

# **Business Exchanges in the Australian Desert: It's About More Than the Money**

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## **Abstract**

This paper synthesizes research from the 'Bush Products from Desert Australia' (BPDA) research project, within the Desert Knowledge Cooperative Research Centre. The paper presents a Netchain Analysis (NCA) of the supply chain associated with wild harvested bush tomatoes in central Australia, where trade between remote Aboriginal peoples and non-Aboriginal people is a prominent feature. The paper finds that while NCA provides some insight into identifying sources of economic value in the chain, some important sources of non-economic value are deeply embedded in social relationships within the chain. This value is difficult to assess within the NCA framework, and is not reflected in the final outputs of the chain. In light of these findings, the paper then determines that the chain itself represents something more than a supply chain within the conventional definitions of a supply chain. This work may have relevance to other situations where economic activity is deeply embedded in inter-cultural social relations, especially where remoteness and isolation are features of the operating environment

Keywords: Netchains, Supply Chain Analysis, Bush Food, Aboriginal, Central Australia

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## **1.0 Introduction**

Aboriginal peoples, and in particular those dwelling remotely, constitute the most disadvantaged group in Australia, with high poverty levels, a significantly shorter life expectancy than non-Aboriginal Australians and poorer overall well-being (FaHCSIA, 2009; Productivity Commission, 2003). Participation in the broader Australian economy has been promulgated as a part of the solution to improving Aboriginal well-being and forms a significant part of the platform of reform proposed in the 'Closing the Gap on Indigenous Disadvantage' strategy of the Australian Government (FaHCSIA, 2009). To date however, participation by remote Aboriginal Australians in public and private economies has been minimal and with marginal success rates (Altman, 2004; Duncan, 2003). Remoteness creates a range of structural factors that impact on the economic situation of these peoples including a lack of external connections beyond the remote regions (Stafford-Smith, 2008) and transport and communication limitations (Carson & Cleary, 2010) with which to facilitate and expedite resource flows (Cunningham, Garnett, & Gorman, 2009). For many remote regions, developing local economic

activity is difficult, because mitigating the impacts of remoteness is largely beyond their control (Carson & Harwood, 2007).

The Australian bush food industry, because of its links with Aboriginal land owners and the Indigenous Ecological Knowledge (IEK) they hold, has been seen as one area for potential economic development, particularly in the establishment of community enterprises in remote areas, related to growing or harvesting bush food for commercial sale (Gorman, Pearson, & Whitehead, 2008; Miers, 2004). There have been multiple attempts to develop Aboriginal community enterprises based on bush food in central Australia and particularly the Northern Territory, with many of these supported by public funding initiatives. Most have ultimately failed, generally surviving for only short periods (Armstrong Mueller Consulting, 2008; Gorman et al., 2008; Whitehead et al., 2006). The reality is that few remote Aboriginal peoples are reaping significant economic benefit from participation in the Australian bush foods industry (Bryceson, 2008; Cleary, McGregor, Bryceson, & James, 2008). In the Northern Territory, participation is primarily through the supply of raw product, which is sold for processing and value-adding that occurs mostly outside the region (Cleary et al., 2008).

There is very little research which deals specifically with the involvement of Aboriginal peoples in the Australian bush foods industry, or the industry supply chains in which remote Aboriginal peoples are situated. This paper takes one highly demanded desert bush food product—the bush tomato<sup>1</sup>—and examines the generic wild harvest supply chain associated with its journey from the central desert region in the Northern Territory, Australia, to suburban supermarket shelves. The paper uses Netchain Analysis (NCA) (Lazzarini, Chaddad, & Cook, 2001) to examine the supply chain. The paper draws on and synthesizes research led by the author between 2007 and 2009, within the ‘Bush Products from Desert Australia’ Core Project undertaken by the Desert Knowledge Cooperative Research Centre (DKCRC)<sup>2</sup>. This research aimed to increase benefits to Aboriginal peoples from the bush foods industry; increase respect for the roles and knowledge of Aboriginal peoples involved in the industry; and increase the security of supply of bush tomatoes to the industry (DKCRC, 2007).

