

DELIVERING BUSINESS INTELLIGENCE FOR REGIONAL TOURISM IN AUSTRALIA: ANALYSIS OF THE DECIPHER TECHNOLOGICAL INNOVATION

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ABSTRACT

Decipher is an online information system designed to deliver research and business intelligence to Australian tourism organisations. Critical to the success of Decipher will be its uptake by small regional tourism enterprises and local tourism associations. These organisations have traditionally faced the greatest barriers to accessing and applying business intelligence. This paper argues that, in order to be in a position to contribute to the capacity to foster and employ innovation in an industrial system, an online information system such as Decipher must first be accepted and adopted as an innovation itself. The literature suggests that certain structural elements including: economic and social capital; fostering of entrepreneurship; development of networks and clusters; and access to public and private sector partnerships can be introduced into the system to facilitate adoption of innovations such as Decipher. However, there are events outside the control of technology developers which may influence the capacity of the system to choose to adopt an innovation or to select between alternative innovations

INTRODUCTION: THE DECIPHER ONLINE INFORMATION SYSTEM

Decipher is an online information system designed to deliver research and business intelligence to Australian tourism organisations. Decipher has been developed by the Cooperative Research Centre for Sustainable Tourism, a formal research partnership between fifteen universities, State and Territory tourism commissions, tourism industry associations and conservation agencies. The authors of this paper are actively engaged in the development, testing, and roll-out of Decipher. Development of Decipher commenced in 1999 (Sharma, Carson and DeLacy 2000), with a prototype which was launched in 2001. The project is now proceeding towards a full, commercial system (due for release at the end of 2003). Decipher catalogues a broad range of tourism statistics and research publications, and delivers these over the Internet for access by: State Tourism Organisations; regional and local tourism associations; industry associations; consultants; financial advisors; investors; and

small and medium tourism enterprises. Critical to the success of Decipher will be its uptake by small regional tourism enterprises and local tourism associations. These organisations have traditionally faced the greatest barriers to accessing and applying business intelligence (Sharma and Carson 2002). To assist in uptake, Decipher includes a range of applications which allow information to be delivered in context.

Information and communications technology (ICT) play an important role in building the knowledge capital of industrial systems, and consequently their capacity to foster and employ innovation (Breschi and Malerba 1997). Over the past five years, online technologies have been at the forefront of ICT development, including applications for tourism (Frew 2000, Carson, Sharma, and Waller 2002). This paper argues that, in order to be in a position to contribute to the capacity to foster and employ innovation in an industrial system, an online information system such as Decipher must first be accepted

and adopted as an innovation itself. While the literature suggests that certain structural elements can be introduced into the system to facilitate adoption of innovations such as Decipher, there are events outside the control of technology developers which may influence the capacity of the system to choose to adopt an innovation or to select between alternative innovations (Storper, 1995). Technology developers need to consider the capacity of the system to adopt their innovation, but they must also be prepared for the innovation to fail despite its apparent technological superiority and clear market need.

SYSTEMIC REQUIREMENTS FOR TECHNOLOGICAL INNOVATION

Innovation is the process of developing new products or processes, the accessing of new markets or new suppliers, or the implementation of new methods of industrial organisation. According to Edquist (1997:1), "innovations are new creations of economic significance." They may be brand new or developed from a combination of existing elements. The innovation process is not a linear one, but involves complicated feedback mechanisms encompassing science, technology, learning, production, policy, and demand.

The study of innovation in economics takes its inspiration from the work of Schumpeter (1975) in the early and mid twentieth century, who argued that firms which remain competitive and sustain growth may enter into dynamic patterns of innovation. The inspiration for innovation comes from recognition of product or process weaknesses or potential opportunity in the marketplace, and the seeking of better solutions to technological problems.

Beyond the individual firm, systems of industrial activity at local, regional, national, and global levels may seek to innovate to solve collective problems (Cooke and Morgan 1998). Innovations are more likely to affect firms and other agencies collectively, rather than individual firms in isolation. If an individual firm is able to successfully bring to market a new product, all agents in the marketplace (including consumers, suppliers,

and intermediaries) are affected (Storper, 1995).

