

Towards Sustainable Freight Logistics in Desert Australia: A Framework for Analysing Options that Meet Economic, Environmental and Social Demands

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Abstract

Establishing supply chains to improve delivery of goods and to source Aboriginal produce and on-sell products from remote communities offers significant opportunities for sustainable development and improved livability in remote communities. It also forces a revision of what constitutes efficient freight logistics in desert areas.

In addressing challenges for freight services in Desert Australia the main research objective is to develop a methodology for evaluating current freight logistics using a set of metrics incorporating economic, environmental and social parameters.

The structure of existing freight logistics models (generally based on algorithms of time, distance and cost) does not allow for the incorporation of environmental and social elements into an evaluation. Furthermore, the relevant literature demonstrates the shortcomings of this approach. Consequently, the paper outlines an extension of the Balanced Scorecard (BSC) approach to performance management (Kaplan &

Norton, 1992). The interrelationship of the four existing perspectives contained within this multi-dimensional performance measurement (MDPM) model have been extended to include social and environmental aspects.

Introduction

Freight services play an important role in providing all communities with equitable access to goods and access to markets for their produce. Remote communities with small populations generally have lower freight demands and higher freight costs than metropolitan communities, usually leading to less frequent though more costly freight services. This impacts on the types of small and medium enterprises (SMEs) which can be established in remote areas and their long term viability. The quality and frequency of freight services is also a major influence on the movement of people from remote communities to and from regional centers.

Australia is regarded as the “driest inhabited continent” (Thorne, 2005, p. 42). It is also a highly urbanized nation with the vast majority of the population living in the major cities of the East and South East, and in the South-West (ABS, 2008). The population density ranges from 8,100 people per square kilometer in East Sydney Local Statistical Area (LSA) to less than one person per square kilometer in more than 250 LSAs (ABS, 2008). Australia has a land area of almost 7.7 million square kilometers and, in distance, stretches more than 3500 kilometers from north to south and almost 4000 kilometers from east to west (ABS, 2008). European settlement was initially concentrated on the colonies established by the British Government from 1788 and exploration of the interior of the country was not completed until the end of the nineteenth century. Transcontinental roads and railways are limited in number and, in many cases, transcontinental highways have been sealed with bitumen just in the past 50 years. The nation’s capital cities have only been linked by rail since 2004.

Australia’s Aboriginal people migrated to the continent somewhere between 60,000 and 120,000 years ago. They occupied the land until 1788 when the first British colony was established on the site of Sydney. Apart from very occasional earlier contact with Europeans, the Aboriginal occupation was unaffected by global developments. However, once this occupation began in the late eighteenth century, the Aboriginal population of Australia has been ravaged by the “spread of introduced diseases ... and

... decimated, relocated, assimilated and emancipated” (Taylor, 2005, p. 66). The Aboriginal population is only now returning to its population size at the time of European settlement (Taylor, 2005). They are also the majority occupiers of the remote areas.

Improvements to freight services to remote desert communities are needed and, if achieved, can be expected to have a significant positive impact on community wellbeing, particularly in relation to access to improved fresh food and opportunities for generating autonomous income. The latter could be a key component of breaking intergenerational reliance on income support, and would provide multifaceted benefits associated with the psychosocial factors linked to many endemic health issues experienced by Aboriginal Australians (Berry *et al.*, 2007).

The central research problem reported in this paper is concerned with addressing the question: Can freight into and out of remote communities meeting stated needs and expectations be profitable or at least break even? Related questions include: What are the most sustainable modes of freight logistics for servicing remote desert communities in Australia? How is sustainability defined for freight logistics in Desert Australia? What are the key outcomes sought by remote communities from freight service providers? Does an evaluation of environmental and social parameters, together with financial parameters, support the introduction of a revised framework for the provision of freight services in Desert Australia? Furthermore, this paper will contribute to an increased understanding of how small businesses and small business networks can more effectively deliver livelihoods for desert people based on use of natural and cultural resources. Finally, it will allow scenario planning and analysis for the provision of services delivery in ways that are economically responsible, environmentally sound and socially appropriate.

