14	(Cornford, 2000; Hudson, 1999; Keating, et al., 2002; Lagendijk & Cornford, 2000; Larsen, 1999; Malecki, 2002b; Morgan, 1997; Oinas & Malecki, 1999; Organisation for Economic Co-operation & Development, 2001a; Rio, 2001; Saxenian, 1994a; Schollman, et al., 2002b; Wolfe, 2000, 2002)

APPENDIX A. Continued

KEY TERM	REFERENCE
Embedded local knowledge -12	(Cornford, 2000; Florida, 1995; Hudson, 1999; Lagendijk & Cornford, 2000; Maskell, 1999; Maskell & Tornqvist, 1999; Morgan, 1997; Oinas & Malecki, 1999; Organisation for Economic Co-operation & Development, 2001a; Rio, 2001; Wolfe, 2000, 2002)
Regional norms and conventions - 10	(Florida, 1995; Larsen, 1999; MacLeod, 2000; Malecki, 2002b; Oinas & Malecki, 1999; Rio, 2001; Schollman, et al., 2002b; Sokol, 2002; Storper, 1995; Wolfe, 2002)
Good infrastructure - 8	(Christie & Hepworth, 2001; Cornford, 2000; Florida, 1995; Lever & Turok, 1999; MacLeod, 2000; Malecki, 2002b; Schollman, et al., 2002b; Wolfe, 2002)
High social capital - 7	(Christie & Hepworth, 2001; Larsen, 1999; MacLeod, 2000; Oinas & Malecki, 1999; Organisation for Economic Co-operation & Development, 2001a; Rio, 2001; Wolfe, 2002)
Trust - 6	(MacLeod, 2000; Maskell, 1999; Maskell & Tornqvist, 1999; Morgan, 1997; Oinas & Malecki, 1999; Wolfe, 2002)

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KEY TERM	REFERENCE
Lifelong learning - 6	(Cornford, 2000; Florida, 1995; Lagendijk & Cornford, 2000; Larsen, 1999; Oinas & Malecki, 1999; Sokol, 2002)
Presence of knowledge workers -5	(Christie & Hepworth, 2001; Florida, 1995; Keating, et al., 2002; Lever & Turok, 1999; Wolfe, 2002)
Input of universities and consultants-5	(Cornford, 2000; Lagendijk & Cornford, 2000; Morgan, 1997; Oinas & Malecki, 1999; Wolfe, 2002)
Critical & knowledgeable customers - 4	(Florida, 1995; Marshall, Taylor, & Yu, 2003; Wolfe, 2000, 2002)
Quality of life - 4	(Christie & Hepworth, 2001; Florida, 1995; Keating, et al., 2002; Lever & Turok, 1999)
Competitive culture - 4	(Lagendijk & Cornford, 2000; MacLeod, 2000; Marshall, et al., 2003; Saxenian, 1994a)
Ability to “unlearn” and be flexible – 4	(Maskell & Tornqvist, 1999; Saxenian, 1994a; Schollman, et al., 2002b; Storper, 1995)
Entrepreneurship - 4	(Lagendijk & Cornford, 2000; Saxenian, 1994b; Sokol, 2002; Wolfe, 2000)
Clustering - 3	(Christie & Hepworth, 2001; Keating, et al., 2002; Oinas & Malecki, 1999)
Bottom up approach - 3	(Lagendijk & Cornford, 2000; Schollman, et al., 2002b; Thompson, 2002)

APPENDIX A. Continued

KEY TERM	REFERENCE
Access to external economies - 3	(Florida, 1995; Lever & Turok, 1999; Oinas & Malecki, 1999)
Transfer of best practice - 3	(Hudson, 1999; Lagendijk & Cornford, 2000; Oinas & Malecki, 1999)
Common regional culture - 3	(Florida, 1995; Larsen, 1999; Wolfe, 2002)
Presence of competent suppliers - 2	(Lagendijk & Cornford, 2000; Maskell & Tornqvist, 1999)
Social entrepreneurs -2	(Malecki, 2002b; Wolfe, 2000)