

Using cluster theory as the lens through which the results of government funded online service initiatives can be examined

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This paper has been drawn from a larger study which encompassed two main themes – regional economic and community development and the consequences of government-funded ICT initiatives. The development action examined is the provision of government funding to support the process of planning, initiating and sustaining online service initiatives in a regional and rural context. A modified version of the Lowe (1999) cluster model is used to tie the emergent theory from a series of case studies to literature in areas including regional development, social capital, community building and community informatics. This paper explores how cluster theory can provide the lens through which the results of government and community actions can be viewed. Impacts are found to be diverse but generally included the establishment of new infrastructure and services, organisational and community learning, enhanced communications and relations, and more efficient government, community and business processes. The Lowe cluster model is shown to be appropriate for examining the impact of government interventions in a regional and rural development context. Further research is required to examine the opportunity to extend its application, for example, to the examination of other areas of community strengthening.

Key words: clusters, regional development, community website, evaluation.

Introduction

Recent literature demonstrates somewhat of a shift in terms of the expectations of information communications technology (ICT) and eCommerce, towards a view that 'technology is only a tool' which requires wise people to use it in ways that make sense for their communities. Consistent with reflections on international industry experience, there is now a greater emphasis on identifying locally appropriate initiatives, exploring opportunities for improving existing communications and service quality and for using the Internet and ICT to support more efficient community and business processes and relationships.

Recent research by Thompson (2005) adds support to this view. The *Community Informatics and Regional and Rural Sustainability* study examined the diffusion and impact of ICT through a series of case studies with the aim of exploring whether government funded online service initiatives could generate community and regional benefits either similar or different to those identified in the literature. Cluster theory provided the lens through which the results of government and community actions could be viewed.

This paper presents an overview of the study and illustrates how the Lowe cluster model was shown to be appropriate for examining the impact of government interventions in a regional and rural development context.

Regional development through ICT

By the late 1990s governments around the world were identifying ICT as a major strategy for improving regional and rural communities. In calling for Australian communities to join the globalised online world the Department of Information Technology and the Arts proclaimed that:

The information economy will play a seminal role in the growth of regional and rural Australia. Online services can build stronger more viable communities, with enhanced investment, employment and skills... Online services can also enhance the quality and convenience of life in regional communities (Department for Information Technology and the Arts 1998, 3).

The harnessing of new technologies was being linked to the generation of benefits for all citizens, however, particular benefits were being predicted for regional and rural communities. Table 1 summaries key themes in the literature on the anticipated benefits of ICT adoption and diffusion in a regional and rural context. These included reducing the disadvantage of distance, growing and creating wealth, enhancing communication and building skills.

Table 1: Anticipated benefits of ICT in regional and rural context

Author	Reduce disadvantages of distance	Increase connectivity and information access	Enhance communication	Raise awareness	Build skills	Develop local content	Grow and create wealth
Buckeridge (1996)		✓	✓	✓	✓		✓
Information Policy Advisory Council (1997)	✓	✓	✓	✓	✓	✓	✓
Department of Communication Information Technology and the Arts (1998)	✓	✓	✓	✓	✓	✓	✓
Hon John Brumby (1999)	✓	✓	✓	✓	✓	✓	✓
Victorian Government (2000)	✓	✓	✓	✓	✓		✓

Policy interventions to promote ICT adoption and diffusion

Through policy and other initiatives governments have set out to target constraints to the effective delivery of ICT; partnered with others to raise awareness of potential benefits; funded training and support services; initiated programs to empower and equip communities for the information age; and progressed their own uptake and delivery of online services. Table 2 provides a summary of some of the major ICT funding programs which were established and available to communities in regional and rural Victoria.

Table 2. Summary of major ICT funding programs

<i>Program</i>	<i>Jurisdiction</i>	<i>Strategy</i>	<i>Value</i>
Networking the Nation (NTN) 1997-2003	Commonwealth	Designed to help bridge gaps in telecommunications services, access and costs between urban and non-urban Australia.	\$464 million
Information Technology Online (ITOL) 1996 – current	Commonwealth	Designed to accelerate national adoption of eBusiness solutions, especially by small to medium enterprises.	\$12 million to 110 projects since 1996

Victorian eCommerce Early Movers (VEEM) Program 1999-2000	Victoria	Funding for local governments to assist in promoting the uptake of eCommerce, particularly in regional and rural Australia.	\$1.7 million 33 projects
Victoria's eCommerce Advantage incorporating Victorian eCommerce Exhibition Project Program (ECEPP) Launched 2001	Victoria	Designed to grow Victorian small business through the use of eCommerce, including \$1.2 million to assist collaborative and innovative e-commerce projects undertaken by SMEs.	\$10 million
Regional Connections Released 2002	Victoria	Designed to improve the environment for investment in regional and rural communications infrastructure.	Includes \$10 million for Customer Access Network Program

With access to significant government funding, a diversity of 'social experiments' were supported based on the hypothesis that ICT diffusion would generate beneficial impacts for regional and rural communities.

