Ministry of Agriculture & Forestry

The Implications of E-Commerce for the Primary Sector

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Executive Summary

This report was prepared following operational research performed for MAF Policy during the latter half of 2000.

The research objectives were to assist MAF in its understanding of:

- the implications and risks associated with e-commerce
- any impediments to the adoption and use of e-commerce in the primary sector
- the role that should be played by Government in addressing these impediments.

The programme for this study involved:

- a series of interviews with key players in the sectors of interest
- an extensive review of current e-commerce-related literature
- critical analysis and discussion to identify the key factors and their implications.

It is important to note that while the knowledge-based economy is commonly thought of as an information technology economy, with an emphasis on software and hardware, information technology is primarily an **enabler**, not an end in its own right (other than for data-based products such as information, software or music).

E-commerce provides the potential for New Zealand to achieve very significant benefits. Studies prepared in the UK and the USA suggest that across the whole economy:

- e-commerce could result in **cost reductions equivalent to between 2% and 3% of GDP** in those countries
- there will also be a **freeing up of working capital** equivalent to about 25% of current inventory levels
- there will be **substantial changes to current business models** as inefficiencies and discontinuities are removed from sector value chains, intermediaries change their roles, and current market channels and relationships change
- there is **a significant opportunity for the primary sector to differentiate its produce** and achieve price premiums, but also **a real risk of downwards price pressure** if market power moves to buyers because the sector is unable to make the transition effectively
- the rate of change in the economy will continue to increase.

There will be considerable impact on the rural community:

- input prices (supply) and transaction costs will reduce, as will the need for working capital by service providers
- the sector will benefit through better access to markets and better marketing information. Farmers and growers will find that they have more choice in how they interact with their markets and service providers
- e-commerce introduces a risk of downward pressure on prices as market power moves to buyers, but also provides an opportunity to achieve price premiums through product differentiation, provided that producers are willing and able to take up the opportunity

- new services will be needed, ranging from online market exchanges to organisations able to certify product for sale
- there may be a negative impact on small rural businesses that are unable to participate in online portals, and there is likely to be increasing difficulty with rural distribution arrangements.

Participation by the rural community in e-commerce requires that access issues be resolved, and that the various forms of resistance to change (regulation, industry structure, skills, motivation, entrenched interests) be overcome. These and other factors enable a subjective assessment to be made of the ability of the various industries to take advantage of e-commerce. This analysis suggests that the meat industries may be most at risk, and that the overall risk (and opportunity) from e-commerce is relatively similar among the others, despite considerable variation in individual factors.

Most of the development in e-commerce will occur independently of government. There are, however, a number of policy areas where government could provide leadership and facilitate co-ordinated efforts to overcome resistance, motivate the sector, reduce duplication of effort, and increase the likelihood of a smooth transition. Current initiatives in relation to e-government are a start, but these must be integrated with the other community needs that can be served online.

We believe that there are roles that MAF could adopt which would benefit the primary sector. MAF could:

- ensure that the rural viewpoint on government policies is solicited, conveyed to Government and responded to, so that innovative ideas promoted by industry thinkers and leaders are heard and acknowledged
- encourage the development of solutions providing rural communities with appropriate **access** to the internet
- work with government agencies as they develop and implement strategies for **e-government**, to ensure that the e-government systems developed will be perceived as 'user- friendly' by the rural community (so that they are not presented from the Government agency's point of view)
- encourage the development of **technical standards and supporting infrastructure for product certification** as required by buyers using on-line exchanges
- develop and maintain a **primary production database** for agricultural, horticultural and forestry production units, enabling the collection of the basic statistical data required by planners and political decision-makers
- work with government agencies to ensure that support is provided for sectors which may not have adequate resources or skills to **re-engineer** their structure and processes to take advantage of e-commerce
- ensure that the rural community and other government agencies are aware of the risks of doing nothing, the risk of being forced into buyer-dominated exchanges, and the opportunities available through product differentiation
- advocate and contribute to the development of local **community-based portals**, by raising awareness, providing advice and assisting the development of a common national template, perhaps adopting a similar stance to MAFF in the UK.

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1. Introduction

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- any impediments to the adoption and use of e-commerce in the primary sector
- the role that should be played by Government in addressing these impediments.

In achieving these objectives, the research had to:

- find out how e-commerce is developing in the primary sector in New Zealand and key overseas countries
- identify the implications and potential for New Zealand producers, processors and marketers
- identify any risks associated with e-commerce for the primary sector
- identify any factors inhibiting the adoption of e-commerce by the primary sector
- determine the probable track of development in New Zealand without intervention
- determine the actions that government might take as facilitator
- identify any advantages or disadvantages of taking a co-ordinated approach towards e-commerce.

The programme for this study involved:

- an extensive review of current e-commerce-related papers and other material (web sites listed in Appendices 1 and 2, and bibliography in Appendix 3)
- a series of interviews with key players in the sectors of interest (listed in Appendix 4)
- critical analysis and discussion to flesh out the key factors and their implications.

We note that the interviewees were invariably positive about MAF's interest in the topic, and while many discussions were subject to commercial confidence, they were all open and free flowing.

E-commerce is developing very rapidly, and significant developments have been announced even during this period of study. Any comment in this report on the current state of e-commerce must be assumed to be a snapshot at a point in time.

2. The Direct Impact of E-Commerce

In this section the impact of e-commerce is discussed at a generic, economy-wide level, using examples from the primary sector. Section 3 deals more particularly with the likely effects on rural communities.

E-commerce is a new method of transacting business using information technology, which allows physical processes to be replaced by electronic ones.

It is fundamentally an open system, usable by all enterprises anywhere, provided an appropriate infrastructure is present and has low barriers to entry, unlike earlier forms of electronic data interchange. It will therefore have a significant impact on small to medium size enterprises for which Electronic Data Interchange (EDI) was too expensive and cumbersome.

The introduction and use of e-commerce will have an effect in four ways. E-commerce will:

- improve **economic efficiency** (via the supply chain)
- allow the use of **new business models** (based on online trading)
- **magnify the effect of other changes** going on in business
- result in some changes to our **society**.

2.1 Economic Efficiency

For a small to medium sized enterprise, there is an estimated **cost reduction of between 2% and 3% of turnover**, with 70% of this being achieved through reduced cost of procurement. This will provide a one-off sustainable improvement in profitability by an average of 5% (or more, for enterprises currently working with low margins) [*Goldman Sachs, 1999b*].

The net impact of e-commerce on the UK economy has been estimated to be **between 2% and 3% of GDP** [*London Economics, 2000*].

It has also been estimated that improved demand forecasting and stock management as a result of e-commerce will enable **a reduction in overall inventories by as much as 25% in the US**. There is evidence from the auto industry that 20% reductions are already being achieved. [*OECD, 2000a*]

This economic impact will occur in three main ways. E-commerce will:

- **reduce the direct cost of goods and services:**

  The direct cost of goods and services was estimated by British Telecom to be 11% less when bought online [*OECD, 2000a.*]. This cost reduction occurs because:

  – e-commerce provides a new distribution channel, ideally suited to products and services that can be digitised (such as software, information, banking, entertainment and some services). These can be delivered for a fraction of the cost of traditional distribution channels.

- enterprises working online have **greater reach**, so that they are able to find the cheapest supplier for their purchases.
- e-commerce enables rationalisation of supply chains, as more efficient intermediaries emerge to displace existing ones.

The extent to which supply chain efficiency gains are passed on to customers will, of course, depend on the complexity of the supply chain and degree of competition. Several of a farmer's major cost items (such as fertiliser, which can be up to 20% of costs) have a short supply chain and limited competition. Their cost may not be much affected, so the impact of e-commerce on farmers may be rather less than on other enterprises.

The price paid for a good increasingly reflects the channel through which it is purchased [*Maurer, 2000*], and may not be directly related to manufacturing costs (the success of The Warehouse is a case in point).

- **reduce the cost of the procurement process:**

The procurement process (the process of purchasing) is far faster and can be much less costly when done online (Box 2.1):

- products are easier to find, catalogues are easier to find and search through, information is kept current and it is easier and quicker to have questions answered
- transactions can be done electronically, automating what is often a relatively expensive process
- there are far fewer errors in orders and invoicing, and therefore the manpower and cost required to deal with errors can be reduced
- it is easier and quicker to provide customer service (queries can often be answered using self-help systems online).

Box 2.1: Based on US data, traditional banking is estimated to cost a bank an average of US$1.08 per transaction – this can be reduced to US$0.13 using the internet [*OECD, 2000a*.].

A rural customer wanting to complete a bank transaction might need only a few seconds online, instead of spending hours travelling to and from the nearest bank branch, or waiting days if using the postal system.

- **reduce working capital requirements:**

A key factor in reducing inventory costs is adopting a 'just-in-time' business model, and improving the ability to forecast demand. E-commerce enables close links to be established between enterprises and their customers, to the extent that an order placed for a car will generate a ripple up through the supply chain automatically generating orders for components among a variety of interconnected organisations.

The ability to do this efficiently means that accurate market information is available to all members of the supply chain, and enables them to reduce their inventory, in some cases eliminating the need for inventory altogether. This, in turn, means that less resource is wasted in excess production, and reduces the need for sales of surplus stock at low prices.

Box 2.2: Until 2000, woolbrokers had to purchase wool from farmers before trading. Now, using **Woolnet**, they can trade wool on behalf of farmers and settle their purchase and sale transactions simultaneously, avoiding the need for working capital.

While this may not have a great deal of impact on producers' own inventories, it will affect their suppliers and their downstream value-chains, making the sector as a whole more efficient in its use of capital (Box 2.2).