## 2.0 Industry Supply Chains

The primary goal of managed industry chains is to optimise performance in that industry using the combined expertise and abilities of the members of the chain (Chaddad & Cook, 2004; Greenwood & Hinings, 1996; McBride, 1986; Porter, 1985). Synchronisation, collaboration, and information and knowledge sharing are critical to the performance of the chain as an entity and as a unified, compelling market force (Mentzer et al., 2001; Ross, 1998). Success is usually defined through return on investment (Boehlje, 1999; Mentzer et al., 2001; O’Keefe, 1998).

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<sup>1</sup> ‘Bush tomato’ is the commonly used commercial name for *Solanum centrale* in the bush foods industry. However, ‘bush tomato’ is also known in non-commercial contexts as ‘desert raisin.’ The term ‘bush tomato’ will be used here, as this paper deals largely with issues related to the market aspects of the fruit. A number of different Aboriginal names are also used for the fruit. In the central Australian desert region these include *akatyerr*, *katyerr*, *akatyerre*, *katyerre*, *kampurarrpa*, *kampurarpa* and *jungkunypa* (Ryder et al., 2009; Alyawarr Speakers from Ampilatwatja, Walsh, & Douglas, 2009).

<sup>2</sup> Reports and outputs from all sub-projects associated with this research can be found at: <http://www.desertknowledgecrc.com.au/research/bushproducts.html>.

Supply chain management optimizes efficiency through better flow scheduling and resource use, improving quality control throughout the chain (Dunne, 2001). Maintaining competitive advantage by reducing costs, increasing profits or by creating efficiencies for the firms or industries involved within chains is paramount. Analyzing chains to examine these factors with a view to identifying their sources of value therefore becomes a critical component of efficient chain management (Beamon, 1998, 1999; Bryceson & Smith, 2008).

## ***2.1 Analysing Industry Chains***

Supply Chain Analysis (SCA), Network Analysis (NA) and more recently NCA have variously been used to examine the effectiveness and efficiency of collaboration and inter-organisational relationships in multiple industry contexts, including the agrifood sector. A brief description of each follows.

### *2.1.1. Supply Chain Analysis*

Supply chain management models are primarily concerned with the vertical, serial relationships in the supply chain. SCA focuses on understanding resource flow and resource allocation (including information) up and down these vertical relationships (Christopher, 1998). Supply chain management models tend to focus on production and operational optimization as a key source of value. Performance measures include cost-based and technical efficiency metrics, with qualitative indicators of customer satisfaction sometimes incorporated (Beamon, 1998; 1999).

Recent literature (see for example, Archer, Higgins, & Thorburn, 2009; Higgins, Thorburn, Archer, & Jakku, 2007; Higgins et al., 2010) queries whether SCA offers an optimal method for analysing agricultural chains. Among other criticisms, Archer et al. (2009) raise the concern that agricultural chains are more akin to complex systems, comprised of a potentially large number of actors in multi-dimensional networks, rather than a linear set of businesses that might be seen in typical manufacturing chains. There is a concern that SCA, with its traditional systems view of measurement and analysis of stocks and flows across vertical relationships cannot consider this complexity (Higgins et al., 2010; Lazzarini et al., 2001).

SCA also poses a problem in that it does not pay particular attention to relationships between agents engaged horizontally with each other, e.g. producers engaged in the same industry. Understanding these relationships is important to understanding knowledge exchange and the uptake of new information (Stuart, Decker, McCutcheon, & Kunst, 1998). In agriculture, for example, farmers might share knowledge with each other about new technologies in order to improve production and management regimes, or with a view to developing supply cooperatives to decrease transaction costs (D'Haese, Van Huylenbroeck, Doyer, & Callus, 2007). Such knowledge in many cases would create greater efficiencies, thus ultimately reducing costs across the chain. However, since in this instance the source of value creation occurs horizontally and is a product of the relationships between the farmers, it would not necessarily be identified by the application of SCA.

### *2.1.2 Network Analysis*

Network Analysis has its roots primarily in Sociology and Economics (Freeman, 2004; Watts, 2003). It deals with horizontal relationships in social networks (Freeman, 2004; Granovetter, 1973, 1983; Wasserman & Faust, 1994; Wellman & Berkowitz, 1988) and the strength of the 'ties' (Granovetter, 1973, 1983) between actors in networks. NA examines how personal relationships between agents and

the positioning of actors in a network influence and impact on individual or collective behaviour and performance within the network (Granovetter, 1973, 1983; Lazzarini et al., 2001).