Background

A number of reports, surveys and investigations have been conducted into the nature of transport and the costs of freight in Australia and, in particular, the Northern Territory (Walker, 1942; AIPS, 1956; Williams *et al.*, 1984; Abelson, 1986; Luck and Martin, 1988; BIE, 1992; BTCE, 1992; Abrams *et al.*, 1998;). To date, all of these evaluations have been primarily of an economic focus – finding that costs and issues are generally similar in nature to other long haul freight throughout Australia while operating on

bitumen sealed roads (BSRs) or utilizing railroads. However, once services leave a BSR to supply goods to remote communities only accessible by dirt track (sometimes seasonally impassable) or by aircraft, the situation changes significantly.

A Senate inquiry conducted by the Rural and Regional Affairs and Transport References Committee into Australia's future oil supply and alternative transport fuels notes in its September 2006 interim report: "Recent sharp rises in the price of oil have served to demonstrate that there are significant sectors within Australian society who have limited capacity to cope with sustained high oil prices" (RRATRC, 2006, p. 11).

A study by Dodson and Snipe found that those Australians most affected by high fuel costs are those who "tend to be those in socio-economically disadvantaged outer-suburban locations and those on the fringes of urban areas and in regional and remote communities" (Dodson & Snipe, 2005)

These findings illustrate the range of issues to be considered in conjunction with financial perspectives when evaluating freight logistics in Desert Australia.

A Sustainable Transport and Logistics Model

A review of the literature, which is beyond the scope of this paper, suggests that social and environmental considerations are rarely considered as part of an integrated approach to sustainable provision of freight services. The outcomes of this research will provide conclusions and recommendations supported by modeling and analysis based on Triple Bottom Line (TBL) principles. This aims to provide a means for evaluating the efficiencies of current freight services and identifying opportunities to generate improvements through greater integration.

For example, a Freight Transport Logistics industry steering committee (2002) noted that freight logistics extend market reach by giving manufacturers access to a wider range of raw materials and supplies from different sources. It also provides consumers with access to a wider range of domestic and international goods and services, while reducing waste in production, consumption and capital expenditure" (Industry Steering Committee of the Freight Transport Logistics Industry, 2002, p. 1). Remote communities with small populations that are not on major freight corridors

generally have low levels of freight demand, which results in less frequent freight services and higher freight costs. This impacts on the types of SMEs that are established and their ability to operate sustainably in these communities.

The transportation industry is a major contributor to environmental degradation through its modes, infrastructures and traffic (Bannister, 1993; Whitelegg, 1993). During the 1990s, numerous studies, reports and opinions were published which suggested how the environment could be incorporated into the logistics industry (Muller, 1990; Tanja, 1991; Murphy *et al.*, 1994). Furthermore, a review of the logistics industry undertaken in 2001 (Rodrigues *et al.*, 2001) reports that the logistics industry was focused on new market opportunities, at the expense of the environment. The scale of this degradation is exemplified by World Resource Institute research, in Thomas *et al.* (2008), who report that greenhouse gas emissions (GHG) from transport comprise 14% of all GHG of which road transport constitutes 72% (by comparison, air transport contributes 11%). While traditional logistics seeks to organize forward distribution-that is, the transport, warehousing, packaging, and inventory management from the producer to the consumer-environmental considerations have opened up markets for recycling and disposal.

While organisations or industries attempt to incorporate Triple Bottom Line (TBL) parameters into operations, there is little evidence of these considerations in the logistics industry. Rodrigues (2001, p. 342) found that: “the purpose of logistics is to reduce costs, notably transport costs. In addition, economies of time and improvements in service reliability, including flexibility, are further objectives”. However, these objectives could be developed into social parameters when seeking to address freight and transport service issues in the remote communities of Desert Australia. The typically unrecognized social benefits of freight services provided to remote communities in Desert Australia actually have significant benefits within these communities by facilitating economic opportunities for remote communities.