This one off, permanent reduction in inventories will free up large amounts of capital for other uses. Cisco, for example, is reported to have reduced the value of inventory by 45% [*OECD 2000a*].

2.2 Business Models

E-commerce provides a new way for enterprises and entire sectors to inter-relate, and therefore enables the development of new business models. As these emerge, most organisations will be under competitive pressure to review their marketing relationships and trading processes.

This new channel allows direct communication between all players in the value chain that have access to the internet. This enables operating costs to be reduced as business transactions are automated, but also facilitates the flow of information through the value chain. As a result, collaboration between enterprises is easier, online trading exchanges are being established, and new businesses are being established.

The consequences of the new channel include:

- **Liquidity** (number of players / amount of funds in the market)

  E-commerce provides a mechanism for a buyer of a good to reach all sellers, and a seller / producer to reach all buyers, removing the geographical constraints that have limited trading throughout most of history. It therefore provides better price discovery (true market value can be established if all possible buyers are able to bid for goods, rather than those physically present on the day), and provides greater certainty of a sale / purchase being made. It potentially improves transparency, making it more obvious if dominant players attempt to influence the market.

  Market operations are improved if the trading exchange is 'open' to all players, both in terms of the technology used (non-proprietary) and the ability to trade (unrestricted participation). An open exchange, for example, might allow a producer to sell directly to a consumer, bypassing traditional intermediaries, and provide intermediaries with opportunities to adapt their roles (Box 2.3).

  Box 2.3: Woolnet is an open exchange, unlike the Australian equivalent AWEX, which preserves current industry structures.

  Producers and brokers are able to sell directly to international buyers, and often obtain better prices than they would have at auction.

- **Aggregation** (of like products, to build critical mass so as to satisfy demand)

  An important advantage of e-commerce is the ability for any party to aggregate product or services, so as to meet a particular customer requirement. This can occur as an informal agreement to coordinate supplies, as a deal struck by a 'virtual' trading organisation, or as a value-added exercise by an intermediary, and is a significant advantage of the use of open trading exchanges (Box 2.4).

  Box 2.4: Producers using **Woolnet** are collaborating to jointly win large offshore contracts.

  The meat producing company and e-tailer Outlands Export Ltd have had to work with other local beef suppliers to get enough volume to satisfy US demand for their product.

Aggregation online may enable producers to redress the balance in market power, which has shifted strongly towards buyers in recent years.

This ability to aggregate products and services will benefit consumers, who are likely to increasingly find that social, community, business and government services are co-ordinated in community-based portals.

- **Collaboration** (collaborative supply of products or services)

  The new alliances made possible with e-commerce are altering competitive advantage and therefore becoming a significant factor in strategies. It is now feasible for even medium size enterprises to go global with partners who may be virtual or permanent, with the significant advantage that they are able to integrate their separate information systems to varying degrees.

  This allows each participant in the collaboration to gain access to markets that separately they might never have been able to address. While there are examples of onshore collaboration of this nature (Outlands Export Ltd, wool brokers, etc), the greatest opportunity for a small country like New Zealand may be in collaborating with larger offshore organisations.

- **Traceability** (compliance with more demanding, high yielding markets)

  There is a growing segment in many of the markets for our primary products that is prepared to pay a premium for specific attributes such as organic growing conditions, humane treatment, etc.

  E-commerce provides the ability to reliably track, at reasonable cost, all biological products from the point of production through to the consumer. Tracking product history and attributes enables these characteristics to be marketed, the product differentiated, and a premium obtained for them.

  Zespri are able to trace kiwifruit in this way, as are several other exporters of primary produce. At least one New Zealand meat processing company is utilising the Celentis developed easiTrace™ technology to enable traceability of meat products. Some industries, such as the dairy industry, may have difficulty with providing traceability along the entire supply chain because of the nature of the raw product or the current structure of processing plants.

  Traceability must be two-way – it must also allow producers to obtain information about their produce from the customer and consumer, enabling them to improve their product.

- **Differential pricing** (changing prices to meet short term opportunities)

  Marketing and selling online enables producers and traders to alter descriptors and prices instantaneously to take advantage of short-term opportunities in their markets, provided that their product supply and/or production systems can also respond quickly. Outlands, for example, is able to vary prices instantly depending on the combination of meat products being purchased.

  The previous industrial revolution generated mass production – this revolution is increasing the speed of production. Now that business must be conducted around the clock, the need to meet short windows of opportunity is leading to 'mass customisation'.

  It is likely that differential pricing will rapidly become the norm as producers / sellers customise their products to address fine market segments and achieve price premiums.

- **Customer Service and Marketing**

A significant aspect of e-commerce is the ability for producers to establish direct contact online with consumers. This new channel enables improved or new forms of customer service, and allows new forms of direct marketing to individual customers and consumers (Box 2.5).

Box 2.5: Lilies by Blewden used to send more than 1 million stems annually to the New Zealand flower auctions.

The company developed a web based selling system, and now has around-the-clock interactive communication with both marketers and customers.

After four months trading, net income had increased by 15%.

Individuals are now able to take part in 'opt-in' direct marketing, where they nominate their interests or allow their purchasing habits to be monitored (by choice or by default). Online advertising is increasingly targeted to the known interests of each particular individual.

The food industry is undergoing major change, as the supply chain responds (rather than pushes whatever is in season) to consumer demand for fresh produce. Today's fresh produce supply chain has been described as an inverted 'demand chain' which is rapidly becoming circular (beginning and ending with the consumer) [*Maurer, 2000*]. 'Demand chain' management may become a central business practice in the near future.

The availability of comprehensive market information from the consumer, particularly in the primary sector, will enable producers to modify their product and their production processes in order to maximise value.

While speed of response has become a crucial competitive advantage, customer service continues to be highly important for those organisations that wish to differentiate themselves (Box 2.6). E-commerce enables these issues to be addressed.

Box 2.6: Why companies need to get wired

Of 60 global companies surveyed, only:

48% know about a problem before a customer does

43% offer better service to profitable customers

42% would sell something during a service call

37% know if they share a customer with another division

23% of telephone agents can see customer's web activity

20% know if a customer has visited the website

Source: Forrester Research

- **Participation** (access to the internet)

The rapid increase in the type of devices able to use the internet will in the near future enable business to be conducted at any time from any place. Farmers are increasingly able to rely on cellular technology, using voice messages, WAP (wireless access to the internet) or SMS (text messaging on cellphones) to obtain crucial information (such as bids for produce on the market via Woolnet, current foreign exchange rates, etc).

This will have a significant impact, and will erode the significance of economic and geographic boundaries.

2.3 The Rate and Extent of Change

Estimates of the rate of uptake of internet-based technologies vary considerably, but there seems to be no doubt that the world is in the early stages of a steep growth curve, with New Zealand somewhat behind the US, Canada and other global leaders, but with an adoption rate slightly ahead of Australia. [*MED, 2000*]

This uptake is partly driven by cost - the real cost of the technology has reduced by 35% each year over the past three decades - a much faster rate than previous technological revolutions like steam power, railways or electricity [*OECD, 2000a*].

E-commerce has, in turn, become a driver of change. E-commerce can:

- **Enable entire sectors to be transformed**

  Not only is information technology evolving rapidly, but it also provides tools used for innovation in all other areas. Access to cheaper and more powerful tools has increased the rate of innovation in general, so creating a "virtuous circle".

  Since this process is occurring in parts of the world with which New Zealand competes for market presence, New Zealand sectors must be able to innovate at at least the same rate as their competitors. In order to compete successfully in their global market, all sectors must be able to:

  - **re-engineer the processes that operate in their value chains**, realising the efficiencies made available by e-commerce, so as to reduce the cost of adding value and to provide the responsiveness and customer service that will increasingly become the norm
  - **modify the structure of their business network**, building collaborative activity into business strategies and enabling intermediaries to modify their roles so as to continue to add value
  - **innovate their products and services**
  - **market these products** to compete with similar sectors offshore (Box 2.7)

  Box 2.7: Woodnet, a timber electronic exchange, has explicitly set out to network the forest and wood products industry. According to Forestry NZ Ltd, traditional market channels have some negative aspects:

  - inconvenient / poor communications affect the ability to develop business
  - supply chain components operate in isolation to each other
  - there is client dissatisfaction due to poor 'supporting' service relationships
  - there is a lack of convenient credit and payment options.

  These result in:

  - missed opportunities in a changing market
  - repeat business threatened / lost / never started.

  Woodnet expects to enable a substantial restructuring of the industry and value chain.

  Those sectors and businesses most able to adapt and re-invent themselves will be the most successful. On the other hand, those sectors and businesses that have inherent and structural barriers to change are likely to be substantially disadvantaged.

- **Provide a 'first-mover' advantage**

  There is in many cases a first mover advantage, where the first entrant builds barriers to entry for other entrants. New Zealand is first off the block in one or two of its primary sectors – if these initiatives are managed well, they will rapidly attract global buyers and sellers. First movers do of course face a relatively high risk of failure, in which case substantial amounts of capital may be squandered.

  The 'network effect' will apply – the bigger the network the more valuable the market, and the bigger the barrier to entry for would-be marketplaces (if the majority of sellers are using one exchange, buyers will not be tempted away to another exchange with a small number of sellers).

  In those sectors where other countries take the first mover advantage, New Zealand will lose influence on the standards-setting processes taking place. Flexibility and speed of response are vital. In those industries where New Zealand is a global player and is not already operating or developing marketplaces, the local industry should keep an informed watching brief, and be prepared to enter the market at the appropriate time.