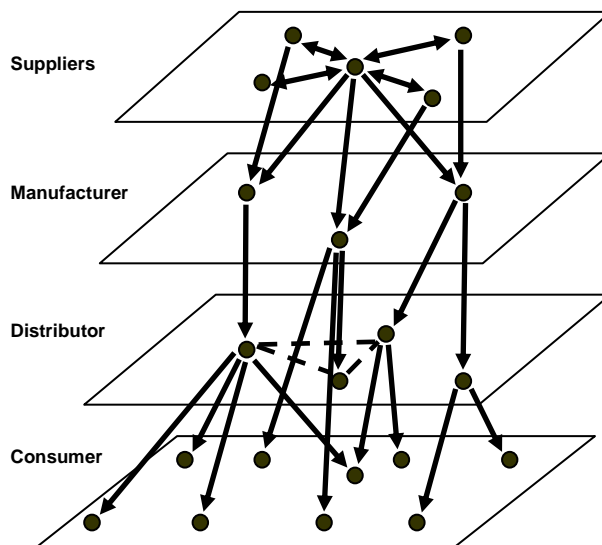
NA has been used as a modelling technique to explain how social relations affect the economic behaviour of agents and the institutional arrangements supporting transactions in relationships between firms (see, for example, Granovetter, 1985, 2005; Nohria & Eccles, 1992). However, it does not concern itself with the vertically integrated, operational optimization of SCA or with the measurement of efficiencies.

### 2.1.3 Netchain Analysis

Both SCA and NA deal with interdependencies (Thompson, 1967) i.e. the nature of the relationships between firms, but neither considers horizontal and vertical interdependencies simultaneously or the distinctiveness of each (Lazzarini et al., 2001). For some commentators, NCA promises to overcome some of these analytical challenges.

NCA attempts to integrate and interpret both supply chain and network perspectives on inter-firm collaboration, with emphasis on the sources of value creation and coordination mechanisms (Lazzarini et al., 2001). Its proponents argue that it can be used to analyze the complexity of relationships and the simultaneous consideration of both horizontal and vertical layers in supply chains and their impact on the nature of coordination mechanisms within particular groups or industries. Figure 1 illustrates this concept of horizontal and vertical relationships in supply chains and the interactions between them.

Figure 1. Generic Netchain (Lazzarini et al., 2001)



Lazzarini et al. (2001, p. 7) argue that focusing upon coordination mechanisms and sources of value is essential to understanding complex inter-organisational relationships and their interdependencies. Following Thompson (1967) they argue that the vertical relationships of SCA are characterized by sequential interdependencies where one output is another's input (depicted in Figure 1 by a solid, single arrow); horizontal relationships of NA are characterized primarily by

either pooled interdependence (depicted in Figure 1 by a dashed line) where relationships are indirect and agents are sparsely connected to each other and where each contributes a discrete piece of work to a broader task or goal; or reciprocal interdependence (depicted in Figure 1 by a solid, doubled-headed arrow) where agents are mutually dependent on the actions of each other. Sources of value created in managed industry chains are derived from the variables that yield economic rents, e.g. cost reduction, rent creation or rent capture. Assessing interdependencies to determine where these variables lie (i.e. whether in horizontal and/or vertical relationships) is the first-stage analysis in improving the supply chain (Lazzarini et al., 2001).