Research Objectives

The main research objective is to evaluate various freight logistics options currently available in Desert Australia using a set of metrics

incorporating economic, environmental and social parameters. Further specific objectives are to:

- consider the needs associated with freight services into remote communities
- consider the opportunities, broader benefits and needs associated with freight services out of remote communities
- evaluate various freight logistics options in terms of alternative fuel (renewables) use potential.

Establishing supply chains to source Aboriginal produce and on-sell products from remote communities, together with revised notions of efficient freight transport logistics in desert areas, offers significant opportunities for sustainable development. The expected research outputs and outcomes include:

1. Better understanding of environmental, social and economic factors in relation to delivering the freight and transport needs of Desert Australia.
2. Information on ways to create sustainable livelihoods for people that are based on natural resources and value traditional skills and knowledge.
3. Identification of product and service enterprise opportunities that are environmentally and socially appropriate.
4. Increased knowledge of critical success factors for small enterprises in Desert Australia.
5. Development of new knowledge on the impact of using bio-fuels and other alternative fuel sources for freight logistics into and out of Desert Australia.
6. Techniques for establishing and operating sustainable SMEs in Desert Australia through:
 - the provision of solutions to freight and transport issues associated with developing viable micro-businesses in remote desert regions

- understanding various options for alternative ways of reducing freight and transport costs.

Towards an Alternative Model

The literature shows that a broad range of parameters need to be considered when evaluating and comparing freight services into and out of remote desert communities in Australia. A review of existing models used in the freight and logistics industry reveals that these models are unsuitable for an integrated assessment as they focus only on efficiencies in moving freight from one point to another via a range of options. The structure of these models, generally based on algorithms of time, distance and cost, means they do not have the ability to incorporate environmental and, in particular, social elements. While environmental and social assessments could be done separately, this present approach results in economics being considered in isolation from environmental and social elements. Such an assessment does not cater to the needs of all stakeholders, particularly those of people living in remote communities.

Furthermore, the time sensitivities in many of the existing models of freight service are suited to urban applications where minutes or hours are imperative, whereas in Desert Australia hours or days would often be defined as “the minimum practical applicable time”. While some existing long haul models can cope with these types of variables, most do not. Additionally, the distances travelled off bitumen are typically at comparably low speeds (in order to cope with the generally poor road conditions). This is another characteristic of desert freight which also proves problematic for many existing models (and also reportedly for compliance with some driver fatigue laws). A framework for analysis was sought from outside of the freight and logistics industry.

The Balanced Scorecard (BSC) (Kaplan & Norton, 1992) has become a widely implemented multi-dimensional performance measurement (MDPM) model. Its advocacy of a balanced and integrated performance measurement system using four perspectives on organizational performance represents a significant departure from uni-dimensional focus on financial performance measures of primary interest to shareholders. Its recognition of employees and customers as vital to organizational success has broadened the range of stakeholders catered for in performance measurement and management systems. In many organisations it has led to the use of non-

financial performance indicators to supplement traditional financial measures, which are themselves frequently being supplemented or supplanted by new financial metrics (Cooper *et al.*, 2001).

Kaplan and Norton (2001a) argue that such new financial metrics are fully compatible with the BSC and that each enhances the other. However, neither new financial metrics nor the BSC itself cater for the needs of all significant organizational stakeholders. Two notable omissions are the environment and social issues, which are relevant to the analysis of freight services to remote communities in Desert Australia.

Brignall (2005) made a case for re-balancing the BSC by incorporating social and environmental aspects of organizational performance that are of widespread concern. In doing so, Brignall questions the causal chain inherent in BSC strategy maps (Kaplan & Norton, 2000, 2001a, 2001b & 2001c), concluding that it is flawed in such a way as to enable the inclusion of social and environmental aspects in a BSC.

Gray *et al.*, (1995) argue that there are three theoretical contexts for social and environmental accounting research. The first relates to the “decision usefulness” of such information to decision makers, usually taken to be investors (Belkaoui, 1984; Aupperle, 1984). The second context concerns positive accounting theory and agency theory, which Gray *et al.*, (1995) dismiss as inimical to social and environmental aspects of organizational performance as they are founded on notions of ‘free’ markets and the supposed virtues of the ‘invisible hand’. Their argument is that the accounting context is unconcerned with the market failures and social inequalities.

