



NEW ZEALAND INSTITUTE FOR THE STUDY
OF COMPETITION AND REGULATION INC.

The Rural-Urban “Digital Divide” in New Zealand: Progress since September 2000

By Bronwyn Howell and Lisa Marriott
May 2002

<http://www.iscr.org.nz/research/>

New Zealand Institute for the Study of Competition and Regulation Inc.
PO Box 600
Wellington, New Zealand

Phone 64 4 463 5563
Fax 64 4 463 5566
Email bronwyn.howell@vuw.ac.nz

*Acknowledgements: This paper updates **The Rural-Urban “Digital Divide” in New Zealand: Fact or Fable?** produced by Bronwyn Howell in October 2000. The authors acknowledge the support of Roderick Deane as project sponsor and Darren Lim, Yellow Pages, in providing data for this analysis.*

Executive Summary

In November 2000, the Institute for the Study of Competition and Regulation reported on the relative uptake of email and website applications by businesses in various geographical areas of New Zealand in *The Rural-Urban “Digital Divide” in New Zealand: Fact or Fable?* This current paper analyses the changes that have taken place over the 18 months period since the original paper was published, using the same methodology based upon listing behaviour in New Zealand’s most comprehensive business contact information directory, the Yellow Pages.

Findings from the research include:

- some provincial areas still outperform all metropolitan areas in email and website listing percentages, and hence use;
- rural areas continue to lag their provincial centres in uptake of both technologies;
- many rural and provincial areas have moved significantly higher in ranking vis-à-vis their metropolitan counterparts in the eighteen months between the two studies; and
- the North Island / South Island “digital divide” is still evident, but is reducing.

The key analysis from the previous report – that provincial and rural New Zealanders face higher costs of communication, and thus will be more likely to substitute new, lower-cost and more effective technologies earlier and at higher prices than their metropolitan counterparts – remains, and may explain the growth in provincial and rural email use relative to metropolitan. However, identification of the provincial and rural areas that have had highest ranking changes as those where significant additional educational and promotional effort has been concentrated (for example, specific local government initiatives and Ministry of Economic Development Electronic Commerce Action Team promotions, combined with strong local business leadership and networks to promote awareness and uptake) indicates that, where there is potential to grow uptake of these technologies, the returns to information-sharing and communication may be both significant and rapid.

We recommend that further research be undertaken to measure the effects of this information-sharing and networking more accurately, in order to ensure that businesses in all environments – rural, urban and metropolitan – can share the economic benefits promised by electronic commerce. While some rural areas still remain low uptakers of the new technologies, the relative slip in the rankings of metropolitan areas is a concern. Access to information-sharing, promotional and networking resources in metropolitan as well as provincial areas may be necessary in order to promote efficient use of the new technologies by businesses in all areas. Over-focus on ‘correcting’ a divide that may not actually exist runs the risk of promoting false perceptions of geographical uptake equity (which will never be efficient at equal uptake percentages, given the differing communication cost-benefit trade-offs faced by different

business types in different regions) at the expense of national economic performance excellence.

Contents

<u>EXECUTIVE SUMMARY</u>	2
<u>CONTENTS</u>	4
<u>LIST OF FIGURES</u>	5
<u>INTRODUCTION</u>	6
<u>METHODOLOGY</u>	8
<u>THE STUDY</u>	10
<u>ISSUE 1: A “DIGITAL DIVIDE” EXISTS BECAUSE URBAN BUSINESSES HAVE PROPORTIONALLY MORE WEBSITES THAN RURAL ONES.</u>	11
<u>ISSUE 2: PROVINCIAL NEW ZEALAND IS DRAGGING THE E-COMMERCE CHAIN</u>	14
<u>ISSUE 3: NEW ZEALAND E-COMMERCE ACTIVITY BEGINS AND ENDS IN AUCKLAND</u>	20
<u>INTERPRETING THE DATA</u>	23
<u>FOCUS ON TECHNOLOGY IN RURAL REGIONS HAS EMPHASISED GROWTH IN THIS AREA AT THE POTENTIAL EXPENSE AND PROMOTION OF URBAN REGIONS.</u>	23
<u>IT IS EQUALLY POSSIBLE TO INFLUENCE TECHNOLOGY UPTAKE IN RURAL AREAS AS IT IS IN URBAN AREAS</u>	24
<u>THE NORTH ISLAND / SOUTH ISLAND “DIGITAL DIVIDE” IS REDUCING</u>	25
<u>PROXIMITY TO LARGER CITIES MAY IMPACT ON SPEED OF UPTAKE</u>	26
<u>CONCLUSIONS</u>	28
<u>REFERENCES</u>	29
<u>APPENDIX 1: YELLOW PAGES DATA</u>	30
<u>APPENDIX 2: TELECOM YELLOW PAGES DATA SUMMARISED BY REGION</u>	31
<u>APPENDIX 3: TELECOM YELLOW PAGES DATA AGGREGATED BY METROPOLITAN CENTRE AND PROVINCIAL AREA CLASSIFICATION</u>	32
<u>APPENDIX 4. TELECOM YELLOW PAGES DATA AGGREGATED BY NORTH AND SOUTH ISLANDS</u>	34
<u>APPENDIX 5: TELECOM YELLOW PAGES DATA AGGREGATED BY RURAL AND URBAN CENTRES</u>	35
<u>APPENDIX 6: E-COMMERCE EVENTS IN NEW ZEALAND, 2001</u>	36

List of Figures

<u>FIGURE 1: YELLOW PAGES EMAIL AND WEBSITE ADDRESSES AS % OF LISTINGS</u>	10
<u>FIGURE 2: WEBSITES AS % OF EMAIL</u>	11
<u>FIGURE 3. YELLOW PAGES EMAIL AS % OF LISTINGS</u>	12
<u>FIGURE 4. YELLOW PAGES WEBSITES AS % OF LISTINGS</u>	13
<u>FIGURE 5: YELLOW PAGES WEBSITE AND EMAIL PERCENTAGES OF LISTINGS</u>	15
<u>FIGURE 6. YELLOW PAGES WEBSITE PERCENTAGE OF LISTINGS: RURAL-URBAN SPLIT</u>	16
<u>FIGURE 7. YELLOW PAGES EMAIL PERCENTAGE OF LISTINGS: RURAL-URBAN SPLIT</u>	17
<u>FIGURE 8. IMPROVEMENTS IN RANKINGS BY WEBSITE UPTAKE</u>	18
<u>FIGURE 9. IMPROVEMENTS IN RANKING BY EMAIL UPTAKE</u>	19
<u>FIGURE 10. EMAIL AND WEBSITE AS PERCENTAGE OF LISTINGS, NORTH / SOUTH SPLIT</u>	20
<u>FIGURE 11. EMAIL AND WEBSITE AS PERCENTAGE OF LISTINGS, NORTH / SOUTH SPLIT EXCLUDING AUCKLAND URBAN DATA</u>	21
<u>FIGURE 12. E-COMMERCE APPLICATION UPTAKE, NORTH / SOUTH SPLIT</u>	22

Introduction

In November 2000 the Institute for the Study of Competition and Regulation produced *The Rural-Urban “Digital Divide” in New Zealand: Fact or Fable?*¹ Information from the Yellow Pages business contact register was used to challenge the commonly held perception that rural New Zealand businesses are restricted by the relative disadvantages of an inadequate telecommunications infrastructure and are much less able to share in the benefits offered by the Internet and electronic commerce than those city resident businesses. The paper concludes that while there is evidence of some “rural-urban digital divides” in New Zealand, it is by no means as simple as saying that all rural businesses are disadvantaged relative to all urban businesses. The analysis showed the need to separate out the different forms of Internet-based applications as different patterns of uptake were evident across different applications. When this was undertaken, the results showed no evidence in the data to support the existence of a “digital divide” with respect to the uptake of email and website applications between metropolitan and provincial centres in New Zealand, merely based on geographical measures. Further findings that emerged from the research include:

- The suggestion of a “divide” which favours earlier adoption of email in particular by businesses that are more remote from their trading partners over those whose partners are closer, translating into higher email uptake in the South Island than in the North.
- Evidence to suggest lower levels of uptake of both email and website applications in all rural areas compared to the level of uptake in their provincial centres.
- Suggestion that some rural and provincial areas (namely Gisborne, Wairarapa, Hawkes Bay, Manawatu, Wanganui, Taranaki and Waikato) are at a greater disadvantage than other areas (namely Otago, Marlborough and Nelson and Bays).