Determining the effect of online service initiatives

How do we determine whether government funding online service initiatives are having an effect, and whether it is the desired effect? Spencer (2002) has called for the systematic evaluation of community based ICT initiatives so that we can learn how these programs benefit the community.

The recent study by Thompson (2005) was focussed on understanding the impact and the effectiveness of policy for regional development through ICT in Australia. Seven very diverse case studies were presented with each one providing different insights into the benefits and challenges of establishing effective online services in a regional and rural context. Table 3 provides a summary of the presented case studies.

Table 3. Summary of community informatics case studies

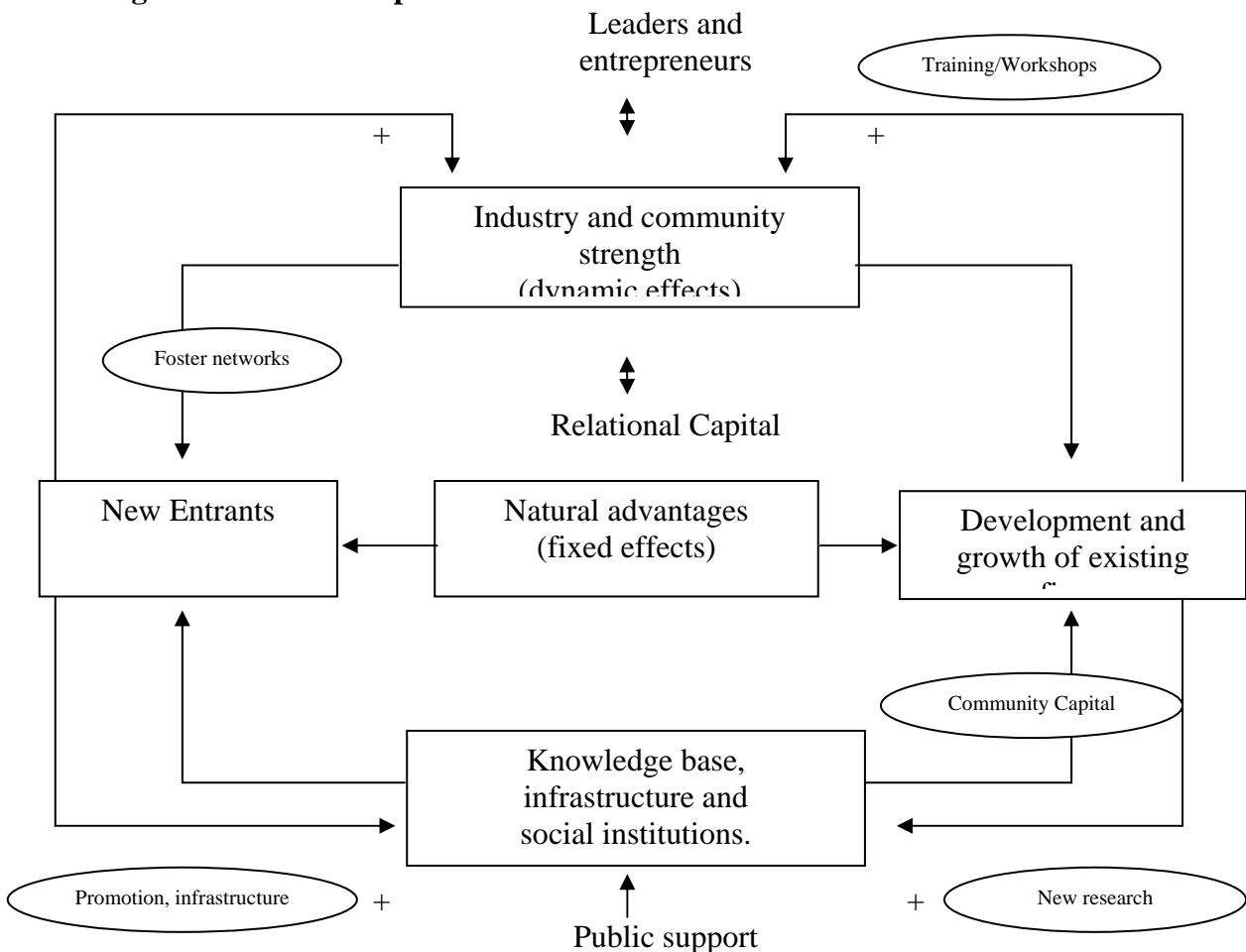
<i>CI Initiative</i>	<i>Year est.</i>	<i>Ownership</i>	<i>Primary project aspirations when initially established</i>
MainStreet Regional Portal	1999	Membership-based association and then UoB	Provide economic development opportunities and empower individuals.
Ararat Online	2000	Local Government	Provide economic development opportunities, empower individuals, revitalise sense of community.
Moorabool Online	2001	Local Government	Provide economic development opportunities, empower individuals.

Pyrenees Online	2001	Local Government	Provide economic development opportunities, empower individuals.
Young Australian Rural Network	2002	Federal Government	Enhance democracy, increase social capital, empower individuals, revitalise sense of community.
Birchip Cropping Group	2000	Membership based association	Increase social capital, empower individuals, provide economic development opportunities.
GrowExport	2003	Local Government as custodian for a regional partnership.	Provide economic development opportunities, empower individuals, increase social capital and enhance strong democracy.