  Box 2.8: It is too early to determine the probable outcome for the New Zealand initiatives:

  - **Woolnet** has not yet achieved critical mass in terms of wool traded
  - **fencepost.com** and **rd1.com** have reported a much slower takeup by dairy farmers than expected.

- **Pressure from the big players**

  Because the efficiency gains are so significant, large enterprises are increasingly requiring their supply chain partners to interact with them online (as Zespri does with kiwifruit packhouses, and as the big dairy companies do with their suppliers).

  Small organisations are therefore being pulled into e-commerce whether they intend to or not. Those that are unwilling or unable to change quickly enough risk lagging behind and being replaced by their competitors in the new networks being developed.

- **'Openness' and boundary-crossing**

  One reason suggested for the internet's success is that participation is not limited to users of specific hardware or software (the internet uses non-proprietary standards) and that it is open to all players.

  This concept of openness applies to parties in a sector business channel, who are increasingly allowing access to their internal systems by their suppliers and customers. This integration of operations provides efficiency gains, and also provides an opportunity for barriers between sectors to be eroded. New specialist organisations will be created, and existing specialists in one vertical value chain may find that they can perform a similar function in another vertical, so that horizontal integration occurs. Established firms may therefore find themselves facing unexpected entrants to their sectors.

  This may occur in functions such as exporting or transport, where current specialists in one sector may find that it makes economic and strategic sense to expand into other sectors. Integration of telecommunications into business processes along with an increasing need for independently certified stock has enabled large transport operators to compete effectively with small, local operators to move wool from farm to depot.

- **'Openness' and the role of the consumer**

  This strategy of being open is now being applied to consumers, who are increasingly being allowed to interact directly with companies' databases, systems and staff. Consumers are increasingly becoming partners in product design and creation, providing feedback directly to producers or manufacturers in much the same way as the software industry has used its customers to identify bugs and develop software.

  This trend is likely to generate an expectation by consumers of a similar openness and transparency from all of the organisations with which they interact, including local and central government.

2.4 Social Impact

A number of social issues may be brought to a head as a result of e-commerce. Among these issues are:

- **Privacy**

  Consumers are increasingly likely to voluntarily provide information on their buying habits, in exchange for direct marketing on topics in which they may have a particular interest. It is possible now for a wide variety of personal information to be collated across the internet, ranging from a purchasing history and personal interests to financial information, information on relationships, work history, etc. It has also become easy to obtain and collate business information, which may put unsuspecting local businesses at a significant competitive disadvantage.

  Privacy laws may apply to New Zealand enterprises operating in New Zealand, but they may be unenforceable in the case of offshore organisations operating on the internet. If this turns out to be the case, then the only remedy is to ensure that New Zealand businesses and individuals are made aware of the risks they take in allowing known or unknown organisations to collate information about them, and to ensure that they are provided with the support necessary to protect private and sensitive information.

- **Intellectual Property**

  The issue of ownership of intellectual property and copyright is becoming significant as more use is made of the internet. The same technology that enables e-commerce also provides a means of copying digital products and other publishable material. Although the various industries concerned are attempting to develop copyright management systems for use online, it is by no means certain that they will succeed.

- **Security** (confidence and trust)

  It appears to have become easier to eavesdrop on communications and to access private and corporate data using the internet. This could have disastrous ramifications for businesses as they move more and more onto the internet, and will require increased vigilance and protective measures.

  The several recent well-publicised attacks on prominent websites, which succeeded in closing them down and therefore disrupting business operations for extended periods of time, as well as the theft of corporate and personal data by hackers, demonstrate that security can be a significant issue for enterprises working online.

Many countries are following the US in drafting legislation in support of electronic signatures. Proof of identity online requires digital certificates, and is relatively easily arranged. As the use of electronic signatures becomes more common, replacing or supplementing physical proofs, security of identity is also becoming an issue. Identity theft is a crime that appears to be growing in prevalence in the US. Technology development will no doubt help to manage this problem in the near future.

- **Access** (connectivity, digital literacy and motivation)

  The term 'digital divide' was coined to crystallise the idea that some parts of the community will be less likely to benefit from use of the internet, for a variety of reasons such as:

  - difficulty getting online or obtaining satisfactory connectivity
  - a perceived high cost of using the internet
  - a lack of expertise in using information technology
  - a lack of interest or awareness of the value of using the internet
  - an inability to use the internet for language or disability reasons.

  The probable outcome of poor access for any of these reasons is that people and organisations that are affected may be excluded from the advantages and services that are increasingly available online.

  The population most at risk is likely to be rural, if only because rural areas are generally poorly supported by telecommunications infrastructure. While the people involved will be disadvantaged, it may be at least as significant that the rural businesses affected will be unable to achieve the efficiency gains and other advantages available through use of the internet, and will therefore be at risk of becoming uncompetitive.

- **Teleworking**

  One of the perceived benefits of the internet is the ability for office workers to work at home, instead of in an office. There are many benefits claimed as a result of this opportunity, ranging from an improved family environment to a possible reduction in traffic flows. There are also a number of concerns, revolving around the increased lack of social interaction and a possible difficulty in managing the effectiveness and efficiency of staff working remotely.

  It is clear, however, that the ability to work from home opens up new employment opportunities for people living in rural areas, or for those who would prefer to live there.

3. The Impact on the Rural Sector

The knowledge-based economy is commonly thought of as an information technology economy, with an emphasis on software and hardware. Information technology is, however, primarily an **enabler**, not an end in its own right (other than for data-based products such as information, software or music). As such, it will have an impact on the entire economy.

The New Zealand economy is heavily dependent on the primary sector [Box 3.1]. We should continually attempt to develop new strings for our economic bow, but the greatest gains in the short to medium term will be achieved by increasing the economic value created by the primary sector.

In the primary sector, e-commerce will enable cost savings to be achieved, but its most significant impact is likely to be in enabling product differentiation.

Box 3.1: According to Statistics New Zealand:

- **63% of New Zealand's primary and secondary sector produce exports** in 1999 came from the food and fibre industries
- **50% of employment in manufacturing** is in industries that add value to primary sector products, such as food, textiles, wood processing and paper products.

3.1 The Importance of Product Differentiation

Many of our primary sector products are commonly referred to as 'commodities'. Commodities are undifferentiated products – their price is subject to global supply and demand and is usually predictable, and margins are driven by economies of scale. New Zealand, with its small size, its difficulty obtaining economies of scale, and its distance from its major markets, cannot survive for long if it produces commodities, and is increasingly seeking the production of differentiated goods.

E-commerce provides the primary sector with a unique opportunity to attract price premiums by differentiating our produce (Box 3.2).

Despite common perceptions, many of our products are in fact global price leaders, not commodities. Even large volume producers (such as the New Zealand Dairy Board, the world's largest exporter of dairy product) have a wide product range and deliver more than half of their product to tight specifications. Much of our primary produce is differentiated, targeted at specific well defined markets, and attracts price premiums – it is not a commodity.

Box 3.2: Points of differentiation include attributes that are part of the value decision for buyers, including:

- **Payment terms**
- Quality assurance **certification** (health certificates can be mandatory, but additional warranties can be important attributes)
- **Branding** (intermediary customers and consumers are prepared to pay a premium for an established brand and what it represents)
- **Delivery** (speed, or delivery in a specific time window)
- **Custom specifications** (supplying niche market quantities that match a buyer's exact needs).
  True commodity suppliers obtain cost advantages from economies of scale with large runs of non-differentiated product, and have difficulty in adapting production for customised requirements.
- **Relationships** (personal or long-standing relationships can provide a sense of reliability).

The sophistication used in production systems for forestry, agriculture and horticulture can at least equal those used in manufacturing.

New Zealand, which depends heavily on its primary sector, must be able to apply or *embed* knowledge in a way that gives its primary sector a global advantage. This is continually done in the primary sector through selection and breeding, improvements in farm and orchard management systems, and development of integrated production technologies, all increasingly driven by the need to supply high quality product targeted to specific market needs (even though some industries are still driven by throughput considerations at points in the process).

E-commerce will increase competition by extending the reach of buyers, but it also provides valuable opportunities to differentiate product, for those who wish and are able to take advantage of the opportunity.

3.2 Online market exchanges

The development and uptake of online market exchanges is forcing changes in existing market channels and relationships. These exchanges have strong benefits for the primary sector, provided it understands and participates in this new world. Most significantly, e-commerce will enable some primary producers to thrive as they find ways to differentiate their product and attract higher returns. Other producers will find themselves driven towards the commodity end of their market, and their returns are likely to suffer.

Online marketplaces offer a number of advantages to their users:

- **"Reach"**

  Online exchanges:

  - provide growers with access to global buyers of their goods, in contrast to auctions, which limit access.

    Some rural areas (such as Southland) currently have poor access to global markets for some of their products (such as flowers).

  - provide significantly better opportunities for price discovery by increasing the liquidity of the market

  - can remain open for trading around the clock, allowing inventories to be reduced and enabling sales to be made in shorter timeframes.

- **Transparency**

  Growers/farmers are able to develop a much better understanding of the attributes for which buyers are prepared to pay a premium, whether described in terms of quality of goods or nature of service.

  Information and communication technology has already had an impact. Local produce (fruit and vegetable) markets have all but disappeared for large volume retailers - mobile phones allowed national buyers to rapidly compare opening prices and then determine where to source product, thus pre-empting local auctions.

Box 3.3: Woolgrowers typically sell to one of the buyers who come to the farm, or sell through the auction system. Now, using **Woolnet**, growers are discovering that on-farm sales often fetch lower than current prevailing prices.