This systems view of innovation has been described in the literature with increasing frequency since the early 1990s (for a review, see Edquist and McKelvey 2000). The bulk of systems of innovation research have focused on the structures and characteristics of systems deemed to have high innovation potential (ie. they are able to select and implement innovations which produce favourable economic outcomes for the system as a whole). These include:

Economic competence: Economic competence provides the resource management (including financial resource management) skills required to successfully innovate (Carlsson and Stankiewicz, 1991; Breschi and Malerba, 1997; Saxenian, 1996).

Resource clustering: Physical closeness enhances the capacity to share tacit knowledge, and increases the speed at which innovation can be diffused (Malmberg and Maskell, 1997; Porter, 1998; Cooke and Morgan, 1998). Clusters are likely to comprise of customers; suppliers; knowledge providers; intermediaries; private sector associations; and public sector organisations (Cooke et.al., 1997; Breschi and Malerba, 1997).

Networks: Nelson (1996) argued that the social and professional interactions between organisations in a system of innovation are more significant in innovation than physical proximity *per se*. Well functioning networks include trust, knowledge sharing, and collaboration (Malmberg and Maskell, 1997).

Entrepreneurship: Given the existence of either clusters and/or networks, Carlsson and Stankiewicz (1991) recognised that the innovation process requires a leader who can provide the vision and take the risks necessary for change.

Critical mass: Entrepreneurship includes the capacity to take risk and to have some innovations (and the firms they are linked to) fail. For a system to be able to absorb failure there needs to be a critical mass of organisations.

Public/ private sector interactions: The various levels of government are usually key players in systems of innovation (Cooke and Morgan, 1998). They not only determine key aspects of the system environment through policy, regulations, and legislation, but they actively engage the system as users of many technologies, and occasionally as producers (Carlsson and Stankiewicz, 1991).

Production and distribution of knowledge: Systems need not only to capture relevant information from within and without, but to produce new knowledge to enhance the capacity for cumulative innovation (Breschi and Malerba, 1997; Edquist, 1997).

Social and cultural capital: Macbeth (1997) recognised that new initiatives require social 'will' and energy to be developed and implemented. Social capital is in many ways more difficult to harness than economic capital. It is intangible, and the responsibility for its maintenance does not rest with any single individual or organisation (Putnam, 2000).

The neo-classical view of economic and industrial systems (which argues that systems adopt the innovations which maximise economic returns) is insufficient for understanding the unique ways in which industrial systems develop (Marshall 1947). Similar systems may adopt differing innovations and develop in different ways because: history matters; the system matters; and knowledge matters.

History matters: According to Cooke and Morgan (1998), innovations produce new resources, meaning economies dynamically shift from state to state, rather than subject to a finite resource set. Similarly, economies become 'path dependent'. That is, once a course of action has been selected, that selection influences the courses of action (known as 'choice sets') available at future points in time (Edquist and McKelvey 2000).

Of particular importance to the study of systems of innovation is that the structure of the system itself is subject to change over time. The structure may be underpinned by formal or informal routines and processes that affect which agencies are engaged in the

system, how business is done, what networks are formed and so on (Malmberg and Maskell, 1997). The statement that 'history matters' calls attention to the need to consider the states, choice sets, and selections of the system over time to be able to understand its development and potential.

The system matters: Firms rarely innovate in isolation, and innovation requires complex feedback loops and iterative learning processes involving a collection of agencies (Edquist 1997; Cooke and Morgan 1998). Systems may exist at any geographic level, and may have a variety of core activities. Some elements of industrial systems are consciously designed, while others appear as 'accidents of history' or association. System boundaries are usually very difficult to specify, and even systems with similar purpose and geographic scope will contain different elements (Edquist, 1997). Relatively closed systems are subject to fewer externalities, while relatively open systems tend to be more dynamic in their make-up, and to have membership across geographic and even sectoral boundaries (Freeman, 1995). It is not only the membership of systems which is important, but the way in which elements in the system interact (Edquist, 1997).