It is timely that we now revisit this analysis, to analyse and reinterpret changes in the data. Clearly economic development and any impediment to accessing new and more productive technologies are closely related. Businesses with the ability to compete in the digital economy are considerably more advantaged than those who do not. Further, communities hosting a technology-literate population are more likely to attract and sustain new businesses.² Conversely, regions that lack reliable access to technology and the skills to use the tools are less likely to attract new investment, and economic prosperity as a result. As the information economy can play a key role in the growth of regional New Zealand, it is important to continue to measure progress to ensure economic and social growth in rural areas is cultivated. Access to

¹ Howell, Bronwyn. 2000. *The Rural-Urban “Digital Divide” in New Zealand: Fact or Fable?* Institute for the Study of Competition and Regulation www.iscr.org.nz/ 2001 Prometheus, 19 (3), p231.

² <http://www.digitaldividenetwork.org/>

online technologies is a necessary requirement for ensuring equity in access to the information economy, as well as ensuring governments are able to achieve their electronic commerce objectives, and allow all New Zealanders to take advantage of the opportunities offered by the information economy.

A number of international surveys have been released in recent months, which point to significant digital divides between rural and urban regions,³ although, aside from the ISCR analysis, there is an absence of population-based data from New Zealand in this regard.⁴ Thus, the purpose of this paper is to examine progress since the first paper, and to take advantage of further research that has become available in the interim, with the aim of further increasing understanding of New Zealand geographical differences in business use and uptake of technologies, such as electronic mail and websites.

³ For example the U.K., as reported by the BBC Science / Technology division 4 March 2002.

⁴ Although Waikato University and NielsenNet conduct survey-based analyses, these are either analysed on a non-geographic rural/urban split (Waikato), or are focused on individual residential as opposed to business use (NielsenNet).

Methodology

For the purposes of this study, the methodology of *The Rural Urban “Digital Divide” in New Zealand: Fact or Fable?* was used, with data provided by the Internet Yellow Pages (IYP) on business listings. In its electronic form, the Yellow Pages (YP) directory also includes provision for businesses to list both an email and a website address. Furthermore, links can be made directly from the electronic YP to the listed business’s website. Thus the data provided includes all businesses listing telephone numbers, with a break down of those that also list an email and / or a website address, within the 18 geographical regions. This information is detailed in Appendix I, and is current as of February 2002.

The Yellow Pages is the predominant register of businesses in New Zealand engaged in both business-to-business and business-to-consumer trading. This source allows us to focus upon business, as opposed to individual, uses of Internet-based technologies. The data collection for this paper differs slightly, as electronic collection has eliminated some double counting, hence lower absolute numbers are found, but this has no effect on relativity.

To distinguish between the bases of urban and rural we classify “metropolitan” as Auckland Urban, Wellington Urban, Christchurch Urban and Otago Urban (Dunedin), with “provincial” centres including the smaller cities and main provincial towns. “Regional” defines an urban centre and its rural hinterland combined, while “rural” is used to differentiate the hinterland from its provincial centre.

There is no charge for a business to list in the IYP, where a standard YP listing is held. A listing in the YP automatically will be listed in the IYP. Where a business telephone line is held with Telecom New Zealand, one standard (and accordingly the Internet) YP listing is free of charge. Many businesses will choose to list under more than one category, and additional listings are charged for. These prices differ between regions, depending on circulation of the printed publication, and also are relative to the size and nature of the business, the size of the advertisement etc. An example can be provided with the Wellington region (circulation 305,000) where an additional listing is charged at \$55.20 plus GST. The data used in this analysis has been de-duplicated for the purposes of this research.

The advantages of using the YP data are detailed in *The Rural-Urban “Digital-Divide” in New Zealand: Fact or Fable?* and include:

- The data enable a measure to be taken on a population basis (businesses listing in the YP), rather than using the sample-based methodologies adopted by other studies. This

removes the margin of sampling error present, and overcomes the problem of insufficient numbers from specific small areas (such as Wairarapa and the West Coast) which occur in sample-based surveys.

- New Zealand has approximately 205,250 companies while the Yellow pages directory has listings for 191,000 unique businesses. Thus, even allowing for the fact that not all businesses are registered companies, not all registered companies are active, and that there may not necessarily be a one-to-one correspondence between companies and telephone listings, the YP still appears to provide a fairly comprehensive and representative directory of New Zealand businesses.
- The data allow the ability to match the location of businesses advertising email and website addresses to quite tightly defined geographical areas. The combination of population analysis plus fine distinction in location enables a relatively sophisticated level of comparison to be undertaken.
- Further, the YP data allows investigation of comparative usage of electronic addresses by businesses physically located in both their own geographic area, and businesses with a national organisation facilitated by 0800 and mobile telephone numbers.

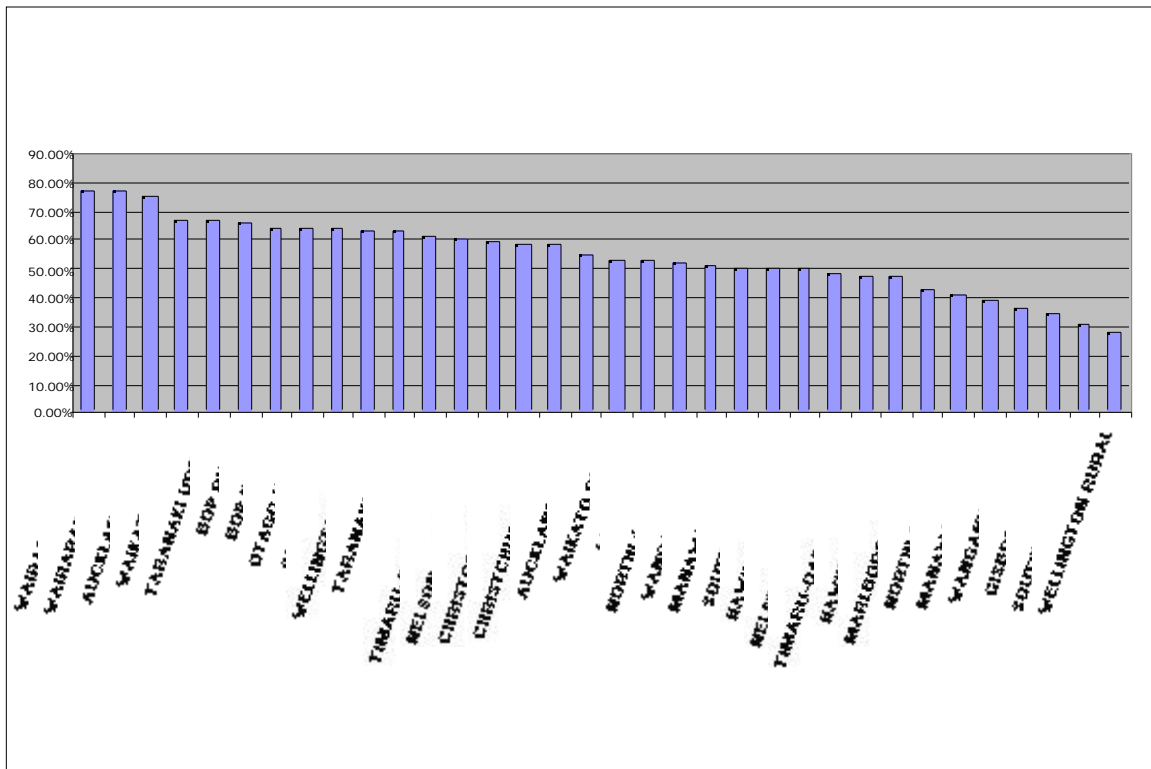
The ISCR paper does identify some limitations in this data. The key limitation is that while the data is population based, there will necessarily be an under-representation of the numbers of businesses operating email and websites, as not all businesses with websites and email addresses choose to list these details in the YP directory. Whilst the initial listing (for business telephone line holders) is free of charge, there is a \$5.00 per month charge to list an email address, and a \$20.00 per month charge to add a website link. The fee charged for the listing also assists with ensuring that those businesses that have chosen to list are active electronic commerce participants. The ISCR paper acknowledges that whilst the proportion of businesses registering websites and email addresses is significantly lower than those obtained from the survey-based methodologies of the MAF and MED/BRC studies, the relative proportions between email and websites are likely to be an accurate reflection of application uptake. Thus, despite the limitations posed by the data we have reasonable confidence that the comparative proportions between email and website listings which we report on in this analysis will reflect actual differences in the use of each medium in practice.

In concurrence with the original methodology, we have 18 identified regions, and a nineteenth classification made up of businesses listing under 0800 and 021/025 mobile telephone numbers that cannot be linked to a specific geographical location. Of the 18 regions the percentage of listings with website addresses ranged between .47% (Southland Urban) and 13.64% (Wanganui Rural). The percentage of regional listings with email addresses ranges from 1.42% (Hawkes

Issue 1: A “digital divide” exists because urban businesses have proportionally more websites than rural ones.