### **3.0 Netchain Analysis of the Wild Harvest Bush Tomato Supply Chain in Central Australia**

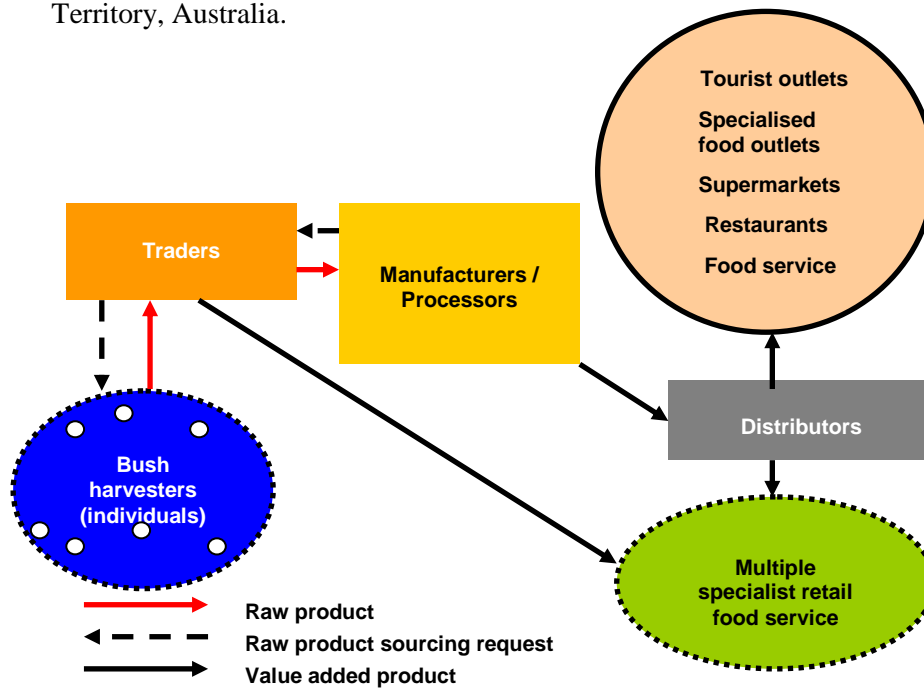
#### **3.1 Context**

Wild, or ‘bush’ harvest in the Northern Territory of central Australia has been undertaken by Aboriginal women for many thousands of years (Clarke, 2003; Everard et al., 2002; Latz, 1995). For the past 30–40 years, some harvesters have been selling some of the fruit they harvest to three (with sometimes a fourth) ‘traders’ (Morse, 2005; Ryder et al., 2009). The traders consolidate multiple small, individual inputs and on-sell them to processors largely external to the region, or set aside small quantities to value-add for local sale. They may also sell directly to restaurateurs and specialist caterers. Annually, approximately 4–10 tonnes of fruit are traded for commercial use, with supply dependent upon seasonal conditions (CSIRO, 2007; RIRDC, 2004).

There is little understanding by the harvesters of the commercial industry or the chain itself, beyond their interactions with the traders (Cleary et al., 2008; Vincent, 2009). At the downstream end of the chain, there appears to be minimal knowledge of the harvesters or how, why and where they operate. Little or no value is placed on their traditional knowledge of the product (Cleary et al., 2008). The remoteness of the harvesters enables traders to set the prices paid to harvesters and paid by processors (who are wholly dependent on the traders for their supply of fruit). Each trader has a particular geographic area from which they purchase raw product (Ryder et al., 2009). Ryder et al. (2009) indicate that these areas relate to specific Aboriginal Language Group boundaries and their associated settlements, and that relationships between the harvesters and the traders are strong, and have been built up over some thirty years. Harvesters collect fruit in bags provided by the traders and are paid cash individually by the traders (Ryder et al., 2009). There is little evidence that harvesters consolidate the fruit themselves, and little or no infrastructure exists to support such activities in the remote settlements in which the harvesters are located.

Processors value-add to the raw product to create a range of products, including sauces, chutneys, marinades and rubs. These products are then distributed for domestic and (increasingly) international sale, through a variety of mechanisms including specialist retailers and supermarkets. Both major supermarket chains in Australia carry a range of bush tomato-based products, for example. Figure 2 illustrates the current movement of resources associated with bush-harvested bush tomatoes from central Australia.

Figure 2. Movement of resources associated with bush tomatoes from Northern Territory, Australia.



Source: Adapted from Bryceson (2008).

### 3.2 Assessing Current Interdependencies using NCA

The application of the NCA framework to the wild harvest bush tomato supply chain reveals some interesting interdependencies which are discussed in this section.

There are interdependencies that are clearly *sequential*, where direct relationships between firms are organised serially, e.g. the movement of the raw product from the traders to the processors and its subsequent distribution and sale to retailers and consumers. Bryceson clearly illustrated the sources of economic value in these sequential relationships in a report on stocks and flows in two major bush tomato and wattle-seed supply chains (Bryceson, 2008).