Enhancing regional and rural community prospects was confirmed as a common theme across all initiatives. Similarly, government seed funding was confirmed as critical, both by acting as a catalysts for project commencements and as an enabler to support communities in implementing locally identified solutions.

In this paper the case study findings are considered in the context of the extant literature with the framework for this analysis developed by linking the cluster elements of the following model with regional development, social capital, community building and community informatics literature.

Figure 1. The cluster process



Source: Lowe (1999, 2).

Explaining the Lowe model in the context of a cluster of ICT initiatives

The cluster model proposed by Lowe (1999) can be utilised in describing the impact of ICT initiatives which have been designed to generate community and regional benefits. The argument which emerges is that the practice of combining regional development and online technologies is a dynamic process where the quality of outcomes will relate to the human effort of participants, the quality of the infrastructure, and the processes which are adopted in developing and implementing initiatives. Participatory approaches are suitable for determining the type of interventions which are most appropriate to the purposes, context, skills and resources available. Further, the use of clustering concepts can assist in better identifying the linkages between various factors which together determine the development prospects of a region and its businesses and communities.

In the context of this study, the cluster process commenced with the introduction of public support in the form of government funding to support the planning and implementation of a significant regional ICT initiative. The University of Ballarat (UoB) identified the opportunity to secure funding for activities that would build on existing infrastructure (including dial up Internet capabilities and Internet access centres). While the target region had a range of existing social institutions and structures the level of knowledge of how ICT could be effectively utilised and applied in a regional development context was limited. Key opinion leaders were therefore encouraged to participate in and to fund and promote activities associated with the initial research activities.

The knowledge generated through this process provided the foundation for future activities and identified new inputs in the form of specialised infrastructure, training, research, and technical support which would be required to support an increase in the uptake of ICT in the Golden West Region. If public support could be secured, there would be opportunities to build on the natural advantages of the region, to support the development and growth of existing firms and to support new business and community development activities. By utilising participatory approaches in implementing the ICT initiatives there would be an opportunity to leverage existing networks; to establish new partnerships across the region; and to build new skills; thus building on the level of social and relational capital.

The UoB together with Local Government and other key organisations provided the initial leadership and used their influence to encourage others to work towards a common goal of more effectively applying ICT in a regional development context. Adoption of a cyclical process of research, analysis, refinement and reflection was beneficial in identifying the impact of activities and also in informing future planning and priority setting. Ongoing promotion of initiative benefits progressively expanded the number of communities and organisations actively utilising ICT in their communication and development activities.

Grass roots support and participation was identified as essential if initiatives were to be sustained beyond any initial seed funded period. Community members would need to be empowered to 'own' and drive local initiatives for themselves. Infrastructure established to maintain ICT initiatives would therefore need to support users with low ICT skills effectively and take account of the factors such as the low level of bandwidth available in the Golden West Region. The availability of ongoing support and 'train the

trainer' services may also assist in increasing local knowledge, skills and confidence in utilising ICT services in a regional development context.

A cluster of regional and rural ICT initiatives

Eisenhard (1989, 545) has identified that 'tying the emergent theory to existing literature enhances the internal validity, generalisability and theoretical level of the theory building from case study research...because the findings often rest on a very limited number of cases'. The aim in this section is to present a comparison between emergent theory from the case studies and the extant literature to identify what is similar, what is different, and why.

The Lowe (1999) model of cluster development – which illustrates the critical relationships between a community's natural advantages; knowledge base, infrastructure and social institutions; the development and growth of existing firms; new entrants; and industry and community strength – informed the development of the framework for the comparison between emergent theory from the case studies and the extant literature. By linking these factors to key messages from the regional development, social capital, community building and community informatics literature, it is possible to identify how and under what conditions ICT can be made usable and useful to a range of users, particularly to support local economic and social development using the Internet (Gurstein, 2000).

Once this initial process has been completed, consideration can then be given to the critical relationships between the key elements of the cluster model. How, for example, does the underlying knowledge base, infrastructure and social institutions (in this case the UoB applying research, infrastructure, knowledge and skills in partnership with diverse communities, to establish online service initiatives in a regional development context) strengthen interaction and facilitate the development of relational capital, communication and development prospects? Does a process of creating a virtuous circle of increasing returns through feedback effects apply? Is a quasi market in social knowledge, assets and infrastructure developing to form an active economic or community cluster that serves to attract new members and new economic and social capital (Lowe, 1999)?

In the Lowe framework clustering led to increasing returns and increased activity principally through four mechanisms:

1. Development of dynamic resources and competencies beyond those initially present.
2. Development of knowledge resources and institutions to support new development.
3. Encouragement of existing members to increase activity and attract new entrants.
4. Leveraging the existing resources on which the community was based.