The majority of fresh produce is now handled by direct supply contracts with small growers subcontracting to larger growers and groups.

- **Certification / Authentication**

To work effectively, the new market exchanges will evolve new terminology or ways of describing the attributes that buyers would like to have in the goods they buy.

This will be easier if there is an external, independent facilitator able to co-ordinate and assist the development of new nomenclature and standards [Box 3.4].

Since it will not be practical for products to be viewed directly by buyers (or for buyers to be endorsed by sellers), there will be a need for independent certification in support of attributes such as guaranteed life history, authenticity or proof of origin, creditworthiness, etc. This is complicated by the fact that some biological produce will change state over time, a factor that must be built in to the certification process.

Box 3.4: SGS Group, the world's largest inspection, testing, verification and certification organisation, has a major international initiative underway for e-commerce.

Recognising that online buyers are unable to verify the product they are offering to buy, SGS have developed a seller protocol that assesses the seller in terms of quality and reliability of product and delivery performance using recent history.

This currently applies to manufactured products, but is now being applied to primary sector products.

The value of certification has already become clear through Woolnet, where uncertified wool stored on farm is attracting lower prices. In some cases, it may take time for the market to realise the value of certification – until then, it may not be cost-effective to introduce the service.

- **Choice and empowerment**

E-commerce, and in particular online exchanges, will empower the rural community, providing accurate and current market information for producers, giving them much more control over their business activities [Box 3.5]. They will be able to recover market power, and find opportunities to collaborate in new ways.

Box 3.5: Agri-fax provides information on New Zealand prices of agricultural, forestry and fish products. They contract to supply information to other organisations that may then pass it on at no charge. Summary information and calculators are displayed on the web-site but more detail is supplied for a fee.

The increased transparency provided by e-commerce allows producers to make an informed assessment of the skills required and the risks, potential returns and costs of each option. Growers/farmers will be able to:

- **retain ownership** of their product further down the value chain than they currently do (buying in any processing services required) so as to establish closer contact with end-customers and a greater share of the margin available to the value chain.

  In some sectors this opportunity is constrained by the need for aggregation (dairy) or structural issues (meat).

- become, by default or choice, **contract growers**, leaving the value-adding activity to intermediaries.

- **Aggregation of product**

  Most producers do not by themselves produce sufficient volumes to make commercially viable parcels. Intermediaries are still needed, but online exchanges make it far easier for them to aggregate product to meet their buyers' specifications.

- **Selling costs**

  The transaction cost of selling is lower, which will increase the net return to producers if there is enough competition between intermediaries to force them to pass on the cost savings. If there is downward pressure on producer prices because market power lies with buyers, then the reduced cost of sales will mitigate this and minimise the impact on producer returns.

- **Opportunities for new business**

  Intermediaries will benefit by being able to reduce or eliminate inventory, improve their cash flows and reduce working capital.

  The exchange also provides opportunities for intermediaries to change their role, develop new ways to provide value (such as aggregating produce to match large orders), and to re-engineer their current business processes and infrastructure. This is already happening in the wool industry (via Woolnet), and is expected in the forestry industry (via Woodnet and Lignus).

3.3 Supply Chain

E-commerce provides a new channel for the procurement and supply of goods and services. The great deal of online supply chain development activity currently going on in NZ:

- will result in significant changes to **business processes** in the primary sector, as the players in the value chain take advantage of the new channel and intermediaries change their roles
- may result in a dramatic change in **competitive position** among those organisations with an interest in the primary sector, as participants in the leading portals targeting the sector take a greater market share.

Several organisations are taking the lead in building a business community around themselves so as to provide a wide range of services to their intended market. The rapid development of these "portals" intended to serve the primary sector (such as rd1.com and fencepost.com, Wrightsons Online, etc) will:

- enable customers to receive **better service** for a range of needs
- **reduce supply costs** by reducing transaction costs between businesses and possibly by taking intermediaries out of the value chain.

  This will have less impact on farmers, because major cost commodities such as fuel and fertiliser may not be much affected (but supply to out-of-the-ordinary specifications may become cheaper and easier to obtain)
- enable **savings in other purchasing** as supply efficiencies improve, choice widens and the opportunity for cooperative buying becomes greater
- be **constrained by delivery difficulties** – delivery of perishables and fragile items will continue to be more of an issue for rural communities than for urban consumers.

3.4 Communications

The internet provides opportunities for communication that could provide significant advantages for the primary sector. Although these are not strictly e-commerce issues, in practice these advantages will be provided in conjunction with related e-commerce functions. These advantages include:

- **Biosecurity/Hazard Awareness**

  Integrated communications systems using online databases and both online and voice communications would enable targeted alerts and information on biosecurity, health and other hazards to be provided as they occur (Box 3.6). The same system used in reverse could allow authorities to become aware of the scope or spread of these hazards through simple and potentially automatic notification processes used by farmers and processors (as is done for Bovine TB, etc).

  Box 3.6: Environment Canterbury (and other Regional Councils) use their Geographic Information systems and the internet to provide farmers and rural businesses with groundwater level information in their immediate vicinity, flood warnings, and similar information.

  This enables better management of water on the Canterbury plains, and enables farmers to reduce or eliminate stock losses due to floods.

- **Health**

  Outbreaks of primary sector related health hazards such as listeria could be monitored and managed using online databases and tracking systems from source to supermarket (and potentially including the consumer via loyalty cards) or point of sale, and the reverse.

- **Benchmarking**

  Use of the internet enables rapid feedback from processor to producer, and enables rapid comparisons to be made between the performance of individual producers and district averages [see Box 3.7]. This information can be incorporated into the management decisions of the producer.

  Box 3.7: Kiwi Co-op Dairies supply producers via the internet with their daily milk supply volumes and quality assessment. **Pork processors** supply their producers with information on the health of the pigs at slaughter and any changes over time. Pork quality assessments are about to be "piggy backed" on this information stream.

- **Support Groups**

  The internet will enable the establishment of online communities of interest that are not constrained by geography, including farmers, their suppliers, their processors, health care specialists, science providers, etc.

- **E-government**

  Various government agencies are planning to provide online services that will directly benefit the rural community. The Crown Research Institutes already provide specialist information and access to research. MAF itself, following a similar strategy to MAFF in the UK, has become an authoritative online source of information, resources, regulations and advice for the primary sector, and several other Government Departments already provide a range of resources online. The Government's e-government initiatives will enhance and integrate these services, improving access to these for all users.

- **Marketing**

  Those exporters which have already started using the internet for communication with offshore buyers and importers have found that while communicating online is a great deal easier and quicker than other methods, face to face interaction is still needed to establish working relationships in the first place (as Food Connect Australia emphasises for Australian exporters).

  Outlands Export Ltd, for example, made no impression on the US market until their sales staff took samples to the US market and established their credentials. While a great deal of the ongoing interaction can now be carried out using the internet, face to face interaction is still required.

3.5 Implications for Rural Communities

While rural businesses and communities should gain considerably by their use of e-commerce, there are a number of implications that must be managed:

- **The cost of distribution**

  The rural delivery of small items is currently underpinned by the banks, which must move bank paper (cheques, deposit slips, instructions, etc) for processing on a daily basis to meet their service commitments. As online banking penetrates the rural community, the volume of bank paper to be moved between branches and processing centres will reduce, rendering many of the current rural courier arrangements uneconomic. This may result in higher delivery charges in rural areas. In many cases it is only profitable to have one delivery van on a particular route, so there will be rationalisation.

  Distribution arrangements are already changing – the need to sell wool certified by independent service providers from recognised woolstores has already led to changes in transport patterns.

- **The competitiveness of small town businesses**

  It is too expensive to deliver goods to remote farms on a commercial basis, and farmers are used to going to a nearby village or town to collect goods. It is therefore likely that:

  – the leading portals will have a physical outlet (depot) in most small towns and villages, providing kiosk access to the portal

  – there will also be depots in these towns and villages where goods will be delivered and held for pickup by the intended recipients.

  The strong need in remote communities for social interaction may be met in part by the portal outlet and/or the depot, as part of their strategy to attract and retain customers.

  Many small, independent rural businesses will be unable to participate in a leading portal, and will become less competitive. Survival may mean reinventing themselves. There will be a need for re-skilling to enable the rural community to take up the new jobs that will evolve as a result.

  Those rural businesses supporting current conventional buying and trading methods (such as auctions) will find their activities rapidly reducing as online exchanges penetrate the primary sector. Some will be able to transform into providers of new services, and some may be able to provide the technical support needed by community portals.

- **Tourism as an alternative**

  The internet and the spread of e-commerce has made it far easier for the rural community to develop non-traditional businesses making use of other rural assets.

  The rapid increase in tourism services such as bed and breakfasts, farmstays, eco-tourism and adventure tourism is likely to have a strong beneficial impact on the rural community, providing a significant alternative source of income (Box 3.8).

  Box 3.8: Rural **tourism** services can be discovered, investigated and booked online from anywhere in the world, through direct contact with the (often rural) service provider, through specialist online service providers (such as www.agritour.co.nz, www.travel.co.nz or www.innz.co.nz), or via online catalogues (such as www.jasons.com or www.nz-destination.co.nz).

  While these services have been developed largely through private initiatives, Government agencies have participated through Tourism NZ (www.pure.co.nz) and the Visitor Information Network (VIN), where each office provides online access to tourism resources.

- **Community-based portals**

  Experience in the US, Canada and other areas suggests that, to be successful, online services in rural areas need to be strongly community-based, and must serve the needs of the local community. Rural communities, when asked about the information they needed most, identified local events, local work opportunities and other local content. This information is often not available online.