The third category is social and political theory, in which Gray *et al.*, (1995) identify ‘stakeholder’, ‘legitimacy’ and ‘political economy’ theories. Roberts (1992) argues that stakeholder theory provides a basis to “analyze the impact of prior economic performance, strategic posture towards social responsibility activities, and the intensity of stakeholder power on levels of corporate social disclosure”. Legitimacy theory argues that organisations must be seen to comply with regulatory requirements (Kaplan & Norton, 2001c) that many would see as part of the ‘social contract’. Mathews (1993, 1995) suggests that social contract theory is the most “persuasive moral argument in favor of increased social and environmental disclosures”.

However, for the social contract to work, organisations must be held accountable for their actions, and Gray (1998) suggests that “the standpoints of accountability and transparency” are the most frequently used justifications for social and environmental disclosures. Gray (1992, p. 212) defines accountability as concerned with “the right to receive information and the duty to supply it”. However, Gray *et al.*, (1997, p. 343) suggest that a stakeholder and accountability approach may fail, being “too inert and only slowly responsive to changing stakeholder needs”. It might also be argued that the social and environmental literature considered so far is likely to be ineffective because it fails to sufficiently take into account the deep conflicts among different interests in society. This is of particular importance in the Desert Australia context due to the often very different perspectives of people, particularly Aboriginal people, living in remote communities to government and freight service providers. It is for this reason that we finally turn to Gray *et al.*, (1995) and their argument that social accounting can be seen to fall within political economy. Jackson (1982, p. 74) suggests that:

Political economy is the study of the interplay of power, the goals of power wielders and the productive exchange system (Zald, 1970, p. 233). As a framework, political economy does not concentrate exclusively on market exchanges. Rather it first of all analyses in whatever institutional framework they occur and, second, analyses the relationships between social institutions such as government, law and property rights, each fortified by power and the economy.

Possibly the strongest critique of the mainstream social and environmental literature comes from Tinker *et al.*, (1991) who argue that the pragmatic approach of the mainstream neglects important issues of social justice and systematic social ills, so denigrating “the importance of accounting in shaping social struggles”. Their preference is for a “conflict based perspective” that places power asymmetries at the forefront of the analysis of the basic inequalities that cause the problems faced by modern societies. They argue that mainstream MDPM models such as the BSC are an important new form of organizational accounting with implications for political economy. Furthermore, most of the research into their design, implementation and use has been “free market” in orientation, hence the effects on wider societal matters have been largely ignored. If this is so,

then a consideration of the inclusion of social and environmental aspects of organizational performance in such MDPM models is relevant at this time in relation to analysis of freight services to remote desert communities in Australia.

The design and application of MDPM models such as the BSC could, however, be said to be a function of their application in organisations for the purpose of strategic planning and policy development exercises. While the social and environmental aspects may never be reflected in managerial practice, depending on the particular bent of an individual manager and the organization they are managing, this need not be the case in the design and application of a MDPM model for research purposes. The conduct of independent research into freight logistics in Desert Australia creates the opportunity to consider the environmental and social effects of current management actions, government policy and regulatory actions, the results of which may not be felt until many years into the future.

A consideration of the interrelationships between the four existing BSC perspectives provides a sound basis for analysis, which may be extended to include social and environmental aspects—an approach to be considered in the next section.

Incorporating Sustainability into a Balanced Scorecard Model

The BSC makes it possible to take into account non-monetary strategic success factors which significantly impact on the success of a business. It is a promising starting point to also incorporate environmental and social aspects into the evaluation of the freight industry in Desert Australia. By utilizing the BSC framework for value-orientated corporate sustainability management, the shortcomings of conventional approaches to environmental and social management systems and evaluations are overcome by integrating the three pillars of sustainability into a single and overarching management and assessment tool. Due to this potential, a range of authors have dealt with the topic of a Sustainability BSC (Radcliffe, 1999; Bieker *et al.*, 2001; Epstein & Wisner, 2001; Epstein & Roy, 2001; Orsatto *et al.*, 2001). From these initial discussions, basic approaches and a methodology for a value-oriented sustainability management with the BSC were discussed (Figge *et al.*, 2001b; Figge *et al.*, 2001c; Figge *et al.*, 2002). A value-orientated approach to corporate sustainability management within

the BSC framework is believed to integrate the three pillars of sustainability into an overarching management or evaluation tool.