The remaining sections of this paper evaluate the ICT initiatives against these four outcomes. A series of frameworks are presented. These have been constructed utilising the Lowe cluster model as the basis for their organising structure. Key messages from the literatures on regional development, social capital, community building and community informatics are then integrated within each major area. Evidence from the

case studies is then mapped against each element to identify those areas where a case study for an online service initiative supports:

1. that the element is reflected (✓);
2. that the element is reflected as a negative effect (X);
3. that the element is not reflected (blank); or
4. that the outcome cannot yet be determined with certainty (?).

The frameworks serve two important purposes. Firstly, they flesh out what is meant by the knowledge base, infrastructure and social institutions; industry and community strength; and the development and growth of existing firms; in the context of ICT adoption and diffusion in a regional development context. Secondly, they assess how each case measures up against these elements.

Knowledge base, infrastructure and/or social institutions

The first framework considers how online service initiatives have impacted on the underlying knowledge base, infrastructure and/or social institutions in each community. Close correlations between the information drawn from the literature and the evidence from the case studies are confirmed (Refer Table 4). Based on the presented case studies, government funded online services initiatives in a regional and rural context have resulted in the establishment of new infrastructure, facilities and services; higher levels of university/region and government/region engagement; facilitated access to specialist expertise, tools and knowledge; supported the delivery of tailored ICT products; resulted in the development of local content; and enhanced information access and transfer.

Table 4. Knowledge base, infrastructure and/or social institutions framework

	MainStreet	Ararat	Pyrenees	Moorabool	YARN	GrowExport	BCG
Knowledge base, infrastructure and social institutions							
University region engagement	✓	✓	✓	✓	✓	✓	✓
Engagement of Government (Local, State, Federal)	✓	✓	✓	✓	✓	✓	✓
Access to specialist expertise tools and knowledge	✓	✓	✓	✓	✓	✓	✓
Receipt of government funding	✓	✓	✓	✓	✓	✓	✓
Access to tailored ICT products	✓	✓	✓	✓	✓	✓	✓
New infrastructure, facilities, services	✓	✓	✓	✓	✓	✓	✓
Develop local content	✓	✓	✓	✓	✓	✓	✓
Information access and transfer	✓	✓	✓	✓	✓	✓	✓
Pilot and demonstration of ICT service solutions	✓	✓	✓	✓	✓	✓	✓
Activities to raise awareness	✓	✓	✓	✓	✓	✓	✓
Active participation in design, implementation and development	✓	✓	X	✓	✓	✓	✓
Integrated approach to ICT	✓	✓	X	✓	✓	✓	✓
Build skills	✓	✓	?	✓	✓	✓	✓
Establish support structures	✓	✓	?	✓	✓	✓	✓
Access to and utilisation of knowledge	✓	✓	?	✓	✓	✓	✓
Organisational learning	✓	✓	?	✓	✓	✓	✓
Conduct research	✓	✓	X	✓	✓	✓	✓

Local 'champions' (early adopters, opinion leaders)	✓	✓	X	✓	✓	?	✓
Foster innovation	✓	✓	X	✓	✓	?	✓
Monitor and evaluate	✓	✓	X	✓	✓	?	✓
Continuous improvement and refinement	✓	✓	X	✓	✓	?	✓
Deal with change at both the strategic and grass roots level	✓	✓	X	✓	✓	?	✓
Change perceptions about ICT	✓	✓		✓	✓	?	✓
Knowledge spill overs	✓	✓		✓	✓	?	✓
New ideas	✓	✓		✓	✓		✓
Strong sense of community ownership	?	✓	X	✓	✓	?	✓
Sustainable development	✓	✓	?	✓	✓	?	✓
Conflict resolution	✓						

The community informatics (CI) literature confirms local participation as an important goal that requires a strategic approach (Colle 2000). Community organisations and individuals need to be able to participate in the design, implementation and development of CI initiatives if they are to address local needs effectively (Day, 2001). Where this 'bottom up' or 'grassroots' participation is achieved the objectives of improving the community in which an initiative is located and of ensuring that community members 'own' and drive an initiative for themselves are better achieved (Loader, 2002).

Participatory community processes are evident in all but one of the presented cases (Pyrenees Online) with the UoB having successfully assisted communities in identifying and implementing a range of strategies to achieve broad community involvement: local 'champions' have been identified; working groups have been established; community representatives have been trained; review workshops have been held; regular monitoring and evaluation has taken place; new research and development activities have commenced; and, in most instances, a strong sense of community ownership has been achieved. Community leaders have been able to attract external resources, including government funding, to support the establishment and expansion of online services and to harness local support which has increased the longer term sustainability of initiatives.

There is significant evidence illustrated through the case studies which confirms that CI outcomes are improved when an integrated approach to ICT development is adopted (Stephens 2001). This maximises the use of the hard technology (Simpson, Wood, Daws & Seinen, 2002); better unites community effort (Gurstein, 1999); builds skills and knowledge (through formal and informal activities); supports organisational learning (Garlick 2000); and enhances capacity for reflection and the envisioning of new futures (Simpson *et al.*, 2002).