It is at the upstream end of the supply chain at the harvester / trader juncture that the application of NCA reveals some complexity in interdependencies. Here, *pooled* interdependencies exist amongst the harvesters, who supply to the traders in an atomised fashion. A feature of pooled interdependence is that agents are usually sparsely connected to each other via weak ties (Granovetter, 1973, 1983) rather than sharing strong social ties. Each agent is therefore more likely to have access to different sources of information and resources that can be brought to the network. Knowledge diversity is usually high within such a network. However, among the bush harvesters, the idea of pooled interdependence holds true *only* as it describes their economic interactions with each other in relation to their dealings with the traders. Outside this economic activity, the harvesters have very strong social and cultural ties to each other with a high degree of collective historical and customary knowledge, but very few weak ties to external knowledge and information (such as market trends). This dearth of weak ties, coupled with geographical remoteness, severely limits the harvesters' access to external

knowledge and they are heavily reliant on the traders as their link to this knowledge and information as a result.

Simultaneously, the harvesters also display *reciprocal* interdependencies amongst themselves, in that they share resources in the process of harvesting, i.e. vehicles to transport them to harvesting sites; and customary knowledge and information associated with the fruit and harvesting sites. Harvesting is a social and cultural activity, associated with caring for country, passing on knowledge to younger generations and is also linked to health and wellbeing outcomes for families by the harvesters (Hassall & Associates, 2007). The ‘value’ derived from the act of harvesting, is thus both commercial and non-commercial in nature<sup>3</sup>.

The traders display *reciprocal* interdependencies in their dealings with each other, in that they have informal agreements related to the areas from which they each limit their procurement. These procurement regions were mapped in Ryder et al. (2009).

The relationship between the harvesters and the traders is not easy to categorise within the NCA framework because it displays both sequential and reciprocal interdependencies across layers. Sequentially, harvester output (when considered collectively) is trader input. However, there are also reciprocal interdependencies between the traders and the harvesters. These two groups have longstanding business relationships, where repeated business exchanges have led to the creation of trust and social norms in the manner described by Coleman (1988, 1990). The traders themselves describe the relationships they have with the harvesters as based on trust built up over a number of years (Ryder et al., 2009). Three of the six traders interviewed by Ryder and colleagues talked about having “particular interests in ecosystems and land” (Ryder et al., 2009, p. 32) and placed a high value on the associated productive uses of natural resources by Aboriginal peoples for economic benefit. The economic motivation of the traders varied, according to Ryder and colleagues, as did the incomes derived from their procurement activities and their level of reliance on them. They reported that the motives of the traders were a mixture of self-interested financial gain and philanthropic concern for the welfare of the harvesters (Ryder et al., 2009). Indeed, the traders claimed that the Aboriginal peoples with whom they traded would not do so without the traders’ interventions because “market coherence doesn’t really exist” (Ryder et al., 2009, p. 22) and that Aboriginal peoples would harvest purely for social and cultural reasons if the traders “did not push them” (Ryder et al., 2009, p. 22) with requests for product. This somewhat blurs the distinctions made by Lazzarini et al. (2001) regarding the nature of interdependencies, in that they argue reciprocal interdependencies are most often seen *within*, not *across* layers in chains. Clearly, this is not the case in this instance and it seems context is important in that it appears to blur the lines between social and economic behaviours (in this case characterised by reciprocity). For the traders also then, the ‘value’ associated with the act of transacting with the harvesters cannot be clearly delineated as solely monetary.

The value created (for both traders and harvesters) from this reciprocity is currently both tangible and quite intangible and relates to both economic and socio-cultural domains. The more intangible value is not fully captured nor importantly, reflected in the finished products in this chain. It is possible that additional value could lie in developing products that reflect the positive attributes