The first finding by the original paper confirms that firms using email exceed firms using websites for commercial activity. Studies such as the MED/BRC study show approximately 80% of firms using email also having websites. These figures were broken down as 85% in metropolitan centres and 74% in rural. The original ISCR paper showed a considerable regional variation, ranging from 35% in Marlborough to 81% for 0800 numbers. The analysis undertaken for this paper shows an even greater range, with Wellington Rural at 28.57% at the lower end, and Wairarapa Rural at the top end with 77.78%. Figure 2 displays this information in descending order.

Figure 2: Websites as % of Email: Rural / Urban Split

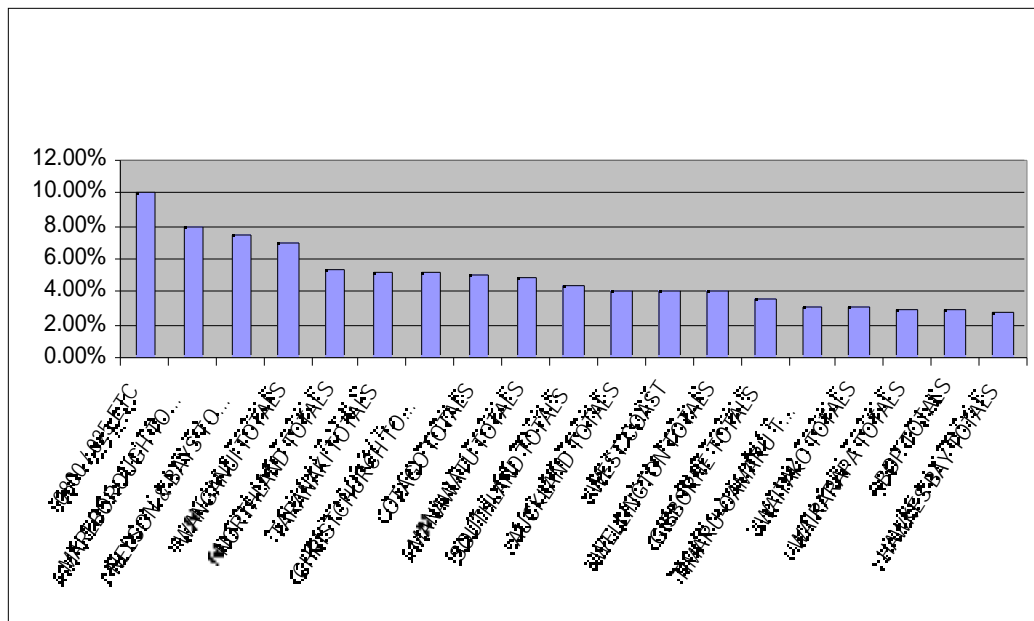


When the rural and urban data is averaged, our research finds provincial and rural areas having 48.17% of businesses with email and also using a website. This rises to 54.43% in urban areas. Whilst the MED/BRC study uses their results for the purposes of confirming a “digital divide” between urban and rural businesses as provincial and rural businesses are less likely to be using a website, the data continues to show that it is more likely to be because provincial and rural

businesses have significantly higher proportions of email addresses than their urban counterparts.

Appendix 1 shows the range of website and email listings, and Figure 3 shows the ranking of email as a percentage of listings. As was observed in the original paper, provincial and rural regions rank strongly towards the top end of the range, with higher proportions of email addresses listed than their metropolitan counterparts. The highest-ranking metropolitan region amongst these figures is that of Christchurch with 5.20%, 52% less than the rural region of Marlborough (at 7.9%). These figures concur with those found in the original paper, with the exception that the South Island region of Christchurch is now the urban region with the greatest uptake of email. The results from the original paper found that of the three largest cities of Auckland, Wellington and Christchurch, that Wellington had the greatest uptake, with Christchurch second and Auckland third. The positioning now sees these rankings as Christchurch first, Auckland second and Wellington third.

Figure 3. Yellow Pages Email as % of Listings

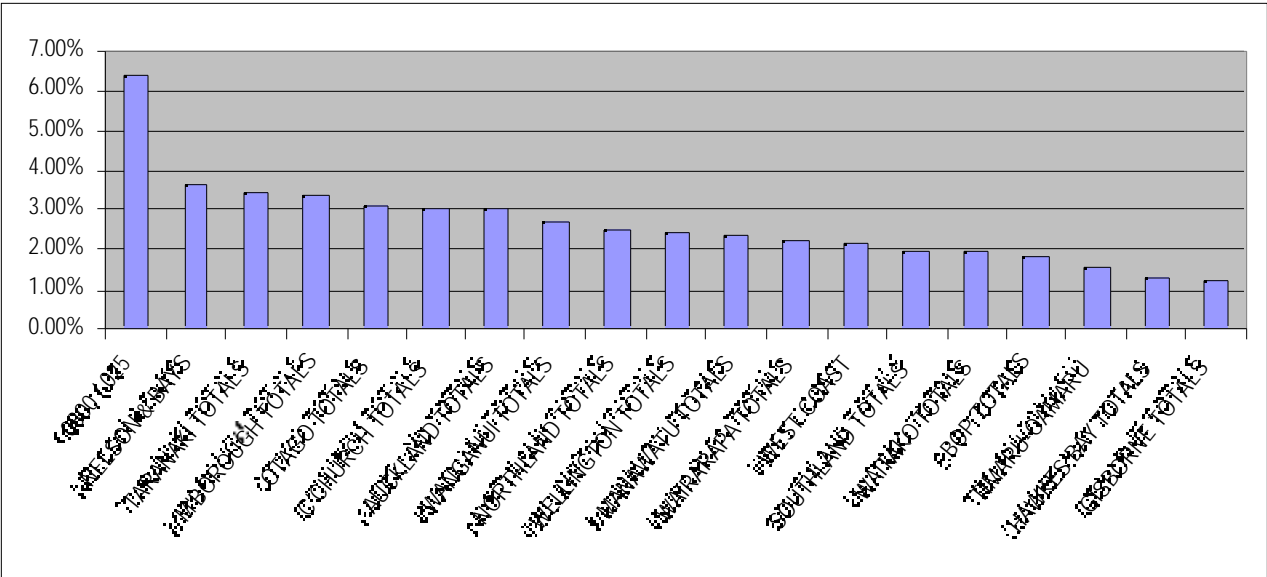


Similarly the figures for websites also do not show a clear advantage for metropolitan centres over rural regions. This was another feature highlighted by the original study, although it is more pronounced with recent figures. This is displayed in Figure 4, with regional areas dominating the upper positions. Again we have seen a change of positions in the three metropolitan centres, with the original research from Auckland first, Wellington second and Christchurch third to Christchurch first, Auckland second and Wellington third. Table 1 displays the changes in these positions.

Table 1. Relative City Websites Rankings

CITY	E-MAIL		WEBSITE	
	Ranking (2000)	Ranking (2002)	Ranking (2000)	Ranking (2002)
Auckland	3	2	1	2
Wellington	1	3	2	3
Christchurch	2	1	3	1

Figure 4. Yellow Pages Websites as % of Listings



The original ISCR study proposes that the yellow pages information provides a more accurate picture of the use of these new technologies, as opposed to the mere existence of them, which is the focus of other studies. The fact that businesses pay⁵ to list their email addresses and websites indicates active business transactional usage. If this were not the case we would not expect to see expenditure on listing the electronic contact details. It is, thus, the analysis of uptake that is of more interest. The figures above tend to confirm the ISCR findings that email is being used more extensively as a business tool in provincial areas than in metropolitan areas. The ISCR study proposes that this may indicate that the “digital divide” may in fact be “going the other way” – that provincial business users of email and websites are, in some areas, considerably more enabled than their counterparts in urban areas. We find no evidence in this review to suggest that this has changed.