The negative consequences associated with failing to adopt a participatory and integrated approach to ICT development are most clearly demonstrated through the Pyrenees Online case study. In this instance there has been an absence of strong leadership to unite community effort (Gurstein, 1999). While activities have been

undertaken to build skills and while numerous attempts have been made to establish support structures, the level of organisational and community learning is still unclear. No local research has been undertaken; activities to raise awareness have largely failed to result in sustained participation; there is a lack of local monitoring and evaluation; very little evidence of continuous improvement and refinement; no apparent change in perceptions about ICT have emerged and no knowledge spill overs or new ideas have been forthcoming. While the Pyrenees community have succeeded in attracting government funding to support the establishment of online services, this does not as yet appear to have had any significant impact on the local knowledge base, infrastructure or social institutions.

In the case of GrowExport.com the optimum levels of stakeholder ownership and leadership have not yet emerged. GrowExport.com was established on the basis of a careful analysis and understanding of the local export community. Simpson (2002) has identified this as an essential prerequisite to any ICT project. With the launch of GrowExport.com coinciding with the departure of the Project Officer, key stakeholder organisations were required to take ownership of all associated project activities. This included distributing responsibility for the ongoing maintenance and expansion of the GrowExport.com services. While commitment to updating site content, maintaining the online database, and regularly utilising the GrowExport.com communication tools and knowledge management systems was clearly evident during the initial months after the service launch, there has been a reduction in key stakeholder activity in recent months. In the case of the GrowExport.com initiative, it is considered too early to determine with any certainty the impact of the initiative in all areas of the knowledge base, infrastructure and/or social institutions framework. Ongoing monitoring and evaluation will be needed to determine whether this initiative leads to the fostering of innovation, continuous improvement and refinement, dealing with change effectively at both the strategic and grass roots level, knowledge spill overs, a strong sense of community ownership and a sustainable development.

Industry and community strength

The second framework considers how online service initiatives have impacted on industry and community strength (see Table 5). Again, a strong parallel between the extant literature and the case study evidence is confirmed with the elements in this framework most directly linked to the literature on social capital, community building and CI.

Garlick (2000) has described social capital as the 'infrastructure for collaboration'. It provides the pathways by which people can come together to exchange ideas, solve problems or form partnerships, and to recognise, value and leverage an area's assets for mutual gain. The Ararat, Moorabool, YARN and BCG case studies provide multiple examples of people and organisations collaborating, forming partnerships and strengthening networks through the process of establishing and sustaining online service initiatives. Increased interaction, enhanced communication and a free flow of information are among the specific benefits which can be observed.

Table 5. Industry and community strength framework

	MainStreet	Ararat	Pyrenees	Moorabool	YARN	GrowExport	BCG
Industry and community strength							
Sense of common interest	✓	✓	?	✓	✓	✓	✓
Community empowerment	✓	✓	?	✓	✓	✓	✓
People and organisations coming together	✓	✓	?	✓	✓	✓	✓
Enhanced communication	✓	✓	?	✓	✓	✓	✓
Free flow of information	✓	✓	?	✓	✓	✓	✓
Willingness to align agendas	✓	✓	?	✓	✓	✓	✓
Showcase region/community	✓	✓	?	✓	✓	✓	✓
Identify local strengths, assets and capacities (tangible and intangible)	✓	✓	X	✓	✓	✓	✓
Collaboration, partnerships and networks	✓	✓	X	✓	✓	✓	✓
Increased interaction	✓	✓	X	✓	✓	✓	✓
Determine local priorities which leverage assets	✓	✓	X	✓	✓	✓	✓
Formulate strategies and action plans	✓	✓	X	✓	✓	✓	✓
Mobilise local resources	✓	✓	X	✓	✓	?	✓
Engage volunteers	✓	✓	?	✓	✓	?	✓
Local sustainability	✓	✓	?	✓	✓	?	✓
Strengthened leadership	✓	✓	X	✓	✓	?	✓
Long term commitment to capacity building	✓	✓		✓	✓	?	✓
Commitment to forward planning	✓	✓		✓	✓	?	✓
Willingness to work with other communities	✓	✓		✓	✓	?	✓
Increased confidence	✓	✓		✓			✓
Improved attitude of mind		✓		✓			✓
Achieve competitive advantage		✓					✓

The McOnline case study, for example, demonstrated the Moorabool Shire’s long term commitment to capacity building through the implementation of locally appropriate online services (Denison, Hardy, Johanson, Stillman & Schauder, 2002); identified how community participation, local planning and volunteering can lead to new collaboration, partnerships and networks (Allen 1999); confirmed the benefits of maintaining a strong emphasis on community empowerment (Black, Duff, Saggars, Baines, Jennings &

Bowen, 2000); illustrated how local leadership can be strengthened (see, for example, the Mt Egerton Township Website Project) (McKinsey & Co., 1994); and confirmed the importance of individuals and organisations cooperating to achieve community goals (see, for example, the McOnline Cultural Heritage and Artefacts project) (Simpson *et al.*, 2002).