There is a high level of agreement in the systems of innovation literature as to what sort of elements make up a system (see, for example: Cooke and Morgan, 1998; Edquist, 1997; Freeman, 1995; Lundvall, 1992; Niosi et.al., 1993; Malmberg and Maskell, 1997). Elements may be organisations – physical entities such as firms or government departments, or institutions – the laws, health and other regulations, cultural norms, social rules, technical standards, and conventions etc. which influence the behaviour of the system. Industrial systems focus on private-for-profit firms (Niosi et.al., 1993).

Freeman (1995) identified that elements within a technological system may be linked in many ways. These include –

- Through financial flows;
- Through research partnerships;
- Through linkages established via legal and policy environments;

- Through information and communication flows; and
- Through social flows (including mobile workforces);

According to Cooke and Morgan (1998) effective systems rely on trust and commitment. All participating organisations need to understand the interdependencies and the boundaries of interdependencies to be able to function effectively. In the same way, the system needs to be able to provide incentives for building trust relationships if innovative collaboration and competition is to be fostered. The policy environment provides such incentives, as does the actions of industry associations, marketing agencies and so on (Patel and Pavitt 1994). The potential for systems to innovate differs according to their membership, linkages, and history. Potential may also be determined by access to knowledge about the system and its technologies (Malmberg and Maskell, 1997).

Knowledge matters: Except where innovation selections are random, non-purposive or entirely the result of externalities, solution seeking is enhanced by knowledge about the nature of the choice set, the history and state of the system, and the likely implications of selections. Even where selections are not purposive, knowledge is required to respond to innovation and re-stabilise the system. Systems with better access to knowledge tend to be more sustainable and better innovators (Freeman, 1995, Bailey and Clarke 2000, Kelly 1997).

Neoclassical economics assumes that agents have perfect information available which allows for selecting optimum solutions. However, it is clear that each agent in the system has access to different types of data, and consequently different levels of information (Cooke and Morgan, 1998). Following Beckman's hierarchy (Beckman 1999) it can be assumed that different agents possess different levels of knowledge, expertise and capability. Consequently, different access to knowledge is a critical source of diversity among and within systems.

Imperfect access to data is one issue in evolutionary economics. Another is the

differences in processes by which agents in systems analyse data and apply knowledge. The process is broadly defined as 'learning'. Cooke and Morgan (1998) identified two orders of learning. In the first order, systems learn to do existing tasks more efficiently. In the second order, systems learn to do better things. Innovation potential also involves the distribution of knowledge throughout systems (Edquist, 1997) which ties systems of innovation approaches to concepts of knowledge management.

Existing and new knowledge may be accessed from all of the organisations in the system, and from experiences of similar systems (similar in sectoral activities, operating environments etc.). Knowledge may be highly codified (usually making it relatively easy to distribute) or tacit. It may be globally relevant to the operation of sectors, or focused on local circumstances. It may apply to general processes of innovation, or be specific to a single aspect of production or diffusion. It may be developed in a cumulative way, or new knowledge may appear 'out of the blue' (Niosi, et.al. 1993). In all these circumstances, systems are challenged to: identify what knowledge may be relevant to problems (even poorly understood problems); make that knowledge available throughout the system to increase expertise; and develop processes to creatively apply expertise through innovation.

Decipher is an attempt to address knowledge management deficiencies in the Australian tourism systems through more efficient delivery of codified data and information relating to common business and management problems. Decipher also encourages organisations involved in regional tourism to become increasingly sophisticated in the identification of knowledge needs and in their capacity to capture and manage their own data. To realise this vision, Decipher must itself be adopted as an innovation by Australian tourism systems.

THE INFORMATION NEEDS OF AUSTRALIA'S REGIONAL TOURISM SYSTEMS

Like all industrial activities, tourism involves the activities of a variety of sectors.