The three pillars of sustainability need to be integrated by a value-orientated approach for three reasons (Figue *et al.*, 2001a & 2001b):

1. Sustainability management that reduces the business value is endangered because it is carried out by firms only as long as the company is successful and can afford this 'luxury'. If firms find themselves under financial distress, those costs which do not contribute to the financial bottom line are cut. Sustainability management which does not create business value will be practiced only as long as firms are successful. Furthermore, in the Desert Australia context, freight services that are heavily subsidized by government will constantly be under scrutiny and contribute to discussions regarding the 'viability' of remote communities. These costs could be considered a contributing factor to past government policies aimed at relocating Aboriginal people from traditional lands into so-called town camps.
2. Non-value-orientated sustainability management is an inappropriate role model for other businesses. As firms which want to promote or reinforce their environmental and social management credentials often use these as points of difference with competitors, it is improbable that they adopt sustainability management which creates losses rather than benefits.
3. Non-value-orientated sustainability management is, in fact, not sustainable. According to the three pillar concept, sustainability involves economic, environmental and social aspects (United Nations, 1987). It is usually implicitly assumed that these aspects bear a complementary relation to each other. Sustainability is only achieved if environmental, social and economic goals are reached simultaneously. Only a business which improves with regard to all of the three dimensions of sustainability demonstrates a clearly sustainable performance.

The BSC assists the identification and the management of those environmental and social aspects, which contribute to financial business goals. Therefore, a Sustainability BSC fulfils the central requirement of the sustainability concept for a permanent improvement of the business' performance in economic, environmental and social terms. The BSC is particularly suitable for value-based sustainability management for two key reasons (Figge *et al.*, 2002):

1. First, it ensures the integration of all three sustainability dimensions because it allows consideration of 'soft' factors which cannot be converted into a monetary measure. Environmental and social aspects often show these characteristics.
2. Second, the BSC approach is conceptually open to implementing different kinds of strategies. As a consequence, the Sustainability BSC is appropriate for use not only to niche companies with an explicit sustainability strategy, but also to many mainstream firms who may not have explicit sustainability strategies.

In the following section, the possibilities of an integration of environmental and social aspects into a BSC extended to apply across an industry, rather than a single organization, are described in the context of freight logistics in Desert Australia.

Developing a Sustainability Methodology for Evaluating Desert Freight Logistics

Brignall and Modell (2000) proposed the addition of environmental and social elements to MDPM models such as the BSC to create a fifth performance dimension. However, they also noted that "in order for environmental and social objectives to be realized, managers will have to understand the interrelationships among... existing BSC perspectives...". It is based on this premise that the model discussed in this paper has been developed for the analysis of freight logistics options in Desert Australia. It contains economic, environmental and social performance measures incorporated into each of the existing four BSC perspectives.

However, before commencing with the incorporation of integrated sustainability performance measures into a BSC model, the model

framework must first be developed from its current format specifically catering to development and/or evaluation of strategic alignment and performance within organisations to a tool which can be applied to various organisations operating within a specified industry, in this case, desert freight logistics. This can be done by defining industry-wide objectives and targets in each of the BSC perspectives, which then supports the identification and incorporation of appropriate performance measures. This process transfers the focus of the BSC outputs from delivering competitive advantage for an individual organization to a benchmarking and comparative analysis tool that can be used to compare various strategic options (for delivering freight services in this application) and scenario planning exercises. The BSC's four perspectives can be characterized briefly as follows (Weber & Schaffer, 2000; Kaplan & Norton, 2001d):

- The *financial perspective*, in the organizational context, indicates if the transformation of a strategy leads to improved economic success. Thus, the financial measures assume a double role: they both define the financial performance that a strategy is expected to achieve and are the endpoint of cause and effect relationships referring to the other BSC perspectives. These roles have been preserved in the Australian desert freight logistics context with objectives and targets defined as follows in order to compare various options in this perspective:

Objectives: To determine the lowest cost freight option/s for servicing remote desert communities. To consider all freight logistics options in terms of respective economic, environmental and social costs and benefits as considered from the service provider perspective (government and freight service provider).