Day (2001) claims that online service initiatives should be pursued with a clear sense of common interest if the goal of improving the local community is to be achieved. In the Pyrenees Shire, a lack of commitment to planning and an absence of a long-term commitment to capacity building through ICT initiatives have weakened the impact of the Pyrenees Online initiative.

CI needs to be accepted as an integral part of development if communities are to restructure themselves more radically towards a knowledge-based future (Pearse, Wright & Cooper, 2002). Crucial foundations for ICT implementation in a regional development context have been identified as soft technology (education and training, awareness raising and building leadership) and social infrastructure (networks, organisations and institutions, community groups and volunteerism) (Simpson *et al.* 2002). In the case studies for MainStreet, Ararat, Moorabool, YARN and Birchip there is evidence of closely related factors which include increased interaction, increased confidence, engaged volunteers, strengthened leadership, a greater willingness to work with other communities and a long term commitment to capacity building.

Development and growth of existing firms

The third framework considers whether online service initiatives have impacted on the development and growth of existing firms (see Table 6). In this instance there is a much weaker correlation between the key messages from the literature and the case study evidence.

The geographic and regional portal initiatives which have been examined reflect that online service initiatives have resulted in: attraction of investment in regional infrastructure; generation of greater exposure of opportunities, goods, services and communities; established new marketing tools for communities and for small business; increased the availability of relevant, quality and timely information; and created new opportunities for communication.

In the case of the Birchip Cropping Group there is evidence of enhanced operational efficiencies, a better ability to compete, the fostering of business innovation, streamlining in the supply chain management system and the development of an entrepreneurial spirit. These factors are, however, not generally reflected in the other case studies which have been examined.

While government literature often emphasises the opportunity for online services to be utilised to grow and create wealth (reduce transaction and overhead costs; create new sales; generate employment) the cases studies do not reflect these anticipated outcomes of ICT adoption and diffusion in a regional development context.

Table 6. Development and growth of existing firms' framework

	MainStreet	Ararat	Pyrenees	Moorabool	YARN	GrowExport	BCG
Development and growth of existing firms							
Attract investment in regional infrastructure	✓	✓	✓	✓	✓	✓	✓
Marketing tool for small business	✓	✓	✓	✓		✓	✓
Exposure of opportunities, goods, services and communities	✓	✓	✓	✓	✓	✓	✓
Relevant, quality and timely information	✓	✓	?	✓	✓	✓	✓
New opportunities to communicate with each others	✓	✓	?	✓	✓	✓	✓
Establishment and strengthening of networks	✓	✓	X	✓	✓	✓	✓
Strengthen customer/stakeholder relationships	✓	✓	?	✓	✓	?	✓
Lower barriers to conducting eCommerce	✓	✓	?	✓		?	✓
Business benefits/development	✓	✓	?	✓		?	✓
Foster business innovation	✓	✓	?	✓			✓
Increase demand for local products and services	?	?	?	?		?	✓
Enhanced ability to compete						?	✓
Enhance operational efficiencies							✓
Develop entrepreneurial spirit							✓
Streamline supply chain management							✓
Reduce transaction and overhead costs							
Generate employment							
Create new sales							

The promise of unequivocal benefits from applying ICT has not yet made 'place' irrelevant (Steer & Turner, 2002). 'In the context of the global economy the regional development game is now much tougher for locals' (Garlick 2000, 75). Locally led ICT initiatives which take the form of geographic or community portals, may enhance the local knowledge base, infrastructure and social institutions and enhance industry and community strength. However, it appears unlikely that Government funded ICT initiatives can live up to the promises of 'levelling the playing field' with regional and rural communities competing equally in the global economy (Department of Communications and the Arts, 1996; Information Policy Advisory Council, 1997; Brumby, 1999).

Critical relationships between the key elements of the cluster model

The Lowe model of clustering illustrated how natural advantages, the knowledge base, new entrants, the growth of existing firms, and industry and community strength can combine to help communities develop a new resource base. In the preceding section evidence from each of the case studies was contrasted with a number of the critical elements of the cluster process. Based on this analysis a modified version of the cluster model has been developed which summarises how CI can enhance the prospects and potential of regional and rural communities (see Figure 7).