Issue 2: Provincial New Zealand is dragging the e-commerce chain

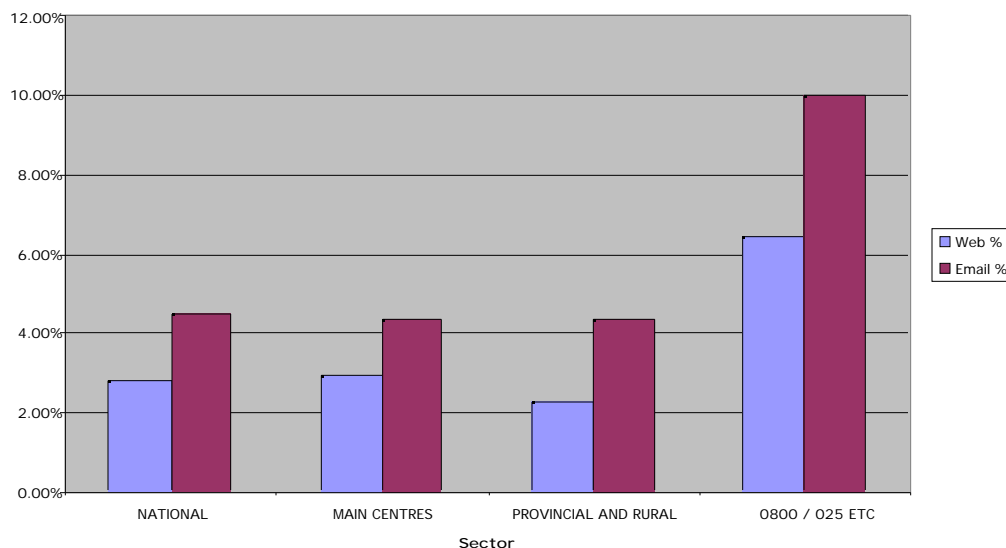
Provincial areas are frequently thought to have slower uptake of technology for, among other reasons, the older population as well as a lack of service providers or support providers in some rural areas. Further, traditionally urban areas have always been the first to receive faster technologies (Butt, 2000).

The higher provincial and rural uptake of email and websites identified above would appear to contradict the findings in other surveys (such as the MED/BRC survey mentioned above) that find provincial New Zealand businesses with a lower uptake of email than their metropolitan counterparts. The methodology followed in this paper is the same as the original ISCR study, which defined ‘rural’ differently to the aforementioned study. For the purposes of this section, data is aligned with the classifications used in the MED/BRD study.⁶ This data is detailed in Appendix 5, where Metropolitan Centres represent the totals in the Auckland urban, Auckland rural, Wellington urban, Christchurch urban, and Otago urban areas. All other regions are aggregated into the provincial / rural bracket.

Using this information provides a very similar result to previous findings with regard to website uptake being above the national average in metropolitan centres, and below the national average in provincial and rural areas. However, email uptake does not display the same pattern, with remarkably similar uptake in both areas. The spread is negligible with metropolitan centres at 4.36% and provincial and rural areas 4.35%. This is displayed in Figure 5.

⁵ The current cost of listing an e-mail address with the Internet Yellow Pages is \$5.00 plus GST per month and the cost of having a website link from the Yellow Pages listing is \$20.00 plus GST per month. It is however, a prerequisite for a website link to have a headline, which costs an additional \$15.00 per month plus GST.

Figure 5: Yellow Pages Website and Email Percentages of Listings



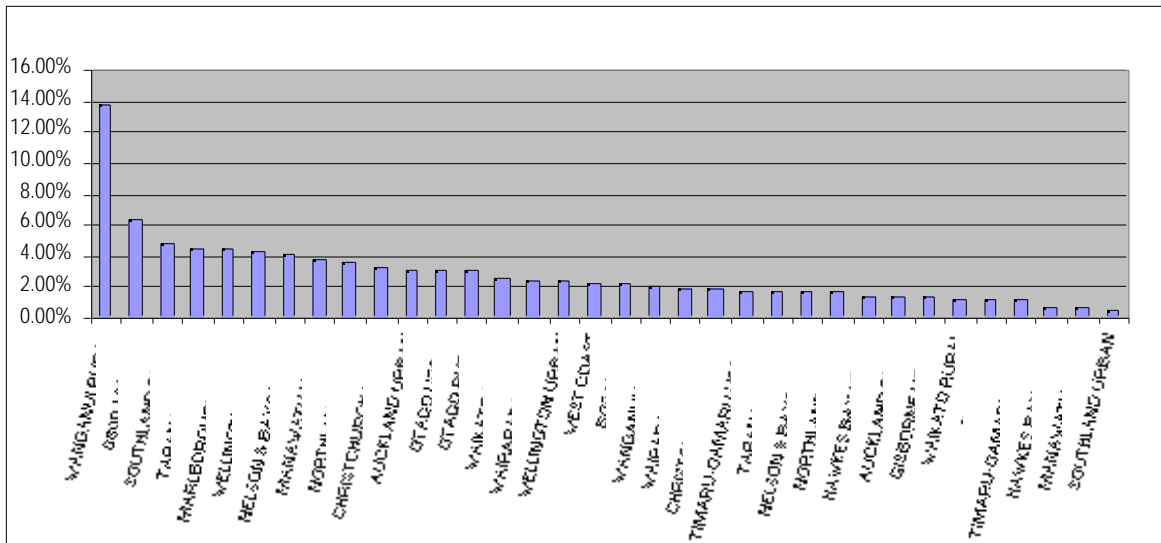
This shows provincial and rural areas having closed the gap with email uptake over the past eighteen months, thus reducing the likelihood that rural New Zealand is dragging the e-commerce chain in this area. On website data, this gap has similarly closed. In the previous study the gap between national and metropolitan centre uptake was 14% (metropolitan centre greater) and national and provincial was 40% (provincial areas lower). The current results show the former now 5% greater and the latter 2% less.

When the data are compared with that of the original research, a definite trend can be seen with a closing of the 'gap' between email uptake and website uptake in all three areas. In the National area, the gap in 2000 was 2.4 (i.e., email uptake was 6.03% and website uptake was 3.63%), this has now reduced to 1.74. Similarly the Metropolitan Centre gap has closed from 2.27 to 1.4 and the Provincial and Rural gap has closed from 2.61 to 2.02. These improvements are significant (ranging from 29% to 62%) and indicate that the majority of regions in New Zealand are taking advantage of the gains to be had from adopting websites in conjunction with their email utilisation.

Figure 6 shows the range of website uptake divided between the traditional rural urban split undertaken for this research. This website ranking no longer shows the clear dominance of urban centres over rural that was witnessed in the previous study. The position now sees rural or provincial regions leading the uptake in this area.

⁶ We note, however, that we are comparing 2002 data with 2000 data and that the comparisons are limited by this. However, the same data that produced Figures 3 and 4 also produced Figure 5, due to largeness in rural low performing areas crowding out high performing small numbers.

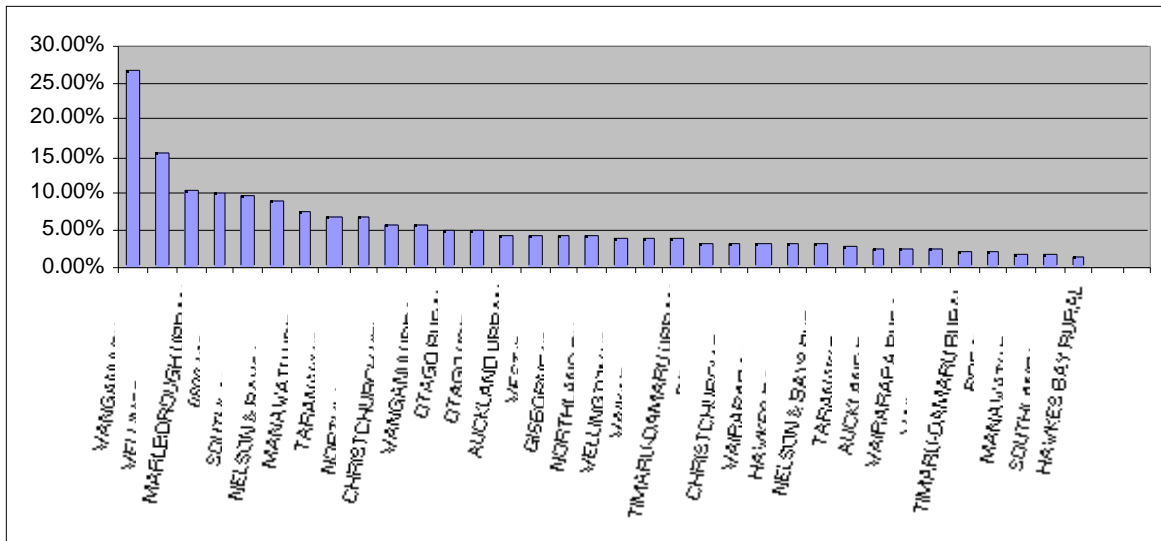
Figure 6. Yellow Pages Website Percentage of Listings: Rural-Urban Split



The region with the most significant improvements is Wanganui rural. This area has small numbers of businesses (132), with an increase in uptake that exceeds all other regions (in both email and websites). Anecdotal evidence has been provided to link this result with the MED initiatives mentioned above, with a large number of Wanganui participants present at the Palmerston North events and local body-sponsored business networking facilitation.⁷ Whilst the facilitation role may initially have been provided by local or central government, the work of Arrow (e.g., Arrow, 1962) and Jovanovic (e.g. Jovanovic and Rousseau, 2002) on learning by doing, combined with that of Jensen on devolution of control to local operators (e.g. Jensen, 1993) supports the contention that the returns to this stimulus have arisen due to local initiatives to further develop the uses of technology.