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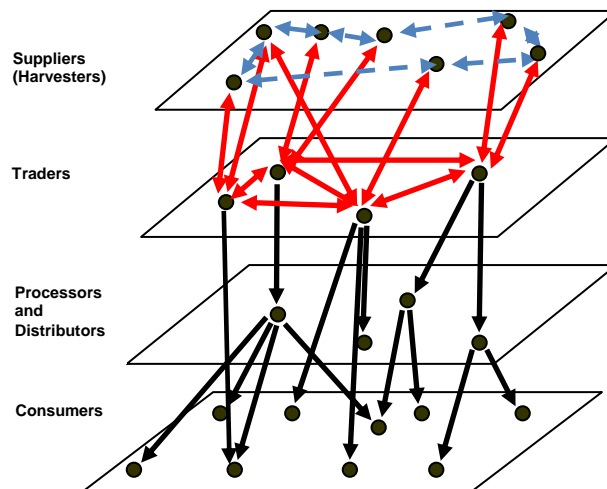
<sup>3</sup> The socio-cultural aspects of harvesting activities and this reciprocity is highlighted in a report compiled by Alyawarr Speakers from Ampilatwatja et al., (2009).

of bush-harvested supply i.e. those that could be differentiated as originating from fruit that is hand picked, ‘green’ and regionally provenanced through the ‘stories’ related to particular Language Groups with their associated IEK, if the value of this was recognised. Such product attributes are valued by discerning consumers in particular niche market sectors (Hurst, 2007) and they could be priced accordingly. This would recognise, in a tangible way, the ‘value’ of IEK and potentially generate increased economic rents across the chain.

Figure 3 illustrates the current wild harvest supply chain as a Netchain. The most significant features of the interdependencies in the bush-harvest bush tomato chain are that:

- There are both reciprocal interdependencies (double-headed arrows) and pooled interdependencies (dashed line) in the supplier (harvester) layer. Reciprocal interdependencies relate to the sharing of resources between harvesters in the process of harvesting, and pooled interdependencies relate to the manner in which harvesters interact individually rather than collectively when selling their fruit.
- The harvesters are highly reliant on the traders in terms of resource flows, including selling their fruit and in receiving any information back to them from the market and the rest of the chain. This is depicted by double-headed arrows between the harvester and trader layers.
- The traders rely upon each other and their agreement to procure from particular regions in which they have existing trust relationships with harvesters. These reciprocal interdependencies between traders are depicted by double-headed arrows.
- Sequential interdependencies are depicted by single-headed arrows. These interdependencies are seen between layers in this chain, in the same way as the NCA model predicts. However, these interdependencies exist in the chain only between those firms which operate downstream, i.e. in non-remote locations.

Figure 3. Netchain perspective of bush-harvested bush tomato chain.





### ***3.3 The Effectiveness of Using NCA to Capture Value***

Some of the value inherent in the interdependencies in this chain has been identified using NCA. NCA has provided a useful framework for examining the vertical and horizontal *structure* of the chain, and for uncovering some of the value associated with these structural relationships. NCA would be useful in subsequently determining ways of restructuring the chain for increased efficiency and economic sustainability. However, NCA does not fully capture *all* of the value inherent in the social relations that exist in this chain, particularly those relationships that exist in the remotely located parts of the chain. There is ‘value’ associated with both harvesting and trade that goes beyond considerations of moving commodities forward for sale. The application of NCA has demonstrated that there is a level of complexity inherent in the chain that cannot be fully framed within the model.

Using NCA, the supply chain could be seen as inefficient upstream e.g. no institutional relationships between harvesters and monopsony relationships with traders. However, NCA does not fully reveal the complex nature of these relationships and the ways in which they contribute to the ‘value’ inherent within them. What it does do, however, is reveal that knowledge of this complexity is essential for assessing options for change within the chain. For example, superficially, it could be argued that the traders are simply taking advantage of the harvesters’ socio-cultural and physical isolation to make money. However, Ryder et al. (2009) argue that the traders are in fact displaying high levels of altruism in their activities. Therefore, the reasons *why* chain members are participating will have a strong bearing on *how* potential change might be addressed, and indeed, whether change is desired. Creating new structures to improve bush harvest supply efficiency and potentially improving price, may not fit with the current social relationships between harvesters and traders, and may not be practical in consideration of the remoteness factors at play in this part of the chain.

Given the ‘blurring’ of vertical and horizontal relationships in this chain that do not fit neatly within the NCA model, is NCA a useful analysis tool? There is certainly evidence that NCA has been used elsewhere to effectively analyse supply chains (see for example, Chaddad, Senesi, Vilella, & Palau, 2009; D’Haese et al., 2007), so other possibilities need to be considered.