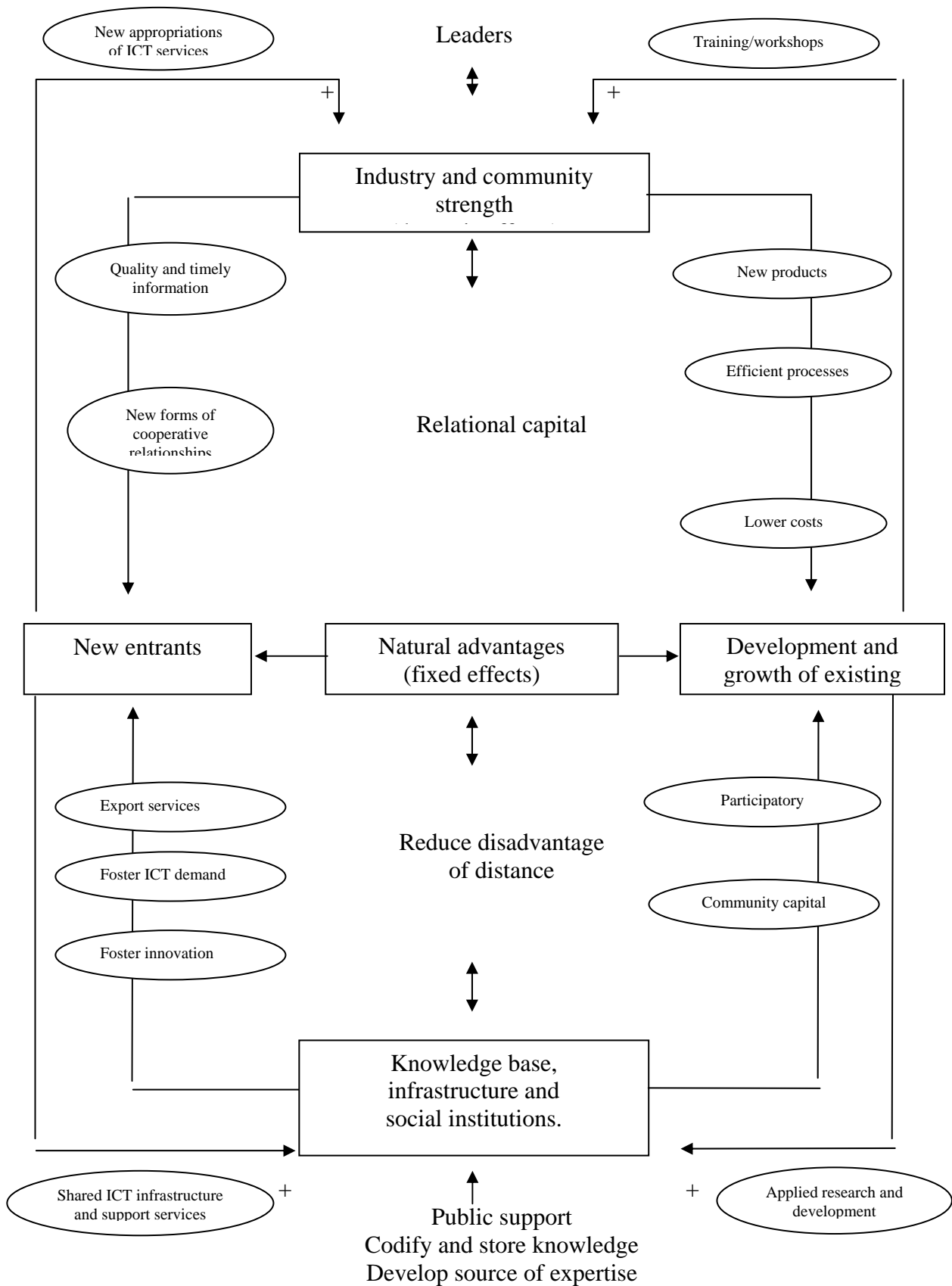
The Internet can be used as an enabling technology where locally identified and implemented initiatives are developed with participant communities. The availability of Government seed funding for online service has been identified in this study as a critical element which has underpinned the initiation and ongoing expansion of online service initiatives in a regional and rural context. In some instances the availability of government funding created the incentive for communities to pursue online service initiatives. In other cases government funding has been confirmed as the enabler which supported communities in implementing locally identified solutions.

The ability for online service initiatives to defeat the 'tyranny of distance' or to grow and create wealth has not been confirmed via the case study evidence. It appears unlikely that government funded ICT initiatives will live up to the promise of 'levelling the playing field' with regional and rural communities competing equally in the global economy. Locally led online service initiatives can, however, be made usable and useful to a range of communities to support local economic and social development.

The embedding of ICT in regional development processes requires ongoing investment in the piloting, demonstration, customisation replication and evaluation of services. The continuing availability of government funding will be an important determinant of the ability of regional and rural communities to initiate or expand initiatives which are designed to utilise ICT effectively. The level of funding which communities can attract from government sources is likely to influence the types of services and support systems that can be established and the extent of other capacity building activities that are associated with community ICT projects.

The incorporation of collaborative processes in the development of online service capabilities is critical if services are to strengthen communities, build new capacity and enhance regional development prospects. Specific observations have included recognising the imperative to support the development of local leadership and ownership, of building a shared understanding of intent, and of achieving optimal design by providing opportunities for community input and participation throughout all project stages (initial design, building and testing, launch, evaluation and ongoing enhancement). Ongoing access to appropriate tools and support services has also been identified as imperative for longer-term sustainability and ongoing improvement. In the cases which have been reviewed the UoB has played a central role in effectively meeting the knowledge, infrastructure, and ongoing support needs of local communities.

Figure 7. The cluster process in a community informatics context



These findings have important implications for designers of government funding programs. There remains a high and unmet demand for the kind of community-based online service initiatives which have been demonstrated (Thompson, 2005). However, regional communities too often lack the skills, knowledge and resources which are needed to apply new technologies to support local social and community development goals. Opportunities for communities to access government funding support to initiate online service projects have declined substantially in recent years. Thompson (2005) makes the case for targeted government investment to support the coordination of support services for local ICT initiatives through similar mechanisms as those which are delivered through the UoB.