  While there will be many large businesses keen to establish themselves as the portal of choice, the fact that they inevitably have their own interests at heart will prove a significant barrier to consolidation. Offshore experience suggests that a workable solution must be independent and community-based, although the local portal may well provide easy click-through access to the main agribusinesses serving the community.

  Local community-based portals are likely to involve schools, churches, local body and central government services, and support local social activities, social interaction and entertainment. The best candidate for supporting these community-based portals may be local government, as part of its community services work.

- **Quality of life**

  E-commerce is expected to lead to an improved quality of life in rural communities, by improving the community's access to:

  – **remote learning**

    Massey University, the NZ Correspondence School and other suppliers of education services are providing limited services online, and intend to enhance these as broadband or high-speed access becomes more universal. These services will provide more learning options for remote communities, and are expected to improve the quality of learning in specialist topics where there may be no local expertise.

- **remote care and other health services**

  Community health nurses in rural areas spend a great deal of time travelling. The introduction of care stations (such as those being introduced by Kodak and ATI in the US and recently approved by the FDA) and video cameras linked to the internet will enable nurses to reduce the frequency of visits needed to remote patients, particularly the elderly. This in turn will enable medical staff to make better use of their time, reduce the cost of care (by making home care more common) and lead to an overall improvement in health care in rural areas.

  In late 2001, a mobile surgical bus will commence service. The bus will carry out publicly funded, low risk elective day surgery in rural centres where the local hospital has lost its operating theatre. Surgeons from large hospitals will be able to assist via a video link.

- **entertainment**

  A great deal of entertainment is available online, ranging from games (such as online bridge, a significant benefit to the elderly who are unable or do not wish to travel, or the wide variety of online games for kids) to literature, music and video (subject to access speed).

  New community-based portals will facilitate more and richer social interaction online, which may compensate for the reduction in face-to-face interaction as e-commerce replaces physical transactions.

- **religion**

  Research in the US [*Pew, 2000c*] indicates that an overwhelming 83% of those surveyed responded that use of the internet has assisted their congregation and 25% said that it greatly assisted it. 81% responded that it has assisted their spirituality, 35% saying that it greatly assisted it. These results reflect use of the internet for communication, sharing of religious material (sermons, etc) and research.

- **family members and friends**

  According to US research [*Pew, 2000d*], 60% of women think that use of the internet has improved their communication with family members and friends. The internet appears to have enriched important relationships and enlarged their networks. In rural New Zealand, the internet has the potential to overcome isolation.

Federated Farmers consider that e-commerce may reverse the movement of skilled people to urban centres, and enrich rural communities again.

4. Participation by the Rural Community

Rural communities differ from urban communities in several important ways, and these will affect the rate at which they are able to take advantage of e-commerce. Because the rural community is still the basis of New Zealand's economy, it is vital that these differences are overcome.

4.1 Access

Rural areas are typically distant from telephone exchanges, and may be in difficult terrain where cellphone coverage is difficult or impossible and where line-of-sight telecommunications services are not feasible. In some rural areas it can be difficult to maintain voice or fax connections, let alone making use of the internet.

Internet-based services require good access - the New Zealand Correspondence School, for example, needs better than 56kbps for interactive whiteboards and video conferencing for classroom sessions – but even 14.4kbps cannot be achieved in some rural areas [Box 4.1]. While some websites and web-based services could be 'dumbed down' by their designers using an absolute minimum of graphics, many rely heavily on graphic content, which can make them unusable on slow connections.

Some countries are considering national broadband (150kbps or faster) strategies – the Canadian telecommunications regulator is reported as implying that high-speed internet services may be designated as 'essential', particularly for small business.

Box 4.1: Massey University's extensive experience has shown that use of the (asynchronous) internet is superior to use of radio broadcasts, video- and/or tele-conferencing for delivery of their distance learning programmes.

During the next five years the University expects all extra mural courses to be supported on-line. This is the best way to get interaction between staff and students.

The student will need access to a high-speed connection - e-mail will not be enough.

Higher speeds available to urban users require short distances to exchanges (DSL, for example) or line of sight to a transmitter. The former is out of contention in rural areas for the foreseeable future, and line-of-sight solutions over long distances are still prohibitively expensive for small numbers of remote subscribers.

It is highly unlikely, in our view, that the copper wire based local loop will provide satisfactory communications support in the short to medium term. Wireless-based solutions will in the near future provide adequate bandwidth, but coverage will remain difficult and/or unreliable in remote rural areas.

Satellite-based applications are an obvious solution. Services currently available in New Zealand provide fast downlinks, transmitting one way only, requiring a phone connection for uploads. This is therefore a good but only partial solution.

Two-way satellite services are now available overseas, however. Starband Communications have implemented a satellite-based system providing high-speed two-way internet access for remote Indian communities in the USA, and are now operating commercially there.

The service is affordable, because it uses new developments in dish technology that have dramatically reduced the capital cost involved. The service includes voice communications.

This service is clearly complementary to television, and could be bundled as a single service. It should be noted that while users in the US tend to use their PCs for internet access, the British are more inclined to use interactive television (and have been accustomed to using Teletext). Pay TV is seen as the carrier for interactive services, and digital media companies are now strongly pushing interactive services like banking, shopping and email to their TV customers.

iHug has introduced interactive TV services here, and has a small satellite-based internet service (relying on modems and the phone line for uploading). Sky has a pilot two-way service operating in Auckland, which could be rolled out as a commercial service using Optus satellites within a matter of months, if it became clear that there was demand for the service and that it would be viable.

4.2 Resistance to Change

There are issues other than access that may make the rural sector slow to change:

- **Industry Structure**

  A rigid industry structure may prevent or delay the changes needed to take advantage of the opportunities becoming available through e-commerce [Box 4.2].

  For any sector to compete globally, there must be mechanisms for aggregation of producers / sellers, co-operative and orderly marketing, and research and development. There is also a need for facilitation and support of the marketplace.

  Online exchanges effectively operate the marketplace, and must be independent, trusted parties in order for the market to be successful. The exchanges, if open, provide new opportunities for collaboration and enable current players to develop new roles. The flexibility provided by the online exchange is a vital element in re-engineering the sector, because it allows all parties to experiment. If some parties are prevented from doing so by external regulations, historical rigidities, current business models or attitudes, it is likely that they will be disadvantaged competitively relative to other parties who may not be similarly constrained.

  Box 4.2: The Australian wool industry has established a closed trading platform (AWEX), which replicates the traditional auction system and preserves the control exercised by the current intermediaries. **WoolPro**, by contrast, has established an open trading platform which empowers growers, and which will enable the NZ industry to make significant gains in both differentiation and efficiency.

  Wool buyers and other intermediaries are currently resisting the infrastructural changes and rationalisation being made possible with internet-based technologies. Denial and protection of vested interests will reduce or prevent the significant opportunities available using the new technology.

  Outlands Exporters, for example, could not have their meat products processed and returned to them for marketing - they found that the only solutions were to lease use of processing plants or acquire their own.

  Where product is compulsorily acquired, producers may be unable to participate in e-commerce, although the marketing body is able to do so.

With product that must be aggregated, such as milk, it may of course be difficult if not impossible to provide traceability, which would enable marketers to differentiate product on the basis of the attributes of a particular farm or area from where the product is derived.

- **Skills and Attitudes**

  We have market segments that increasingly require specific attributes, such as organic produce, absence of genetic engineering, humane treatment, or proof of origin, and are prepared to pay a price premium for them. These attributes require traceability and involve extensive use of information systems right through the production process. There are three issues:

  – **The primary sector must be able to identify and satisfy these opportunities to differentiate**

    The ability to implement the processes needed rapidly could become a significant advantage in relation to offshore competitors. E-commerce, as an enabler, will play a vital role in identifying this advantage, delivering information to the market and promoting the points of differentiation.

  – **Product certification**

    Because buyers using online exchanges will be unable to see the produce for themselves, they will rely on **certification** from trusted service providers (Box 4.3).

    All the marketable characteristics of a producer's product must be quantitatively defined, especially for live, changing and perishable product, and these characteristics must be certified. It is important that the benefits and costs of the change are clear to producers, and that they are assisted through the transition.

    Box 4.3: Experience with **Woolnet** shows that certified product stored by a reliable service provider attracts better prices than uncertified product sold on-farm.

    There has, however, been considerable inertia to overcome. Woolnet experience suggests that skills must be developed among producers, their attitudes need to change, and confidence must be built in what is for them a radically different system.

  – **Terms of trade**

    In addition, Woolnet experience indicates that it can be difficult to get growers, who are often inexperienced sellers, to accept and honour **terms of trade**. A number of major buyers have been let down by the commercial naivety of some farmers not used to commercial obligations, and will now not buy any on-farm lots.

  This suggests that part of the transition process is the co-operative development of terms of trade that are agreed to, accepted and honoured by all parties. Producers may need to change their business processes, and upgrade their skills.

  Many producers currently treat their produce as a commodity, and have been happy to take the advice of their preferred buyer or agent. For the primary sector to realise the opportunities opening up to differentiate their product, producers will need to become aware of the benefits of change.

4.3 Community Participation

Research on the digital divide in the UK, USA and Canada has clearly demonstrated that access is not enough – there has to be a draw card to persuade people to participate on-line. There must therefore be a bundle of services available online – satisfying or facilitating business, administrative, social and entertainment needs for all members of each family.