Targets: Improved services to remote communities. Identification of opportunities for improvement of services. An increased understanding of how various freight logistics options compare with each other when evaluated on a consistent basis using Triple Bottom Line Principles. An increased understanding of the environmental and social aspects of various freight logistics options in Desert Australia.

- The *customer perspective* defines the customer (or in a non-profit application, the stakeholders) in which the organization operates. By means of appropriate strategic objectives, measures, targets and initiatives the customer value proposition is represented in the customer perspective through which the firm/business unit wants to achieve a competitive advantage in the envisaged market segment. In relation to freight services in Desert Australia, the key customers or stakeholders have been defined as the people living in remote communities. As such the key objectives and targets have been articulated as follows: Objective: To evaluate freight services from the perspectives of the remote desert communities they are servicing, government and remote businesses based on economic, environmental and social principles.

Targets: An improved understanding of the key issues relating to freight logistics into and out of desert communities. Identification of the key concerns people living in these communities have about freight services and quantifiable measures for these issues that allows comparisons of various options to be made. A consistent basis for analytical comparison of freight logistics options in Desert Australia.

- The *internal process perspective* traditionally identifies those internal business processes which enable an organization to meet the expectations of customers in the target markets and those of the shareholders. In the industry-wide adaptation of the BSC, this perspective identifies and measures various freight industry characteristics impacting on freight logistics in Desert Australia and compares options in relation to these characteristics. These characteristics emanate from government policy, regulatory requirements and subsidies currently defining the freight logistics framework in Desert Australia.
- Finally, the *learning and growth perspective* describes the infrastructure (both physical and more intangible types) which is necessary for the achievement of the objectives of

the other three perspectives. Typically this has meant the most important areas are qualifications, motivation and goal orientation of employees and information systems. In the Desert Australia context there is an extension of these ideas to skills and knowledge development of people living in remote communities so that they are better skilled and equipped to manage freight logistics service providers to suit their own needs. This involves developing knowledge of how service providers operate and having the skills and information technology to place orders, access back loading opportunities and action matching strategies in order to transfer their involvement in the freight logistics industry in Desert Australia from passive recipients to proactive influencers and managers.

Once each of the BSC perspectives has been defined specifically in terms of the Desert Australian freight logistics context, appropriate performance measures can be selected under each of the three pillars of sustainability. That is, under each BSC perspective performance measures are categorized under economic/financial, ecological/environment and social sub-sections. This structured method of developing the MDPM model using the BSC as a base framework ensures integration of environmental and social elements with economic/financial performance measures and, if done correctly with appropriate stakeholder engagement, value-orientated outcomes from assessments.

Figge *et al.*, (2002) propose three different approaches for integrating environmental and social elements into the existing economic focus of the BSC. In the Desert Australian freight logistics industry application, the integration of sustainability categories into the existing four standard perspectives is preferred to the addition of non-market perspectives into the BSC or creation of a separate environmental/social scorecard. This avoids the possibility of separating these elements from the economics after the analysis has been done. In this way, sustainability is imbedded into the analysis.

This model then provides an effective tool for conducting both consistent comparisons of existing freight logistics options and also the sustainability of potential future scenarios in Desert Australia. The following sections outline supply chain characteristics that will be examined

and explored through scenario planning applications of the BSC model incorporating sustainability metrics specific to freight logistics in Desert Australia.

Matching Strategies

A hypothesis to be tested through this research and which is evaluated predominantly through the *learning and growth perspective* of the BSC is that a transfer of skills and knowledge from freight logistics service providers to people living in remote communities will liberate matching strategies that improve the overall economics. For example, creation of SMEs with appeal to world markets (Aboriginal art and produce) creates back loading opportunities with high value items that may eventually offset the costs of supply into remote communities.