One possibility is that the wild harvest bush tomato chain is more than a supply chain in the generally understood sense of the term. At its simplest, a supply chain is the physical forward flow of resources required for raw materials to be transformed into finished products (La Londe & Masters, 1994). There is certainly evidence of the physical flow of resources that can be analysed in the bush harvest bush tomato chain. However, perhaps the chain represents something more, of which the forward flow of resources is simply one part? In that sense, NCA does reveal some of the complex dynamics at play in the chain, which in turn, reveals that not all the value that is inherent in these relationships is identifiable using this analysis model. In other words, the business exchanges that are occurring may be more than business exchanges related to the movement of a product from harvest to retail. This is a critically important point, if changes to effect efficiency in the chain with regard to increased rents and decreased costs are sought, and is explored further in the following section.

#### **4.0 Can a Supply Chain be More than a Supply Chain?**

It is clear from the NCA undertaken on the wild harvest bush tomato chain that there is complexity in both socio-cultural and economic domains that is not easily explained by conventional analysis. Max Weber (1864–1920) expressed strong views on what he termed the rationality of economic participation (Nwala, 1974).

Rationality for economic participation may be either formal or substantive according to Weber. He described formal rationality as seeking efficiency, and substantive rationality as adherence to an ideological system. He also saw these as opposed, especially in relation to economic life, but that they very often existed together (Nwala, 1974). He suggests that individuals may hold both formal and substantive reasons for undertaking economic activity and that where this happens, a tension exists between them (McGehee, 2007). This would certainly seem to be the case in the bush harvest bush tomato chain.

Following Weber, the harvesters may hold both formal (picking bush tomatoes provides a limited but reasonably important source of income) and substantive (picking bush tomatoes is a customary activity associated with health and well-being; passing on traditional knowledge; and caring for country) rationalities for harvesting. For the harvesters, the balance between these two forces may be related to their current worldview and how this applies to harvesting, in considerations of both its economic and cultural importance to them. If they hold more substantive than formal reasons for harvesting, in the Weberian understanding of these terms, then participation in the bush foods industry through harvesting may be only opportunistic, as suggested by the traders in Ryder et al. (2009).

The traders may also hold both formal and substantive rationalities for their interactions with the harvesters. These rationalities form the basis of why they do what they do, and the balance between ‘formal’ and ‘substantive’ influences determines how they function. Currently, they are providing a critical link to and from the harvesters that appears to be mitigating the effect of remoteness and in bridging both socio-cultural and economic domains.

#### **5.0 Conclusion**

NCA enables a level of analysis that assists in the identification of sources of value associated with both horizontal and vertical relationships and their interdependencies that may be invisible to either SCA or NA alone. However, where economic activity is deeply embedded in social relations, the interdependencies may not readily align vertically or horizontally and the sources and nature of value are somewhat blurred. ‘Value’ in these situations may be more social than economic in nature and broader than the supply chain context in which it is observed. The value may not relate only to the forward flow of resources, and therefore may not be reflected as an efficiency in the chain or recognised as value in the finished product. Thus, applying NCA as a means of identifying sources of ‘value’ (while perhaps more effective than either SCA or NA alone) is not entirely informative in cases like the one examined here. However, what it does do is identify that there is a level of complexity which, by virtue of the fact that it cannot be fully understood using this framework, requires some rethinking about both considerations of the structure itself (it isn’t ‘just’ a supply chain) and in what constitutes ‘value’ (it may not be ‘just’ economic) and how it is captured. Critically, any attempt to change structures of this nature to create efficiencies or to

make improvements in accordance with the success metrics described in conventional chain literature, for example, may have an impact on the ‘value’ associated with the current interactions. For this reason, these findings may well have relevance to other situations where economic activity is deeply embedded in inter-cultural social relations, especially where remoteness and isolation are features of the operating environment.

## 6.0 Acknowledgements

This paper has benefitted significantly from critical comment provided by Susan Robinson, Guy Robinson, Dean Carson and Kim Bryceson and I thank them. The work reported here has been supported by funding from the Australian Government Cooperative Research Centres Programme through the Desert Knowledge CRC; the views expressed herein do not necessarily represent the views of Desert Knowledge CRC or its participants.

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