Discussion of tourism as an industry has persisted for many years. Some authors have suggested that tourism is not an industry, but a collection of industries (Bull, 1991), while others have argued that tourism is a set of markets, rather than an industry (Sinclair and Stabler, 1991). There is no doubt that the industrial aspects of tourism are difficult to define and then measure. This is because tourism as an industrial activity needs to be bound by the distribution and consumption of goods and services which have the intention of supporting or causing tourism (Stear, Buckley, and Stankey, 1988). A number of sectors are involved in these activities (Australian Bureau of Statistics, 1997), including: package travel; accommodation; food and drink; transport; recreation and cultural activities; and shopping.

A range of enterprises are responsible for providing tourism products and services (Stear, Buckley, and Stankey, 1988). In addition, suppliers interact with intermediary associations, regulators, and public and private sector tourism marketers. The ways in which these suppliers and other organisations interact, and the institutional context in which they operate may be seen as constituting a tourism system. The imposition of regional political and administrative structures, and the pervasive concept of tourism 'destinations' (Leiper, 1995, Hudman & Hawkins, 1989) suggests that regional tourism systems may be seen to exist.

Regional tourism systems may be spatially based on: Local Government areas; State Tourism Organisation identified tourism regions; combinations of Local Government areas; and regions defined by collaborations of enterprises (Kelly, 2002). They are also likely to be sectoral systems, identifiable by their desire to produce goods and services for specific markets (visitors).

While much of the research into systems of innovation has focused on manufacturing and technology sectors, it has been recognised that primarily service oriented sectors also benefit from innovation potential. Freeman (1995) note that service sectors face added barriers to innovation given the intangible nature of their products, the dominance of small and micro enterprises in product development and

delivery, and a poor history of knowledge acquisition through research and development initiatives.

There has been some past research on the information needs of key agents in Australia's regional tourism systems. The Centre for Regional Tourism Research (Prosser 2000) conducted a national research roadshow in 1999. The roadshow included participation from over 500 regional tourism operators and association managers. In 2001, the Centre hosted the Australian Regional Tourism Convention in Port Macquarie (Kelly, 2001). The Convention included a national forum which identified the broad information needs of regional and local tourism associations. The results of these two initiatives were supplemented by a series of five focus groups held throughout late 2002 and early 2003 to determine the current data or information needs in regional tourism, and the perceived barriers to obtaining and using this information.

Workshops and focus groups were conducted in Adelaide, Lismore, Canberra, Ballina and Sydney with participants stemming from State Tourism Organisations (eight participants), Regional Tourism Organisations (thirteen), Local Tourism Organisations (twenty-four), industry associations (seven), and individual tourism businesses (eighteen).

The questions used to stimulate discussion within the focus group sessions were derived from organisational and knowledge management literature (Soo et al, 2001; Beijerse, 2000). These questions included:

What do you believe are the current local level information / data needs?

What would you use this information / data for?

What are the current barriers to gaining and using this information / data?

All three investigations demonstrated the difficulty organisations (particularly small

Nature of Information	Application
Industry performance information Competitor information (number, size, location, facilities)	Business planning and performance monitoring Financial plans/ forecasts
Activities undertaken by key markets Product capacity Population profile	Product development decisions Feasibility statements Destination management activities
Key markets analysis Market trends/ growth Advertising/ marketing campaigns	Sales and Marketing Marketing plans Monitoring market share
National and state economic indicators Stock exchange data	Corporate governance Internal reporting Annual reports
Employment/ labour force data Investment statistics Visitor expenditure Forecasts	Lobbying Evidence for investors Funding submissions Economic impacts assessment

Table 2: Data and Information Needs of Regional Small Tourism Firms and Local Tourism Associations

businesses and local tourism associations) experienced in articulating their data, information and knowledge needs. For the focus groups, it was necessary to construct scenarios where participants could discuss their decision making processes and distil data and information needs accordingly. Table 2 summarises the results of the focus groups (augmented with material from the 1999 roadshow and 2001 Australian Regional Tourism Convention) according to the nature of data or information required and the applications of that data.

Significantly, local tourism associations and industry associations recognised their role as information intermediaries, which meant they desired access to information that they did not have a direct application for, but which was required to satisfy requests from members (usually small firms), students, media and so on.