The most common issue raised by those who could be online and are not is the lack of useful, local community content. There are a number of implications from this and similar findings:

- **Online content:**

  In order to maximise participation, there must be content online that is closely relevant to the everyday activities and interests of all members of the community, including such areas as:

  - local job listings and employment news
  - local social events, including entertainment, activities, ceremonies, etc
  - the services available locally from clubs, churches, local government, central government
  - the ability to interact online with service providers, especially with local and central government
  - the ability to bank and pay bills online
  - the ability to shop, and to track delivery
  - communication with teachers and schools, and the ability to participate in school events online, to see children's work, etc
  - the ability for kids (and adults) to email, chat and play games with each other in a safe online environment
  - access to health services and online entertainment for the elderly, the disabled or people unable to travel
  - current weather forecasts, other environmental factors (such as water levels) and custom farm-based information, assistance or services
  - the ability to monitor and control onfarm or business activity.

  It should be noted that while interaction currently relies on PCs, there will be a rapid introduction over this decade of new devices able to be used online, including TVs, various handheld devices, appliances and equipment. Users will be increasingly networked at home, and be using the internet in parallel.

- **The community network:**

  A number of organisations already provide supply chain services to the rural community (fencepost, rd1, Wrightsons, etc) and online suppliers will proliferate in the short term (the time frame will primarily be dependent on the extent of suitable access for rural consumers).

  Online suppliers will inevitably begin to compete with each other, making life more complex for the end-user. Resistance to this by users and the inability of latecomers to operate profitably will force these organisations to rationalise their online activity.

It is unlikely, however, that any one of these will become the community portal by default, because of the self-interest involved (each will attempt to capture consumers for its own product range, whereas consumers may prefer to retain free choice). It is more likely that the several sector-based vertical portals (such as the dairy industry ones, livestock, wool or wood products) interacting with one customer will eventually collaborate, particularly since many ancillary services such as transport will involve interaction with the same third parties. These verticals will then begin to specialise so that new or spin-off organisations provide specialist services to several vertical sectors (financial services, exporting, transport management, etc). One obvious potential horizontal speciality is the customer interface.

It is therefore likely that local community-based portals will develop, underpinned and administered by a local organisation, where the local population has recognised methods of adding content or interacting with the portal (Box 4.4).

The local district or regional council may be best placed to provide the support needed. These councils already have objectives in relation to community development and support.

Box 4.4: 'Not Just Gumboots & Scones' is a **rural community web site** developed by a group of women in the South Island. Internet access has been provided at four resource centres.

Information is provided on key regional organisations, business diversification, rural issues, legal points, tertiary study opportunities, community funding and useful publications. Links are provided to national organisations.

Given the number of these councils, it may be useful for protocols or standards to be developed by local government, avoiding the need for many parallel development initiatives. These protocols would cover access to the local portal, structure of the portal, etc, providing a set of common standards while retaining the ability of each community to customise its own particular portal.

Central government services, as they move online, are likely to be provided in the same way through links from all portals, as will be services provided by national or regional businesses, so some standards will be provided by default.

5. Policy and Support Issues

A number of policy issues should be considered, all of which suggest intervention or co-ordination by government agencies.

For all these issues, intervention or at least co-ordination by government would facilitate the change process needed, enabling it to proceed faster, and allowing the rural community to derive the gains available from its use of e-commerce sooner. If government chooses not to become involved, the changes brought by e-commerce may take longer, involve significant duplication of effort and therefore be more costly, and cause more stress to the rural community than might otherwise be the case.

5.1 Access

The most crucial policy area is in relation to access (Box 5.1). Since this is the issue most likely to affect the rural uptake of e-commerce, government should ensure that broadband access is provided to the rural community - people with adequate access to the internet will be able to participate in this revolution and the gains available. Those without will not.

Most rural communities in New Zealand are unlikely to have the resources or the ability to look after their own telecommunications infrastructure, although local bodies in Otago and Southland are intending to address this issue, and Telecom NZ appears to be promoting the idea.

Box 5.1: The UK experience is instructive: regional licences to provide wireless internet access in the UK failed to attract bidders in the latest auction of radio spectrum.

This has led to fears of rural areas becoming 'business blackspots', because business will not be attracted to places where high-speed access cannot be obtained, and recommendations that telecommunications providers should be forced to extend their service to rural areas.

Government is, of course, intending to address access issues. In an announcement in May 2000, as part of its e-Government vision, Government said that:

> *"all New Zealanders will be able to gain access to government information and services, and participate in our democracy, using the Internet, telephones and other technologies as they emerge."*

It seems clear that satellite-based communication systems offer the best technical solution, although broadband wireless may, in the medium term, offer a satisfactory solution as well. Satellite services are technically feasible now, but the potential operators are doubtful that there is sufficient demand to support a viable service. A business case needs to be made to persuade potential operators that there is sufficient demand for these services to be commercially viable. This approach may be a better course of action than the use of regulation.

A pilot would be required to test both demand and pricing, before an operator could be expected to consider introducing two-way satellite-based services on a commercial basis.

5.2 Online market exchanges

The emergence of seller-driven online exchanges will help the primary sector increase the value it creates by enabling and encouraging product differentiation. There are a number of corollaries to this:

- independent certification of products and good business practice with respect to contracts are essential
- independent certifiers that are recognised by buyers are necessary in order for certification to be successful. These certifiers must also be able to certify traceability attributes
- current service providers and intermediaries may need facilitation to understand the need for change and the opportunities open to them
- farmers need skills and support to develop their businesses in this new environment.

All of these issues will eventually be resolved by the sector, but proactive communication by Government agencies aimed at raising awareness, educating the community and facilitating the changes needed could make them a great deal less difficult for all concerned. The operators of the new exchanges will do (and are doing) their best to assist their users, but they are driven by commercial imperatives, and will have limited resources to spare from their core business. The changes will benefit the entire community, which makes it appropriate for Government to provide leadership and facilitate the change process.

Online exchanges developed offshore have tended to be buyer-driven - listing criteria and presentation is often standardised. This forces commoditisation, and hence is extremely dangerous for New Zealand produce. Wool*pro*'s Woolnet exchange is seller-driven, but until similar exchanges become established in our other primary sectors, their produce is at risk of being commoditised.

Many of the current generation of online exchanges developed overseas (such as those provided by Ariba and CommerceOne) are driven largely by technology (the software has been developed, and is customised to each implementation) and are intended to benefit buyers. It is possible that the business-rule based exchanges being developed in New Zealand (such as Woolnet, Woodnet, and Global Ecomex, which are built based on a detailed knowledge of the sector and the nature of the products involved) will turn out to be a superior form of exchange, because they enable the benefits of online trading to accrue to all parties by specifically enabling producers and buyers to incorporate a variety of factors in contracts, thereby enabling differentiation.

5.3 Market Structure

All forms of structural rigidity limit the ability of the primary sector to respond to the opportunities presented by e-commerce. Several forms of rigidity have been referred to in Section 4.2, including regulations, current business models, producer boards, the need for aggregation, etc. This is of course a complex area, and Government's position as regulator and facilitator will need rethinking to minimise resistance to the changes implied by e-commerce.

The impact of structural rigidities will be to delay or prevent the transformation needed to realise the gains available from effective use of e-commerce. If New Zealand is slower to adapt than our international competitors, then our international competitiveness will be adversely affected and our economy will suffer.

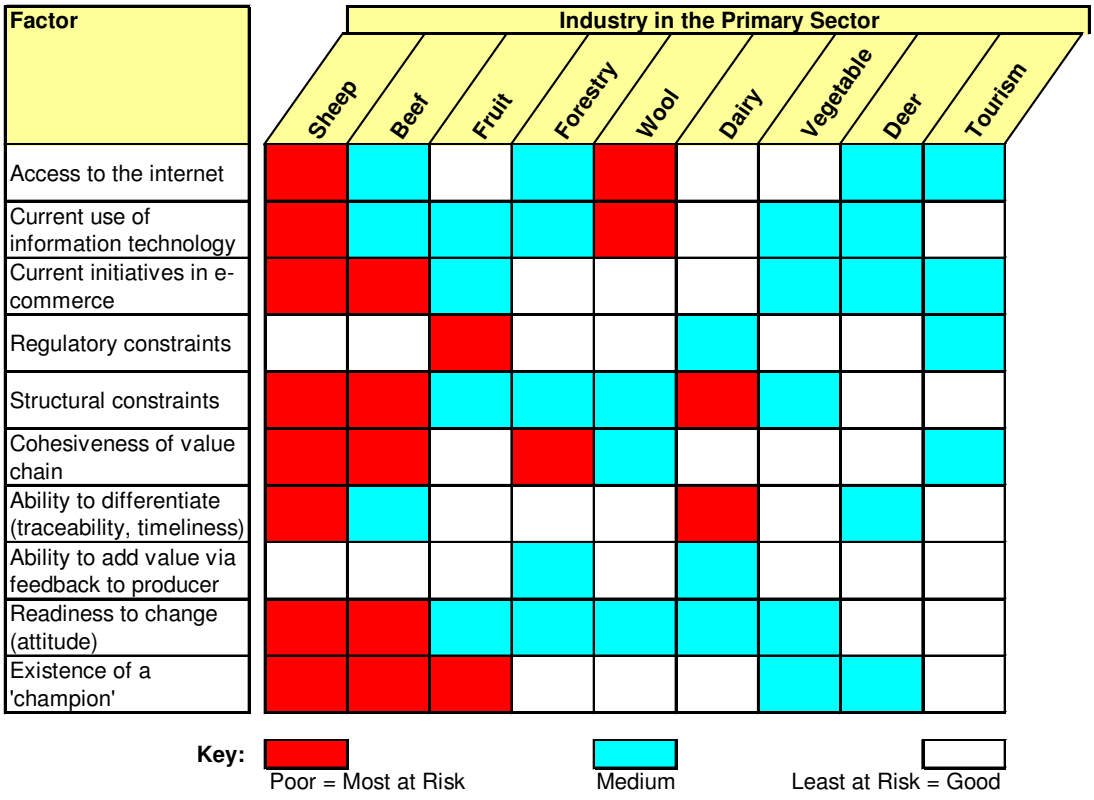
While structural rigidities must be addressed, the sectors must be made fully aware of the opportunity to regain some market power if the various players co-operate in marketing and other areas.