⁷ Interview with Liz Dengate.Thrush, Ministry of Economic Development, 29 April 2002.

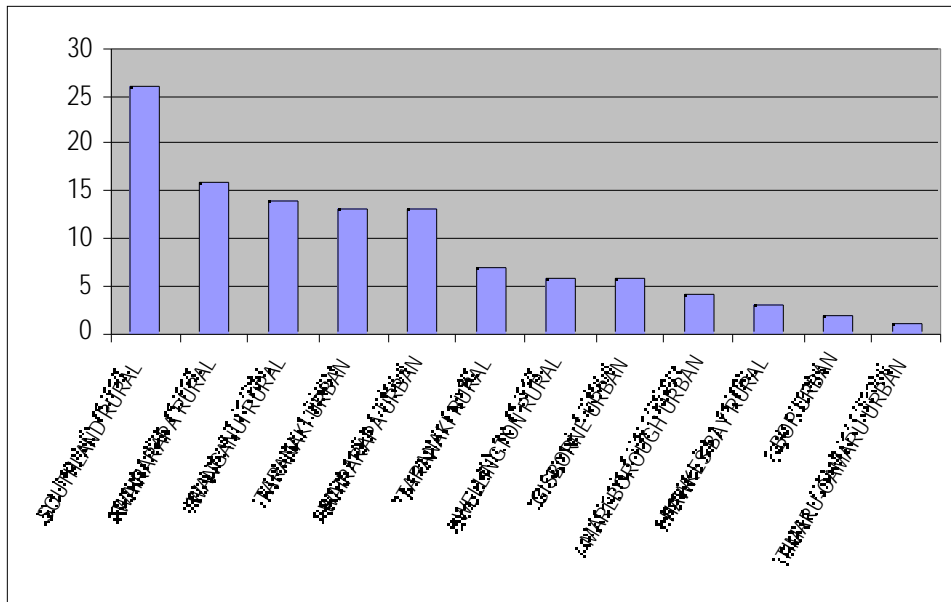
Figure 7. Yellow Pages Email Percentage of Listings: Rural-Urban Split



When considering those areas that have had the most significant improvement in uptake for both website and email technologies the greatest improvements in position have been made in provincial areas. These are displayed in Figures 8 and 9. An explanation for some of this movement may relate to e-commerce initiatives that have been undertaken over the past 18 months in some of these areas. For example, in Figure 8, 75% of the areas that have made positive moves (including the top six regions) in their website rankings can be identified with regions where the Ministry of Economic Development’s E-Commerce Action Team (ECAT)⁸ have sponsored or been involved in regional e-commerce events. Further, of the ten regions identified where these seminars have taken place all have shown an improvement (in either rural or urban region) in at least one of the two categories, with 50% of the regions showing improvements in both email and website categories. When considering the email improvements in Figure 9, 90% of the regions that had MED initiatives are represented by either a rural or an urban listing with a positive increase.

⁸ ECAT has been set up to help realise the aim of New Zealand becoming a world leader in adopting e-commerce for competitive advantage. www.med.govt.nz/

Figure 8. Improvements in rankings by website uptake



The one area that did host such an event but is not represented by a significant upward ranking shift, is the Hawkes Bay. The Hawkes Bay event was one of the few half-day events, whereas the majority held in other centres were full day. In the previous study, this area did not feature strongly (being ranked second to last in website listings in rural areas and 22nd out of 36 in urban regions for website uptake). This positioning is now 32 and 26 respectively, showing a small improvement in rural areas and a slight decline in urban areas. When looking at email listings, the previous results showed rural areas ranked at 15th with urban at 12th. Both of these have declined to 34th and 24th respectively with the current results. Thus the benefits that have accrued to the majority of regions involved in the MED events have not been witnessed in the Hawkes Bay region.

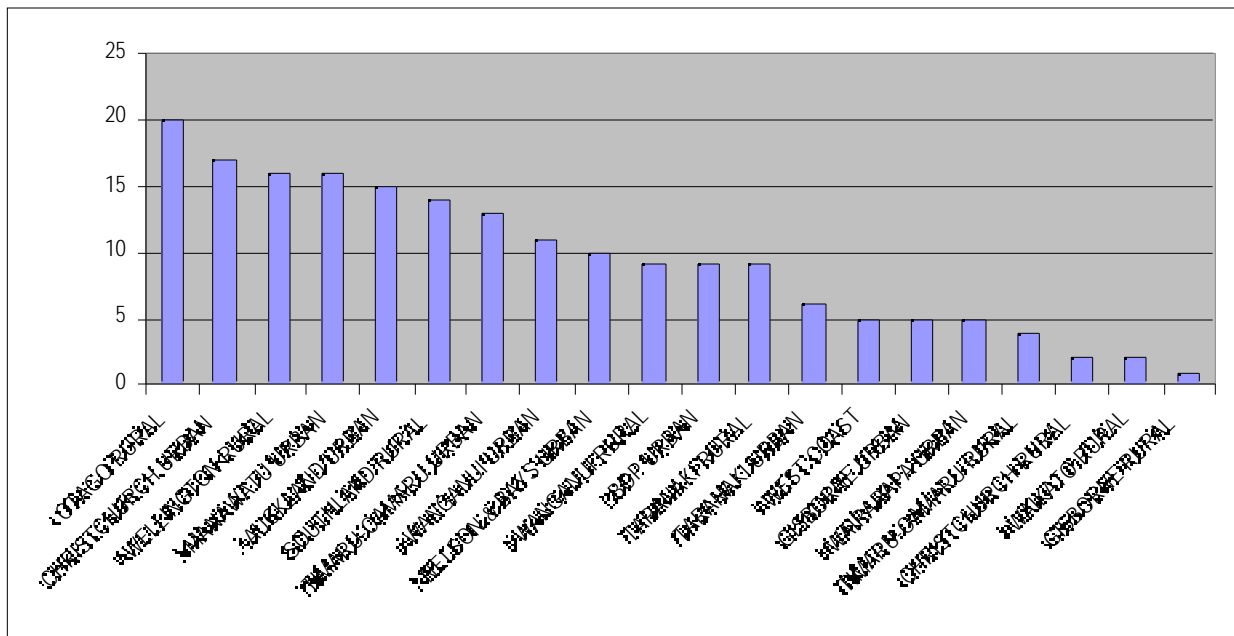
While it is beyond the scope of this study to explain the reasons for Hawkes Bay's relatively poor performance, it is noted that this region has a very much higher proportion of its workforce employed in businesses with five or fewer employees (50%) compared to regions such as Manawatu and Gisborne (25%)⁹. It is possible that this higher than average proportion of workers in small businesses implies that this region has either a smaller number of businesses that can gain large benefits from the use of email or website uptake, or that the thresholds for the cost-benefit trade-off for the types of business in these areas is lower than for other regions. Research undertaken by the Waikato Management School (Clark, 2001) indicates that predominant industry type may play a large part in the uptake of new technologies. Levels of website activity were shown to vary considerably depending on the industry (for example, 91%

⁹ Figures derived from Statistics New Zealand Infos database official statistics.

in tourism to 24% in transportation). As New Zealand's industries tend to be location-specific, this is also likely to have an impact on the results seen.

Further research to understand why Hawkes Bay has not performed as well as other rural and provincial areas is indicated to further understand the dynamics driving business email and website uptake.