DELIVERY OF BUSINESS INTELLIGENCE AND RESEARCH INFORMATION BEFORE DECIPHER

The delivery of business intelligence and research information to regional tourism has been influenced by: the range of information providers; the format and nature of data and information; the scope of information; pricing and access structures; and delivery

technologies. Suppliers represent: government agencies; industry associations; consultancy firms; research agencies; and enterprises themselves. They range from tourism focused, national organisations such as the Bureau of Tourism Research and broad based data agencies such as the Australian Bureau of Statistics to small localised agencies with data collections such as Visitor Information Centres. Information is provided in varying forms –

- Statistical collections (unit record files)
- Numerical tables (summaries of URFs etc.)
- Charts, maps, or other manipulable images, and static images
- Unpublished reports/papers (ie. with flexible formatting)
- Published reports/papers (inflexible formatting)
- Newsletters/brochures/interpretive ('bites' of information)
- Multimedia formats

Information may be about: visitors; products; host communities/ destinations; places of origin; and product distribution (Carson and Sharma 2002). Information can be provided free of charge, or priced on a 'per copy' or

subscription basis. Delivery has been dominated by hard copy publications distributed through libraries and tourism agencies. There are a small number of single collection data manipulation software packages including the Bureau of Tourism Research CD Mota package. Some applications have been developed which can handle multiple collections and publications including the Australian Bureau of Statistics Ausstats online information system. Distribution online has mainly been of free publications, with some e-commerce by the Australian Bureau of Statistics through Ausstats and the Cooperative Research Centre for Sustainable Tourism through its online bookshop.

The focus groups identified barriers to effective access to, and application of information as being:

Poor user awareness of information availability;

The need to access a variety of sources individually leading to increased information costs;

Many potentially valuable information providers do not have well developed distribution strategies, meaning that access to their information is difficult;

Users are generally suspicious of the quality of information, especially from lesser known sources. This is a particular concern in relation to information about small areas;

Timeliness issues associated with access to Australian tourism business information. These arise not only from delays in publishing information, but from time issues involved in identifying information suppliers, making contact with suppliers, and arranging delivery of information and payment where applicable; and

The expressed need for *knowledge and information* rather than raw *data*. Many users and potential users lack the resources to undertake additional research/analysis to transform data into knowledge, and to apply data to common business and management tasks.

Factors identified as strengths of the existing information distribution models were:

The amounts of information associated with each of the information needs expressed by tourism organisations;

The range of information sources provides a diversity of views and a 'critical mass' of data sources; and

Attempts to interpret information and research are reflected in newsletters etc from various agencies, and so there is some foundation for contextualised delivery.

It is important to recognise that, on the whole, there is a range of quality information relating to topics of importance to the tourism industry. The issues are not so much in terms of availability of information, therefore, but in facilitating access to information under conditions which take into account the key observations here.

THE INNOVATIVE CHARACTERISTICS OF DECIPHER

Decipher is similar in aim and scope to systems developed in Canada, Austria, and Spain (Sharma, Carson and DeLacy 2000), but it has been developed with very different information management protocols. Decipher contains more than 1000 information 'packets' from more than sixty suppliers representing each of the supplier types identified in the previous section. Information packets are: tables, maps, publications, html pages, hyperlinks and so on. Packets are delivered through a number of pathways, which create context. For example, 'resource areas' are structured collections of packets aimed at meeting the information needs of specific user groups.

The technological soundness of an innovation may be described by its capacity to address weaknesses in the current technology, while maintaining or enhancing the strengths. Table 3 summarises the characteristics of Decipher which achieve this.