5.4 The Take-up of e-Commerce in the Primary Sector

The various industries that make up the primary sector have varying degrees of readiness for e-commerce, for different reasons. While there may be a number of factors involved, several appear to stand out (refer Figure 5.1). All of these factors have been used and illustrated in this Section.

Hard research to assess the exposure of each industry in the primary sector to risk and opportunity in relation to the introduction of e-commerce has not been carried out. A highly subjective view of their relative standing using these factors, based on interviews and observations at this point in time, is provided in Figure 5.1.

Figure 5:1: Assessment of E-commerce Readiness by Industry



This assessment reflects the significance, in our view, of:

- current business models in the meat industry, which focus on maintaining throughput at processing plants, and tend to disconnect producers from customers and consumers
- regulatory constraints in parts of the fruit industry, which may make it more difficult for them to change

- the complexity of the industry and the degree of co-operation that exists
- current e-commerce initiatives in the forestry, wool and dairy industries
- the proximity of the fruit, dairy and vegetable industries to urban centres, which enables better access to the internet.

5.5 Education and Awareness

New Zealand must take advantage of e-commerce by finding and taking opportunities to obtain premium prices for its primary produce. This requires a change in mindset for the many farmers who have not been particularly concerned with markets outside their farm gates (refer Section 4.2).

The rural community is likely to be affected by e-commerce whether it wants to participate or not. Inaction could result in commoditisation of primary produce by default, rendering the primary sector uncompetitive. With good preparation and facilitation, however, rural businesses could find and implement ways of attracting premium prices for their produce, increasing the wealth of the community and therefore its well-being.

All parties with any influence should be encouraged to do what they can to achieve the better result of the two.

5.6 Community Support

If community portals are going to evolve, the process would be made a great deal easier if there was a template available to follow, and a set of standards for organisations to use when interconnecting. Since these would be national templates and standards, there is a role for national bodies and Government to develop and promote these.

In many remote communities, there may be inadequate support for installation, for hardware and software problems, for training needs and for resolution of similar problems in the use of the technology. These services may need encouragement to become established (Box 5.1).

Box 5.1: People in rural communities need opportunities to expand their computing skills and share their experiences.

The SeniorNet model, which provides computer learning for the over-55s, may be appropriate in the rural setting. The club approach to training is based on experiential learning with peers as tutors and uses manuals written for the target student group.

Elements are present in the PioPio School programme, which provides community tutoring and Internet access.

5.7 E-Government

Since local and central government services are an essential part of the support structure for rural communities, current e-government initiatives should be progressed as fast as possible. Related services such as health, welfare and education should be packaged together. Interactive services need to be available online and integrated to make them easy for communities to use.

It is possible that standards established by government for integrating public services with other community resources available online will be used by the private sector as well.

There are several areas where e-government could provide specific support to the primary sector:

- Export businesses can be supported by:
  - establishing comprehensive information systems to provide key information held by both government and industry
  - ensuring a presence on key offshore portals that relate to New Zealand's export and tourism businesses
  - further enhancing Tradenz initiatives supporting e-commerce.

  These systems could be developed by industry and government in partnership (Box 5.2).

Box 5.2: 'Supermarket to Asia' is Australia's leading web site on food and fibre exports to Asia. It is a joint industry - government initiative to take advantage of the growing markets in Asia. [*Kennedy, 2000*]

It contains Food Connect, an e-commerce platform designed in partnership with Telstra for the Australian food industry to avoid multiple approaches and ease the cost of entry for Australian exporters, on a platform capable of delivering aligned export documentation, transaction tracking and payment.

- Successful uptake and use of e-commerce would greatly benefit from the establishment of a New Zealand e-commerce Information Centre.

  The Internet is characterised by an 'openness' that allows e-commerce to introduce a transparency to trading and information exchanges that has not been possible previously. Most sectors will need to re-engineer their processes, modify their business structures and position themselves much 'closer' to their consumers. Some may not have the resources or vision to do this, and it may fall to government agencies to provide the support needed.

  Corbitt and Thanasanki [2000] noted that Ireland and Singapore, considered the two most successful countries using e-commerce outside the USA, have both established advice centres for business, support for business with finance and grants, and web sites for ongoing support.

- There are a number of issues raised by e-commerce that may need to be dealt with at an inter-governmental level.

  Issues of immediate concern include the protection of information and the sharing of intellectual property held in scientific and other publications.

  The New Zealand government will be able to use the Internet to keep the local export businesses informed of both the tariff and non-tariff requirements of the countries to whom New Zealand exports.

Government has already declared its intentions in this area. An e-Government Unit was established in the SSC in July, and an e-Government Advisory Board subsequently formed. The Unit has been establishing foundations for e-government including:

> *"… policies and standards for data and system management …an interoperability framework for government agencies… a meta-data system and… a secure extranet."* [Hon. Trevor Mallard, address to the Government Online Conference, 6 December 2000].

The Government anticipates that during the next five years people will be able to electronically:

- register information with the Government (eg, births, deaths and marriages, land transactions)
- conduct their financial dealings with government organisations
- complete and send all government forms from one place on the Government's Internet site
- have their say on a wide range of government proposals and policies
- view land survey and title information
- notify changes of address (so that one entry on the Internet can ensure multiple Government agencies are notified automatically.)

It is likely that e-Government will reduce rural transaction and compliance costs. However, if e-Government becomes widespread through the general economy and there is no corresponding improvement in the rural telecommunications infrastructure, many rural people will not be able to participate. This problem will be compounded if government agencies close branch offices and centralise in response to e-Government.

5.8 MAF's Role

MAF exists to create opportunity and manage risk for New Zealand and the food, fibre, forestry and associated industries. MAF's roles are to:

- provide policy advice on the trading environment, sustainable resource use, and the regulation of product safety, biosecurity, and related, matters.
- administer the regulation of product safety, biosecurity and related matters
- provide services where Government needs to be the provider.

MAF is already involved in e-commerce/e-government through its internet-based service for application for health certification for meat, game and seafood products.

Electronic certification of seafood and meat exports is now being trialed with the objective of full industry application by April 2001 for seafood, and September 2001 for meat. Dairy quota management is also carried out electronically, while electronic provision of sanitary certificates for dairy product exports is planned for mid-2001.

MAF also provides a wide variety of regulatory, policy, resource, news and other information at its website, aimed primarily at the primary sector.

Box 5.3: In the UK, **MAFF** is examining its role in e-business. Present focus is on the Common Agricultural Policy arrangements in England and the setting up of a rural portal.

The **Portal Scoping Study** proposes a portal that builds on the 'MAFF brand' as a source of trusted information, that will provide a 'first-stop shop' and gateway to a full range of farming and rural information, as well as a gateway to interact with government as a whole.

MAF should take an active role in promoting e-commerce for a number of reasons:

- There is no obvious alternative party as well positioned to champion the broader interests of the rural community within government.

  Unless fostered, the rural community may become increasingly resource poor, which would have consequences for the health, wealth and welfare of the wider New Zealand community. The present strengthening of the economic outlook is associated with the increased export earnings of the rural sector.

- New Zealand has a large capital investment in the rural sector, which is highly significant to the economy (Box 5.4).

  Box 5.4: The rural sector produces more than **60% of export earnings**, and about **50% of employment in manufacturing** is downstream of the rural sector (ref Box 3.1).

  MAF must see that any impediments or limitations that impact on the productivity of the primary sector are addressed. It is important that New Zealand takes advantage of all opportunities to increase the speed and effectiveness of communication and reduce the effect of distance and location.

  The resources required to manage this investment base are increasingly going to be available through e-business channels. Any impediments to access national and global e-business resources could result in less than optimum management processes.

- MAF has accepted a wider responsibility for the rural community at large that extends beyond the production of food and fibre. The rural community will increasingly be able to support tourism, and will have to provide the ancillary goods and services required for the development of eco-tourism, adventure tourism, wine trails, farm tours, farm stays and cultural visits, etc.

  New Zealand needs to attract and retain innovative managers of its land resources, including its agriculture and forestry holdings and the extensive national estate under DOC management. Adoption and progression of strategies involving the internet will assist all sectors.

6. Recommendations

We recommend that MAF Policy adopt the role of champion on behalf of the rural community, and work with other groups to bring about the policy initiatives and other changes that have been described as necessary in this report.

We specifically recommend that MAF:

1. encourage the development of solutions providing rural communities with appropriate **access** to the internet

2. work with government agencies as they develop and implement strategies for **e-government,** to ensure that the e-government systems developed will be perceived as 'user- friendly' by the rural community (not presented from the Government agency's point of view).

   MAF should also influence Government to ensure that the systems used to solicit the rural viewpoint on government policies are such that innovative ideas promoted by industry thinkers and leaders are seen to be heard and acknowledged.

   The rural community interacts with government agencies for purposes in common with all citizens, but also for compliance and other specialist services which are not as much in demand in urban areas. All users will benefit from integrated or one-stop-shop services from government agencies with standardised common methods of interaction.