Figure 9. Improvements in ranking by email uptake

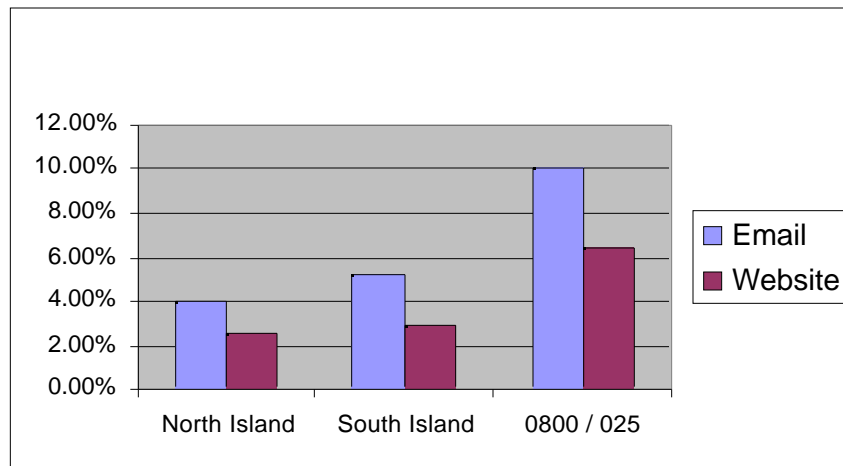


Issue 3: New Zealand e-commerce activity begins and ends in Auckland

This paper confirms the findings in the original paper, which found that New Zealand's largest city, Auckland, does not appear to be the leader in economic commerce. The first paper showed Auckland urban to be ranked 5th in website listings and 11th in email. This study shows these positions having declined to 11th in website listings and 14th in email, as rural and provincial areas have increased. The area now leading the uptake in both websites and email is Wanganui rural. This area was 15th in website listings and 10th in email uptake in the previous paper. Only two other rural regions feature strongly (in the top ten) regarding website uptake (Southland and Wellington rural), and similarly only two are included in the email uptake (again Wellington rural and Southland – this time the positioning is reversed). Christchurch is the highest-ranking 'large' New Zealand city, positioning at 11th for website and email uptake. These changes in position more likely reflect rural areas increasing their uptake at a faster rate than Auckland, as opposed to Auckland uptake decreasing in real terms.

For geographical uptake purposes, the data was split into a north / south alignment, as detailed in Figure 10. This shows greater uptake of both technologies in the South Island, with email uptake at 5.26% in the South, compared to 3.95% in the North. Website figures are 2.92% in the South and 2.53% in the North.

Figure 10. Email and website as percentage of listings, North / South split



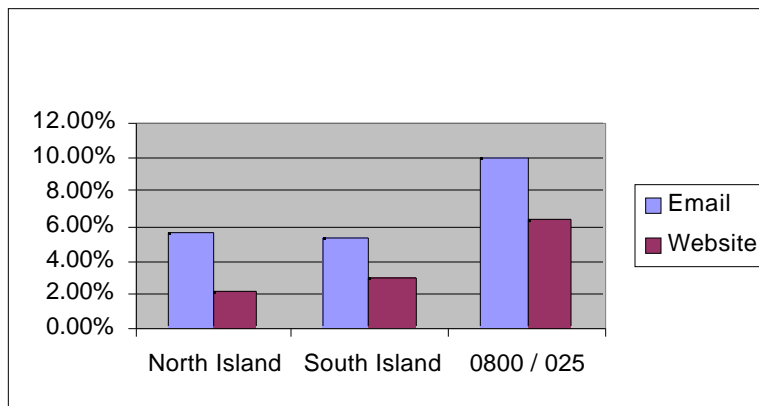
When Auckland urban figures were removed from the North Island grouping in order to see the effect that this category was having, Figure 11 results. This shows the North Island email uptake excluding Auckland now overtaking that of the South Island, with 5.56% as compared to 5.26% in the South. Websites have not had the same result, with the gap between North and South widening when Auckland results are removed. These opposing results would indicate that

Auckland is ‘dragging the chain’ when it comes to email uptake, but is actually increasing the North Island performance for website uptake. This is consistent with the finding of the previous paper that website uptake was less affected by the costs of communication than email uptake, thereby providing no ‘natural’ cost or benefit-based advantage in uptake propensity for rural and provincial businesses over metropolitans per se.

What can, however, be clearly seen is the pattern recognised in the original paper, where the areas most distant from Auckland - i.e. those in the South Island - have a significant advantage of uptake of both categories over the North. Thus, there is no support for the proposal that Auckland, as the metropolitan commercial location and largest population base, is the leader in the uptake of these new technologies.

It is proposed in the original paper that a potential explanation for this is rather than supporting the hypothesis that e-commerce uptake is a function of business concentration, instead the actual effect of the greater distance from Auckland, and thus the lack of business concentration, actually provides more potential benefit from new technologies and email in particular, and hence the greater uptake.

Figure 11. Email and website as percentage of listings, North / South split excluding Auckland urban data

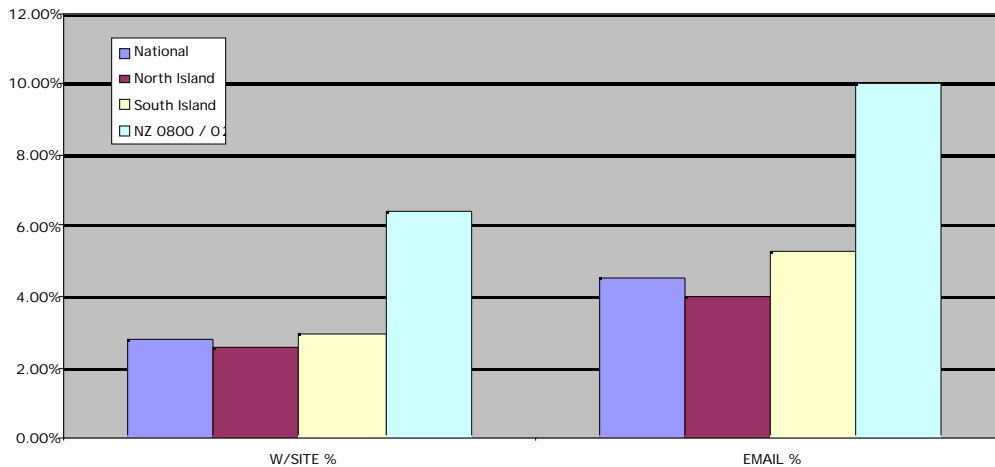


Further evidence in this regard is found in Figure 12, which shows the North Island with an uptake of both email and websites lower than the national average. To put this into context with the figures, the South Island is 4.5% higher than the national average, with the North Island being 9% lower. When considering the overall email uptake of the North Island, this is .58% less than the national average, with the South Island .73% greater. Proportionately this result has the South Island 16% above the national average, and the North Island 13% below.

When a similar exercise is done with the data from the ISCR original research paper the situation is now reversed. In the 2000 North / South Island comparison, while Auckland was below the ISCR 6/13/2002

national average, the North Island average increased by over 25% for both website and email uptake when Auckland was *included* in the figures. This contrasts with the more recent information gained which shows the Auckland figures now reducing the overall North Island average. Rather than Auckland usage diminishing, we believe this reflects the increased uptake of regions relative to Auckland. Clearly this shift has been significant in order for the provincial regions to overtake Auckland in the 18 months since the publication of the original ISCR paper, and is particularly noteworthy given the relative size of the Auckland's population compared to the population of the rest of the North Island.

Figure 12. E-Commerce application uptake, North / South split



Interpreting the data

The original ISCR study pointed to a number of explanations for the data. These included:

- That earlier and higher provincial and rural email adoption is consistent with higher communication costs in rural areas.
- That email adoption patterns in rural and provincial areas follow the demand-driven adoption seen in EFTPOS rollout.
- The optimal time to invest in websites depends more on the size of the firm and the product than on infrastructure and geographic business location.
- Websites can substitute for email in some business communications.

From the updated data, further propositions are raised.

Focus on technology in rural regions has emphasised growth in this area at the potential expense and promotion of urban regions

A number of features in the analysis of recent data points to an acceleration in technological uptake in rural and provincial areas that has not been evidenced in metropolitan areas. This can potentially be explained by the results of studies¹⁰ indicating that the areas most in need of assistance with uptake were the provincial and rural regions, although these findings were not in concurrence those found in the original ISCR research paper. As a result of this supposed inequality between rural and urban regions, initiatives have predominantly focused in these areas. Appendix 6 details the regions where the Ministry of Economic Development ECAT team has either been involved in e-commerce events, or regional events have been held. However, these initiatives have not been held in Auckland, and it is significant that this is the centre that is performing relatively less well in this study.

Evidence to support this supposition includes the data comparison from the first study. As noted above, when Auckland is removed from the North Island / South Island comparison, the results for the North Island uptake increase in both technologies. However, in the earlier study these results were reversed. When Auckland was removed the North Island figures suffered as a result, decreasing by over 25% for each technology. This indicates that Auckland businesses have not kept up with the rest of the North Island with the rate of email and website uptake. These figures are further supported with a similar exercise undertaken with the South Island, and removal of Christchurch and Dunedin from the figures. In both the previous study, and the current study the movement in figures has been in the same direction (with both showing decreases in the overall South Island figures when the two metropolitan cities are removed from the results). This can be explained, in some part, by the fact that both Christchurch and Dunedin

¹⁰ MED / BRC and MAF studies

businesses may have both benefited from spillovers from MED initiatives during the past year, and as a result have maintained their relative levels of website and email uptake.