Role of Community Leaders

SMEs are the backbone of the desert economy. These businesses sustain desert communities by providing services and products and by supporting larger companies that operate in the desert. They are also a source of skilled employment necessary for growth to take place (DKCRC, 2008).

In Desert Australia new business networks are being established which are developing Aboriginal products such as art and bush produce (eg. condiments and personal care or indulgence items) that are unique to the remote communities in which they are manufactured. These items have a high degree of appeal in overseas market segments, particularly the UK, Germany, Japan and North America. However, existing freight logistics service providers in Desert Australia are traditionally focused on subsidized services into remote communities rather than provision of two-way services and the facilitation of international freight forwarding.

Within the Australian (and international) freight industry, private businesses that specifically seek to address freight logistics issues with a clear commitment to skills transfer and autonomous involvement of Aboriginal people are required. Furthermore, the value and flow-on benefits of providing back loading or return services to get products from communities to markets needs to be fully understood and documented.

Best Practice Business Frameworks

The performance measures incorporated into the Sustainability BSC for freight logistics in Desert Australia provides a robust basis for evaluating the sustainability of various options in this context. However, the elements that constitute sustainability in Desert Australia, with particular reference to Aboriginal cultural elements, are expected to differ significantly from how sustainability might be defined for freight logistics in the rest of Australia and worldwide.

The differences and similarities between the requirements for sustainability in these varying contexts provide another application for the Sustainability BSC: identification of best practice business and industry frameworks. By realigning the BSC model focus from strategies to deliver competitive advantage to one that analyses performance of an overall system (particularly through the performance measures incorporated into the *internal processes perspective*), limiting and enabling factors can be identified. Furthermore, the ability of various freight logistics options to deliver the best outcomes within existing policy and regulatory frameworks can be determined.

Partnerships

The freight logistics and agri-food (particularly the native produce) supply chains in Desert Australia represent a key opportunity to link the various knowledge bases of entrepreneurial research institutions (such as the Desert Knowledge Cooperative Research Centre), numerous freight companies and other businesses entering and operating in remote communities to expand market segments for Aboriginal produce. It will also transform a heavily subsidized industry delivering a low level of service into a highly integrated and more efficient network.

Future Direction of the Research

Kaplan and Norton's BSC is an MDPM model which can be effectively developed into a tool which supports evaluation of the sustainability of a range of options specific to an industry rather than just a management tool to support the implementation of corporate strategies. Use of such a model with sustainability metrics imbedded into its four perspectives for evaluation freight logistics options in Desert Australia

provides a method of ensuring consistent comparison based on value-orientated performance measures. This is generating research outputs that support tangible outcomes in terms of identifying ways to improve freight services to remote communities in Desert Australia.

Interviews with a range of freight service providers operating in Desert Australia (in particular those air and road freight service providers that operate off the bitumen) have identified a heightened commitment to social values and corporate social responsibility. It is these businesses that are typically operating with significantly higher operating costs and significantly lower profit margins who continue to provide freight services and the associated flow-on benefits to remote communities under conditions that many others would consider uneconomic propositions. The owners of these businesses typically continue to operate because of the lifestyle – a love of the desert and its people. It is these types of characteristics that a BSC model incorporating sustainability metrics captures to allow more equitable comparisons of freight services in Desert Australia. This approach is proving particularly beneficial as a means of understanding and developing strategies for delivering freight services in Desert Australia more efficiently. It is also proving to be a benchmark in demonstrating the broader social and environmental characteristics of the freight logistics industry in general.

An early indication derived from application of the model in a limited number of case studies is that export supply agreements with SMEs in remote communities may be a key to transitioning the freight logistics industry in Desert Australia. In the absence of clear government policies, they are expected to create the pull necessary to support transition of freight industry in Desert Australia from individually operated and often heavily subsidized businesses with a focus on supply only to a network of partnerships facilitating improved service both into and out of remote communities.

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