   The rural community needs representation to ensure that e-government services are designed and implemented to minimise its compliance costs. Best practice systems must be employed and 'ground truth' testing undertaken before they are introduced. This validation may involve the professionals used by farmers and foresters.

3. encourage the development of **technical standards and supporting infrastructure for product certification** for buyers using on-line exchanges.

4. encourage the development and management of a **primary production database** for agricultural, horticultural and forestry production units, enabling:

   - the collection of the basic statistical data required by planners and political decision-makers (while minimising the impact on producers by ensuring that unnecessary duplication is avoided).
   - improved management of **biosecurity (**if the database included contact details of producers), allowing the internet to be used for rapid communication with all affected producers in the event of an outbreak of an exotic disease.
   - the provision of real time management information to producers, potentially including performance comparisons using MAF's model farms, regional data, etc.

   Since the same core data describing the production unit may be required by several agriculture and forestry sectors, the provision and maintenance of a primary production database may be best provided by a government agency. AgriQuality currently provides a similar service, and may be an appropriate vehicle.

5. ensure that the rural community and other government agencies are aware of the risks of doing nothing, the risk of being forced into buyer-dominated exchanges, and the opportunities available through product differentiation.
6. work with government agencies to ensure that support is provided for those primary sectors that may not have adequate resources or skills to **re-engineer** their structure and processes to take advantage of e-commerce.
7. encourage the development of local **community-based portals**, by raising awareness, providing advice and assisting the development of a common national template.
8. liaise with MAFF in the UK on e-business developments, and for specific discussions on the proposed MAFF portal.

Appendices

1. Current E-Commerce Activity in the NZ Rural Sector

The number and range of e-commerce sites is growing rapidly. This list of websites includes those that enable e-commerce – there are a large number of 'brochure' sites. This list is illustrative of the range of e-commerce activity in the primary sector.

Agri-Fax www.agri-fax.co.nz	A commercial information service that provides New Zealand agricultural and other primary product prices using an extensive agricultural price database. These include lamb, beef and venison prices, wheat, dairy and wool prices, forestry and pine log prices, rural finance, fish prices, etc.
Ethical Agents Ltd www.ethicalagents.co.nz	Offering the latest information on pets and livestock, not to mention the most comprehensive range of health and nutritional products in New Zealand.
FarmIndex farmindex.co.nz	Offers services such as free community noticeboard, saleyard price listings, real estate listings, rural news, local and international news, health advice and long distance educational services for schools.
Forest Research **www.forestresearch.co.nz**	Provides technology information and solutions for the forest industries as well as links to overseas forest organisations.
Grazing Systems Ltd www.grazingsystems.co.nz	The worlds first and only online decision support service for pasture based livestock producers.
Kiwi Dairy Company www.fencepost.com	Fencepost provides information about daily milk production and quality data, market prices, news and weather; expert, unbiased farm management programmes; sharp deals on farm purchases, and opportunities for discussion.
Lavender NZ Ltd www.lavender-nz.com	Sells lavender skin and healthcare products.
Lignus www.lignus.co.nz	An electronic trading exchange for the wood industry.
Lilies by Blewden www.lilies.co.nz	The web site was created so that customers, both within New Zealand and around the world, could get easy access to the goods and services that Lilies by Blewden offer.
New Zealand Dairy Group www.RD1.com	Provides information and tools personalised to farming New Zealanders.
New Zealand Government **www.govt.nz**	Front end to all Government departments, including MAF (www.maf.govt.nz).
New Zealand Pork Industry Board www.pork.co.nz	This provides information to the pig industry both politically and on issue relating to the production and marketing of pig meat. Provides information on the Pork Quality Improvement Process and PigWin management recording packages.
Stocknet www.stocknet.co.nz	StockNet is New Zealand's first online information and listing service for the livestock industry, with listings of stock to buy and sell from farmers and agents from all over New Zealand.
Woodnet www.woodnet.co.nz	Networks the forestry and wood industry value chains globally, providing our community of users with purpose-built value-adding tools, integrating the entire wood sector, enabling online or direct trading of wood products.
Woolnet www.woolnet.co.nz	An independent internet-based trading system for New Zealand wool, open to all New Zealand-based traders.
Wrightsons www.wrightson.co.nz	Deals with forestry and livestock services.

2. Selected Offshore E-Commerce Sites of Interest to the Rural Community

The number and range of e-commerce sites is growing rapidly. This is a selected list of current sites, and should be treated as a snapshot at this point in time. It is not intended to be comprehensive.

Agribiz.net www.agribiz.net	Canadian web development firm headquartered in Guelph and with a sound knowledge of the agri-food sector. Has created a number of business-to-business on-line trading applications using several auction and selling models.
Canada's Forest Network www.forest.ca	Provides links to products, services, government, research et al and the rest of the world. Can source information on statistics, management, news, legislation, education etc. Discovered Forest Research, Rotorua under Asia/Africa/Australia heading!
FarmIndex farmindex.com.au	Offers services such as free community noticeboard, saleyard price listings, real estate listings, rural news, local and international news, health advice and long distance educational services for schools.
Farms.com www.farms.com	Provides various farm management tools and market information. Also resource information for farmers, chat shows, events calendar, career jobs etc. For Canadian and USA farmers. Now merged with Agribiz's e-harvest portal.
MAFF, UK **www.maf.gov.uk**	The website for the Ministry of Agriculture, Fisheries and Food in the UK covers topics such as statistics, regulations, publications, Information Asset Register, Open Government, news releases, e-business in MAFF, services to exporters, rural development, animal health & welfare, environment, consultation exercises etc.
National Farm Products Council www.nfpc-cnpa.ca	This is the web site for the Canadian government agency that oversees orderly marketing of sectors. This covers chicken and turkey for processors and eggs. The site has a clear statement outlining its privacy policy.
Rabobank www.rabobank.com www.vtraction.com	Established vTraction.com in Feb 2000 as an e-cooperative business-to-business company based on cooperative principles and located in New York. It will work with partners in the global food and agriculture market. Part owner of Agribiz.net below.
Supermarket to Asia Council www.supermarkettoasia.com.au	Supermarket to Asia is a joint industry and government initiative, established by Prime Minister John Howard, Australia to help food producers take advantage of the growing markets in Asia.

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4. Interviewees

Enablers:	
Ericsson	Arran Chuntlan
Optus Networks Pty	Tony Hill
Sky Television	Andy Huljich, John Simmons
Telecom Communications	Bruce Parkes
Facilitators / Researchers:	
Massey University	Catherine Wallace, Tom Prebble
Ministry of Agriculture and Forestry	Irene Parminter, Godfrey Gloyn
Ministry of Economic Development	Reg Hammond
NZ Food Marketing Institute	Oswin Maurer
Industry Groups:	
Federated Farmers	Catherine Petrey
Forestry New Zealand / Woodnet	Peter Berg, Stuart Orme
Forest Industries Council	James Griffiths
Fruit Growers Federation	Sue Pickering
Meat & Wool Board Economic Service	Rob Davison
Meat New Zealand	Neil Clarke
New Zealand Dairy Board	Brian Sharpe
New Zealand Pork Industry Board	Frances Clement
Vegetable & Potato Growers Federation	Peter Silcock
Service Providers:	
Advantage Group	Philip Verstraaten
Agri-Fax	Rod McKenzie
Clutha District Council	Ciaran Keogh
Environment Canterbury	Neil Pilbrow
Environment Waikato	Chris Samson
Farmers Mutual	Roger McEwan
Fletcher Challenge Forests	Bryce Whitcher
Global Ecomex	Matt Barker
HortResearch	Dorian Scott, Richard Campbell, Jack McKenzie
Lilies by Blewden	David Blewden
MG Ltd	Tony Walsh
National Bank	Mark Peterson
NZ Correspondence School	Alistair James
NZ Dairy Group	Neal Murphy
NZ Post	Peter Miscimmin
Outlands Export Ltd	Jim Gray
PPCS	Stewart Barnett
Pyne Gould Guinness	Hugh Chapman
Rabobank Group	Alister Bennett
Rangitikei College	Keith Scott
SGS	Roger Judd

Service Providers (continued):

Taupo District Council	Mark Lester
Turners & Growers	David Kenchington (contractor)
WoolPro / WoolNet	Lance Wiggins, Richard Gardner
Woolworths NZ Ltd	Carmel van der Veen
Wrightsons	Simon White
Zespri International	Bob Martin

5. Glossary of Terms

aggregation	Grouping like products to achieve critical mass so as to satisfy market demand
Broadband, bandwidth	transmission medium that is able to carry a large quantity of data (commonly thought of 'high speed' transmission)
bundled	collection of services that are tied together
community portal	web site that offers a range of content and services geared toward a particular community
e-commerce	buying and selling goods and services over the internet
e-government	carrying out government related business over the internet
electronic data interchange	transfer of data using computers
horizontal portal	Web site that offers a broad range of content and services
'just-in-time' business	the acquisition of goods and services just as they are needed
liquidity	In the context of markets – greater liquidity suggests a more perfect market, where prices are less likely to be constrained by a lack of buyers or suppliers. Greater liquidity promotes better price discovery
portal	Web site acting as a one-stop-shop for a particular community or sector, with a packaged set of content and services
price discovery	transition from a general price level to a specific price for product with particular attributes
proprietary	Product registered and/or held in private ownership, often implying that prices are held higher than they would otherwise be
supply chain	The system through which goods and services are acquired by a particular enterprise
supply chain services	The services that are provided to a particular enterprise that will enable it to perform its business
traceability	Provision of information (and tracking systems) to provide source, life history and other information demanded by high yielding market segments
vertical portal	Web site with a tightly focussed content area geared toward a particular audience