When the website regional rankings are looked at as a whole (i.e, rural and urban regions are grouped together), with the exception of the Christchurch / Canterbury grouping (which was unchanged), all other regions which feature a 'large' New Zealand city (that is, Wellington, Auckland or Dunedin), are ranked in the bottom third. This would appear to add weight to the hypothesis that the current focus on rural regions is at the detriment and focus on the larger cities. In this same ranking, all the regions that had an overall improvement in ranking, are from regions with significant rural populations (Taranaki, Wairarapa, Wanganui, Marlborough and Nelson and Bays). This pattern is not dissimilar in the email regional rankings, with no region featuring one of New Zealand's four largest cities having an overall improvement in ranking. The Wellington region and the Dunedin / Otago region are ranked in the lowest third again, with Christchurch / Canterbury and Auckland showing no net gain or loss.

Thus, the results indicate that the areas most in need of increased attention with regard to business email and website uptake may now be Auckland and Wellington. It is important that e-commerce awareness programmes do not promote equity above total uptake, given that the efficient level of use of these technologies may well be different for businesses in different regions, given industry type, average employee size and other information-related differences. There may be some indication from this study that businesses are responding to initiatives based upon equity of uptake irrespective of these differences – that is, rural and provincial businesses are connecting in order not to be 'behind', and metropolitan businesses may face less promotion, and are thus less aware of the benefits and are thus less likely to connect.

It is noted that Christchurch fared well in the original ISCR study, ranking at 6th and 7th position for website and email uptake respectively, and has managed to maintain its position. The reasons for this warrant further investigation. The real cause for concern relates to the cities and regions of Auckland, Wellington and Dunedin that are being overtaken by rural and provincial regions. This may be either because their efficient level of uptake is lower, or because they lack the awareness that has been raised in the rural and provincial areas. It is especially important to understand which of these effects is the dominant reason for the findings in this study, in order to ensure that new technologies such as broadband are promoted appropriately given that 'broadband divides' are becoming a new source of access focus (OECD, 2001).

It is equally possible to influence technology uptake in rural areas as it is in urban areas

A strong relationship appears (anecdotally) to exist between regional initiatives and increasing adoption of technology. This can be witnessed in the improvements in rankings in almost every

region that was involved in one of the aforementioned initiatives. Of the 20 areas that made improvements in their email rankings, there was a fifty-fifty split between rural and urban regions. Similarly, of the 12 areas that made improvements in website rankings, again there was an equal division between rural and urban regions. This points to an equivalent opportunity for New Zealand to assist with technological advancement for all regions of the country.

Further, the remarkable improvement of the Wanganui rural region demonstrates that it is entirely possible to achieve 'turn-around' results in an area that is not achieving business growth at the same level. The uptake in Wanganui has increased from 0.94% to 13.64% in website uptake and from 2.7% to 26.52, although it is interesting to note that the Wanganui urban region has not had the same degree of success. Anecdotal evidence points to strong locally based regional co-ordination and existing networks assisting in this area.

As attendance at the aforementioned initiatives cannot be separated into rural and urban attendees it is not possible to ascertain the exact benefits felt in rural versus urban regions based on this parameter. However, what the results do point towards is the benefits that appear to have been gained from the initiatives overall. It appears that exposure to information about the benefits of technology has been sufficient to increase uptake, for both rural and urban areas, and there is no indication of increased receptivity of rural participants over urban or vice versa. These initiatives may have lowered information barriers, as described by Jovanovic and McDonald (1993), leading to increased uptake. There is no reason to suppose that these methods may be equally successful in raising awareness, and consequently uptake, in metropolitan areas, if this is deemed desirable.

The North Island / South Island "digital divide" is reducing

When the relative positions of the North and South are compared between the 2000 study and more recent information, the 'gap' can clearly be seen to be reducing between the two Islands with regard to uptake of technology. When considering the positions of the Islands, the initial ISCR study shows the South Island sat much the same as the national average (0.01% difference), with the North Island clearly below the average by approximately 25% (with the balance accounted for by 0800/0900 listings). Recent data shows the South Island now 4.5% above the national average, however the North Island is now only 9.5% below this figure. This sees a gap of 25 percentage points now reduced to 14. A similar pattern is seen with email uptake. The initial study returned results that showed the North Island 30% below the national average, and the South Island 23% above this figure. The recent information does not change the positioning, however the range is again reduced, with the North Island now 13% below the national average and the South Island 16% above.

The regional initiatives may perhaps partially explain this difference, with 40% of the locations being in the South Island. Further, the attendances in the North Island locations were generally higher, with up to 320, while the highest-attended South Island session had 140. Thus, a greater range of population has had potential exposure to the initiatives in the North Island based on locations, combined with a greater potential number of businesses being available to influence in the North Island.

This result shows that strategies aimed at reducing the divide are probably having some effect. However, the rider on the desirability of equity of uptake still remains – there is no guarantee that equal uptake by businesses in all regions will be the efficient level, given the differences between business size, business sector, product form and other factors.

Proximity to larger cities may impact on speed of uptake

An interesting feature in the results stems from the apparent trend for some provincial areas close to metropolitan areas to exhibit low email and website uptake. Particular examples are the Wairarapa and Waikato regions. These regions consist of urban centres, albeit of vastly different sizes, (Masterton and Hamilton) bordering on to Wellington and Auckland respectively. In the first study, these regions were poor performers, with ratings of uptake for both websites and email uptake in the lower half of the range. In the case of email uptake, they were both in the lower quartile. The current results are similar (Waikato website uptake has dropped four places in overall ranking).

It is interesting to note firstly the similarity of patterns in the data results of these two areas. One would perhaps expect to see this in areas with a similar industry focus, however this is not the case. While both are highly focused on agriculture (as is the majority of New Zealand) the Wairarapa region has a large wine-growing region while the Waikato is strongly dairy focused. There are three possible explanations for this trend that warrant investigation: technology barriers; industry type; and demographic reasons.

It may be that both regions have businesses with information transfer requirements that are below average, thus a lower uptake is reasonable when considered from a ‘need’ perspective. This may well result from a larger than average share of businesses that have no need, for example, for advertising or direct customer contact. This would fit with the suggestion above that these areas have many organisations that rely on the presence of representatives to undertake their technology-focused activities on their behalf (for example, reliance on central processors such as Fonterra. Further, it may be that these regions are more highly populated with ‘commuter businesses’ – that is, businesses where there is a presence in the adjacent metropolitan where electronic commerce and business communication is focused, despite also

having a physical presence in the provincial area. While we can only speculate, further research is indicated to explore the extent of these factors for the Wairarapa and the Waikato.

A recent MED-supported study has produced data¹¹ that provides interesting information on the willingness of individuals and businesses in the Wairarapa to pay for increased Internet connection speed. Between 6 and 20% of survey respondents appearing willing to pay between \$42 and \$56 per month for this benefit. Significantly, only 6% of the commuting population (that is, workers travelling regularly to Wellington for work purposes) indicated a willingness to pay the \$56 monthly charge for broadband. This may demonstrate some characteristics of the workers and businesses in this area, with few appearing to justify purchase of (through the lack of willingness to pay for or lack of need for) an advanced product. The implication is that the organisations operating in this area may have different information transfer requirements than their counterparts in other regions, that commuting workers may have substitutes for Internet access in the centre to which they commute thereby obviating the need for Wairarapa-based access, or some other as yet unexplained factor.

¹¹ Reported in Infotech, Issue 540 3 June 2002. *Wairarapa unhappy with Net speeds – survey.*
ISCR 6/13/2002

Conclusions

This paper has highlighted significant improvements in the uptake of email and website applications in provincial and rural areas of New Zealand. Whilst not conclusive, the evidence points towards this, at least to some degree, being attributable to initiatives undertaken by the Ministry of Economic Development. This displays the returns possible from promotional activities and the information dissemination that results, in that the local initiatives have resulted in changes that are both large and rapid.

The relative growth in rural and provincial areas compared to metropolitan regions since September 2000 raises questions of whether equally large increases in returns could also be gained in larger areas with similar promotion.

Thus, whilst these initiatives are well justified in their apparent success, there is a need to ensure that overall excellence is not forgone in the pursuit of promoting equity. Whilst it is unclear whether a similar increase in uptake can be expected in metropolitan areas, the issue is raised whether the emphasis on provincial promotion may be at the expense of potential growth in metropolitan areas, which would result in a higher overall economic gain. The results of recent research (e.g., Boles de Boer, Lewis and Howell, 2000; Howell, 2001) shows New Zealand leading the way in many e-commerce measures – a position that needs to be maintained. Thus, there is a requirement for encouraging application uptake at all levels of the country, including those already performing well, and not just in those areas that would appear to be lagging behind. The risk incurred if this is not carried out is that New Zealand, not just Auckland, may lose ground, and thus the benefits associated with e-commerce applications.