Strength	Characteristic
Information on multiple topics	Information packets are catalogued according to the National Tourism Information Model (Sharma and Carson 2002) Organisation of packets in resource areas and other pathways Over 1000 discrete information 'packets'
Range of sources	Arrangements with more than 60 suppliers Suppliers covering regional, State and national information
Range of contextualised information formats	Capacity to distribute packets in varying formats – tables, maps, charts, web pages, links, pdf documents, web based applications etc.
Weakness	Characteristic
Awareness of information availability	Automated reporting identifies common information needs and alerts users to new packets according to those needs Multiple pathways to information help expose users to new sources
Common access point	Access to 1000+ packets from 60+ suppliers
Distribution strategies	Single point of access Engagement of key industry and government organisations in roll-out
Data quality	Metadata management tools Local data collection tools
Timeliness	Reduces dissemination time via instant upload
Information and knowledge production	Pathways designed to create context

Table 3: Contributions of Decipher

In addition to these contributions, a substantial technology testing regime ensures that the Decipher technology is robust. Decipher is not able to address some of the weaknesses of existing information distribution, in particular: issues with the time lags between data collection and release; and the need for more comprehensive data sets for small areas. Despite this, Decipher is a clear improvement over existing information delivery models. This has been acknowledged by the financial support for Decipher from all State Tourism Commissions in Australia, and the active engagement by the key information suppliers on the Decipher Steering Committee or through negotiated supplier arrangements.

CONCLUSIONS: AN ASSESSMENT OF THE IMPLEMENTATION POTENTIAL OF DECIPHER

'Implementation Potential' can be described as the likelihood that a particular innovation will

be adopted in the system it was intended for in a way similar to its intended purpose.

Decipher represents an improved technology which is being developed in consultation with key organisations in Australia's regional tourism systems. Decipher meets a regional tourism need consistently identified as high

priority (see, for example Department of Industry Tourism and Resources 2003; Prosser 2000). In the neo-classical view, this market demand and product superiority would be considered sufficient for successful implementation as the current 'optimal' solution to the problem of poor information access. However, the history of national online tourism initiatives in Australia is one of difficulty in achieving widespread uptake (Danielle, Mistilis and Ward 2000, Sharma, DeLacy and Carson, 2000). There is no guarantee that Decipher will achieve its implementation potential. Table 4 identifies potential barriers to implementation, highlighting the importance of the innovation potential of the industrial system.

System Characteristic	Threat to Decipher Implementation
Economic competence	Poor history of users (especially small firms and local tourism associations) purchasing research and business intelligence threatens the commercial viability of the application
Resource clustering	Spatial dispersal means it will be difficult for potential users to hear about Decipher and to see it in operation. This has been identified as a key barrier to all ICT uptake in regional tourism (see Sharma and Carson 2002, Carson, Sharma and Waller 2002)
Networks	Poor contact between the proponents of the innovation and the desired users resulting from the large number of small firms with relatively poor ICT skills (Kelly 2001, Kelly 2002)
Entrepreneurship	Requires 'champions' (Sharma and Carson 2002) from key user groups and leadership from commercial (rather than R&D) organisations.
Critical mass	Inability to achieve critical mass of users has been vital to the performance of previous initiatives.
Public/ private sector interactions	The policy environment has identified the need for Decipher (Department of Industry Tourism and Resources 2003), but the institutional structures have historically focused on promotion. The nature of the interactions between these structures and potential Decipher users will need to change.
Production and distribution of knowledge	Fundamental flaws in the existing system that Decipher can't address may be the ones which are mission critical timeliness, regional quality and so on. Capacity to use information not only affected by access to it, but by the skill sets of operators etc.
Social and cultural capital	There is poor understanding of the degree to which potential users are willing to change their behaviour to make use of Decipher. Technological innovation may be influenced by the inertia of key agents (see Gretzel 2000; TTF 2002).

Through the Decipher case study, some of the barriers to implementing innovation in the relatively open Australian regional tourism systems have been identified. These barriers may influence the implementation of Decipher, particularly its uptake by small regional tourism firms and local tourism associations. The case of Decipher relates to attempts to implement innovation in many of the dispersed, small firm dominated industries common in regional areas because. Investment is made in technological solutions to widely recognised problems. However investment is also required in the innovation potential of the industrial system into which the technology is to be introduced. Policy makers, industry associations, and R&D organisations must find ways to address deficiencies in the organisation and behaviour of the system as

well as they find ways to address technological deficiencies.

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