Conclusions

This paper has explored how cluster theory can provide the lens through which the results of government and community actions can be viewed. The Lowe cluster model has been shown to be appropriate for examining the impact of government interventions in a regional and rural development context. Future research may further extend its application to other area, for example, to examining the impact of government investment in community strengthening initiatives.

References

- Allen, J. C. (1999). *The Nebraska Model*. Australian Regional Summit, Canberra, Australia.
- Black, A., J. Duff, S. Sagers, *et al.* (2000). *Rural Communities and Rural Social Issues: Priorities for Research*. A Report for the Rural Industries Research and Development Corporation, RIRDC Publication No 00/130. 2001.
- Brumby, H. J. (1999). *Connecting Victoria: The Victorian Government's Strategy for Information and Communications Technologies*. Melbourne, Department of State and Regional Development, Victoria.
- Buckeridge, R. (1996). *Rural Australia Online: Electronic Information Systems for Building Enterprises and Community Beyond the Cities*. Barton, Rural Industries Research and Development Corporation.
- Colle, R. D. (2000). *Telecentres as Vehicles for Community Informatics*. Using Community Informatics for Regional Transformation, 2nd Edition, Get Smart Conference 2000, Rockhampton, Queensland, Central Queensland University.
- Day, P. (2001). *The Network Community: Policies for a Participative Information Society*. University of Brighton, Unpublished PhD Thesis.
- Denison, T., G. Hardy, G. Johanson, L. Stillman & D. Schauder (2002). *Community Networks: Identities, Taxonomies and Evaluations*. *Electronic Networking 2002 - Building Community Conference*, Monash University, Caulfield Campus, Melbourne, Centre for Community Networking Research School of Information Management & Systems, Monash University.
- Department for Information Technology and the Arts (1998). *A Strategic Framework for the Information Economy: Identifying Priorities for Action*. Canberra, Commonwealth of Australia.
- Department of Communications and the Arts (1996). Government Announces Regional Telecommunications Infrastructure Fund. 2002.
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14, 532-550.
- Garlick, S. (2000). *Engaging Universities and Regions: Knowledge Contribution to Regional Economic Development in Australia*. Canberra, Evaluations and Investigations Programme Higher Education Division Department of Education, Training and Youth Affairs.
- Gurstein, M. (1999). *Community Informatics: Enabling Communities with Information and Communications Technologies*. Hershey PA, Idea Group Publishing.
- Gurstein, M. (2000). *Community Informatics: Enabling Communities with Information and Communications Technologies*. Hershey PA, Idea Group Publishing.

- Information Policy Advisory Council (1997). *Rural & Regional.au/ for All*. Canberra, Department of Communications and the Arts, Australia.
- Loader, B. (2002). *Whither Electronic Communities? Community Informatics in Principle and Practice*. Community and Information Technology: The Big Questions, Melbourne, Australia, Monash University.
- Lowe, J. (1999). Growth and Decline: Rejuvenating and Sustaining Regional and Rural Communities, Australian Research Council Strategic Partnerships with Industry - Research and Training Scheme Application Form for Year 2000 Grants.
- McKinsey & Co. (1994). *Lead Local, Compete Global: Unlocking the Growth Potential of Australia's Regions*. Final Report of the Study by McKinsey & Company for Office of Regional Development, Dept. of Housing and Regional Development. Sydney, McKinsey & Company.
- Pearse, W., L. Wright & M. Cooper (2002). *Hervey Bay in Transition: The Role of Community-Based Information Technology in Overcoming the Great Digital Divide*. Information Technology in Regional Areas Conference 2002 Using IT: Make IT Happen, Rockhampton, Queensland, Central Queensland University.
- Simpson, L., L. Wood, L. Daws & A. Seinen (2002). *The Design and Implementation of Rural Communication Technology Initiatives: Guidelines for Project Planners*. Information Technology in Regional Areas Conference 2002 Using IT: Make IT Happen, Rockhampton, Queensland, Central Queensland University.
- Spencer, S. (2002). *Measuring IT Outcomes in Regional Australia*. Information Technology in Regional Areas Conference 2002 Using IT: Make IT Happen, Rockhampton, Queensland, Central Queensland University.
- Steer, D. & P. Turner (2002). *ICTs and the Role of Place: Tasmanian Insights*. Information Technology in Regional Areas Conference 2002 Using IT: Make IT Happen, Rockhampton, Queensland, Central Queensland University.
- Stephens, U. (2001). *Strengthening Rural Communities Resource Kit*, NSW Premier's Department Dragonfly Print Services.
- Thompson, H. (2005). *Community Informatics and Regional and Rural Sustainability*. School of Business. Ballarat, University of Ballarat.
- Victorian Government (2000). *Skills x Knowledge = Growth: A Statement by the Victorian Government on ICT Skills*. Melbourne.