References

- Arrow, Kenneth J. 1962 The Economic Implications of Learning by Doing. *Review of Economic Studies*. 29(3):155-73.
- Boles de Boer, David; Lewis Evans and Bronwyn Howell. 2000. *The State of e-New Zealand*. Wellington: ISCR <http://www.iscr.org.nz/research/>
- Butt, D. 2000. *Slow Connections – Building non-urban infrastructure online*. www.icvp.com
- Clark, Delwyn N. 2001. *Net Readiness in New Zealand Industries: Empirical Results, 2001*. Department of Strategic Management & Leadership, University of Waikato Management School.
- Howell, Bronwyn. 2001. *Scoping Report: e-Commerce Performance Measurement for New Zealand*. Wellington: ISCR. www.iscr.org.nz/research/
- Howell, Bronwyn. 2000. *The Rural-Urban “Digital Divide” in New Zealand: Fact or Fable?* Wellington: ISCR www.iscr.org.nz/research/ 2001 Prometheus, 19 (3), p231.
- Jensen, Michael C. 1993. The modern industrial revolution, exit and the failure of internal control systems. *Journal of Finance* 48(3):831-880.
- Jovanovic, Boyan and Glenn MacDonald. 1993. *Competitive Diffusion*. National Bureau of Economic Research Technical Working Paper 4463. <http://www.nber.org>.
- Jovanovic, Boyan and Peter L. Rousseau. 2002. *Moore’s Law and Learning-By-Doing*. National Bureau of Economic Research Working Paper 8762. <http://www.nber.org/papers/w8762>.
- Ministry of Economic Development. 2000. *Electronic Commerce in New Zealand: A survey of Business Use of the Internet*. Wellington:MED. <http://med.govt.nz/>
- Ministry of Economic Development. 2001. *Statistics on Information Technology in New Zealand 2001*. Wellington:MED. <http://med.govt.nz/pbt/infotech/currentstats>
- OECD Information Society. 2001. *Communications Outlook*. Paris: OECD. <http://www.oecd.org/>

Appendix 1: Yellow Pages Data

EXCHANGE	TOTAL	EXT W/SITE	EMAIL	YP W/SITE	TTL W/SITE
AUCKLAND RURAL	5163	65	132	7	72
AUCKLAND URBAN	52138	1297	2214	352	1649
BOP RURAL	4249	43	79	9	52
BOP URBAN	9480	171	312	30	201
CHRISTCHURCH RURAL	3519	65	115	2	67
CHRISTCHURCH URBAN	17958	497	1002	96	593
GISBORNE RURAL	185		0		0
GISBORNE URBAN	1530	20	61	1	21
HAWKES BAY RURAL	846	6	12		6
HAWKES BAY URBAN	5516	69	162	8	77
MANAWATU RURAL	3762	23	63	2	25
MANAWATU URBAN	4067	120	311	38	158
MARLBOROUGH RURAL	559		0		0
MARLBOROUGH URBAN	1794	61	186	19	80
NELSON & BAYS RURAL	1120	17	32	2	19
NELSON & BAYS URBAN	3795	123	335	39	162
NORTHLAND RURAL	3790	51	150	10	61
NORTHLAND URBAN	3263	80	223	36	116
OTAGO RURAL	3112	91	155	5	96
OTAGO URBAN	5318	143	262	25	168
SOUTHLAND RURAL	1443	49	141	22	71
SOUTHLAND URBAN	2792	9	43	4	13
TARANAKI RURAL	1848	22	51	10	32
TARANAKI URBAN	2932	86	201	47	133
TIMARU-OAMARU RURAL	1019	11	20	1	12
TIMARU-OAMARU URBAN	2445	28	90	15	43
WAIKATO RURAL	6235	65	146	13	78
WAIKATO URBAN	8583	150	322	65	215
WAIRARAPA RURAL	734	14	18		14
WAIRARAPA URBAN	1236	28	39	2	30
WANGANUI RURAL	132	18	35		18
WANGANUI URBAN	2028	26	113	15	41
WELLINGTON RURAL	229	7	35	3	10
WELLINGTON URBAN	18581	369	716	81	450
WEST COAST	1546	26	63	7	33
0800 / 025 ETC	8336	440	837	95	535
TOTAL	191283	4290	8676	1061	5351

Appendix 2: Telecom Yellow Pages Data Summarised by Region

	TOTAL	EXT W/SITE	EMAIL	YP W/SITE	TTL W/SITE	W/Site & Email Link
AUCKLAND TOTALS	57301	1362	2346	359	1721	367
BOP TOTALS	13729	214	391	39	253	61
CHRISTCHURCH TOTALS	21477	562	1117	98	660	127
GISBORNE TOTALS	1715	20	61	1	21	11
HAWKES BAY TOTALS	6362	75	174	8	83	33
MANAWATU TOTALS	7829	143	374	40	183	58
MARLBOROUGH TOTALS	2353	61	186	19	80	19
NELSON & BAYS TOTALS	4915	140	367	41	181	45
NORTHLAND TOTALS	7053	131	373	46	177	50
OTAGO TOTALS	8430	234	417	30	264	64
SOUTHLAND TOTALS	4235	58	184	26	84	27
TARANAKI TOTALS	4780	108	252	57	165	30
TIMARU-OAMARU TOTALS	3464	39	110	16	55	10
WAITAKO TOTALS	14818	215	468	78	293	44
WAIRARAPA TOTALS	1970	42	57	2	44	11
WANGANUI TOTALS	2160	44	148	15	59	21
WELLINGTON TOTALS	18810	376	751	84	460	122
WEST COAST	1546	26	63	7	33	8
0800 / 025 ETC	8336	440	837	95	535	113

Appendix 3: Telecom Yellow Pages Data Aggregated by Metropolitan Centre and Provincial Area Classification

EXCHANGE	TOTAL	
	EXT W/SITE	
	EMAIL	
	YP W/SITE	
	TTL W/SITE	
	TTL W/SITE % of TTL	
	EMAIL % OF TTL	
NATIONAL		191283
		4290
		8676
		1061
		5351
		2.80%
		4.54%
METROPOLITAN CENTRES		99158
		2371
		4326
		561
		2932
		2.96%
		4.36%
PROVINCIAL REGIONS		44298
		906
		2266
		312
		1218
		2.75%
		5.12%

RURAL

39491

573

1247

93

666

1.69%

3.16%

0800/025

8336

440

837

95

535

6.42%

10.04%

Appendix 4. Telecom Yellow Pages Data Aggregated by North and South Islands

EXCHANGE	TOTAL	EXT W/SITE	EMAIL	YP W/SITE	TTL W/SITE	TTL W/SITE EMAIL % OF	
						% of TTL	TTL
NATIONAL	191283	4290	8676	1061	5351	2.80%	4.54%
NORTH ISLAND	136527	2730	5395	729	3459	2.53%	3.95%
SOUTH ISLAND	46420	1120	2444	237	1357	2.92%	5.26%
0800/025	8336	440	837	95	535	6.42%	10.04%

Appendix 5: Telecom Yellow Pages Data Aggregated by Rural and Urban Centres

	TOTAL	EXT W/SITE	EMAIL	YP W/SITE	TTL W/SITE	TTL W/SITEEMAIL % OF	% OF TTL	TTL
NATIONAL	191283	4290	8676	1061	5351	2.80%	4.54%	
METROPOLITAN CENTRES	99158	2371	4326	561	2932	2.96%	4.36%	
PROVINCIAL AND RURAL	83789	1544	3645	412	1956	2.33%	4.35%	
0800/025	8336	440	837	95	535	6.42%	10.04%	

Appendix 6: E-Commerce Events in New Zealand, 2001

Region	Date	Details
Tauranga	June 2001	120 attendees – full day
Waikato	July 2001	320 attendees – full day
Hawkes Bay	July 2001	160 attendees - half day
Wairarapa	July 2001	120 attendees – full day
Taranaki	July 2001	260 attendees – full day
Palmerston North	February 2001	260 attendees
Palmerston North	May 2001	260 attendees
Palmerston North	October 2001	260 attendees (included attendees from Horowhenua and Wanganui)
West Coast	November 2001	148 attendees (full day)
Invercargill	February 2002	150 attendees (full day)
Christchurch	November 2001	140 attendees
Dunedin	October 2001	100 attendees
Hawera	April 2001	50 attendees
Taradale	November 2001	53 attendees