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**A BUSINESS LESSON FOR THE TASMANIAN ROCK LOBSTER INDUSTRY:
Information Systems and Technology is not a Quick Fix**

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Abstract The Tasmanian rock lobster industry plays a significant part in the social and economic development of the island state of Tasmania and its rural, remote and regional communities. However the mixed effects of globalisation and the rationalization of businesses and technologies on these communities can make them highly dependent upon resource extraction, a situation which underscores the need to create new and appropriate management strategies that reduce dependency on exogenous forces and influences.

This paper provides a valuable insight into the Tasmanian rock lobster industry supply chain. It captures the journey of the Tasmanian Rock Lobster Fishermen's Association and their exploration of Information Systems and Technology (IS/IT) to reduce their members' dependency on market influences and being 'price takers' for a scarce and valued commodity. This journey also reveals a more complex problem associated with the industry members' ability to manage the supply chain and it provides them with some important lessons for how the industry can move forward.

Drawing from qualitative social research, information systems, supply chain management and fisheries policy, this paper challenges the notion that IS/IT alone can promote industry competitiveness and sustainability. In order for industry members to successfully manage their supply chain in terms of reliance and capacity building, an integrative approach needs to be adopted that promotes trust, transparency and industry cohesion.

The Tasmanian Rock Lobster Industry

The Tasmanian rock lobster industry plays a significant part in the social and economic development of Tasmania (Frusher 2001; Williamson, Wood and Bradshaw 1998; DPIWE 2003a; DPIWE 2003b). The fishery is part of an industry supply chain that involves numerous participants including fishers, processors, freight forwarders, airlines and end buyers, all of whom are particularly economically and socially significant to the Tasmanian coastal townships and communities.

The Tasmanian rock lobster *Jasus edwardsii*, also known as southern rock lobster (DPIWE 2003b), is the target species harvested by the Tasmanian rock lobster fishery. The same species is also commercially harvested in South Australia,

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Victoria and New Zealand. Tasmanian rock lobster is known for its size, sweet taste and firm flesh and is highly desired in export markets. It also travels relatively well and East Asian consumers are prepared to pay premium price for high quality live red lobster.

The fishery has been managed by the Tasmanian State Government for over 100 years and has been an important component of the State's fishing industry for over 150 years (Bradshaw et al. 2000; Phillips et al. 2003; Ford 2001). The fishery is managed under an output controlled individual transferable quota management system (QMS), introduced on 1 March 1998, to replace the failing input control management method and engender bioeconomic sustainability of the fishery.

The lifestyle and work life of Tasmanian fishers and processors have been geographically remote and detached from the rest of the world which, in the past, has provided some immunity from global market trends (Cole 2003; Fulcher 2000). However, in recent times, industry members have had to manage various tensions between the local and the global. Technological developments and innovations such as refrigeration, transportation and telecommunications have provided opportunities for them to participate and trade in the global market place such as the American frozen tail market and the live export trade into Asian markets (Frusher 2001). They have also sought markets that pay premium prices for the Southern rock lobster product. Despite the benefits of participating in the global market place, increased exposure to new challenges and exogenous forces need to be identified and managed by fishers and processors if the industry is to remain viable and sustainable, economically and socially.

Despite the fact that high quality live red Tasmanian rock lobster demands premium prices in its major marketplaces, fishers and processors regard themselves as 'price takers' and are vulnerable to market fluctuations. China imports approximately 95 percent of the Tasmanian rock lobster exports (DPIWE 2003b; Griffiths and Pauley 2002). Duty-free points of entry in Hong Kong are used to import rock lobster and are controlled by six wholesale buyers in China who re-tank and re-distribute the rock lobster to restaurants throughout China (DPIWE 2003b; Griffiths and Pauley 2002).

At that point in the supply chain, the transparency of the physical flow of the product and associated business processes becomes uncertain due to the restricted flow of reliable information (Pontecorvo 2003; Lamming et al. 2001). Upstream players such as fishers and processors suspect that this uncertainty is contributing to wholesalers' competitive advantages in terms of price manipulation, making fishers and processors 'price takers' for a product that is of high value, in high demand and limited in supply. Hurn and McDonald (1997) highlight the point that consumer income and exchange rates accounted for much of the price risk faced by Tasmanian rock lobster fishing firms when the Japanese market was dominant.

The vulnerability of fishers and processors is also heightened by a lack of diversification of markets. It appears that there is a reactive cycle associated with the industry and its relationship with markets that ensures an ongoing reliance on the dominant marketplace. When prices are good in the dominant marketplace and money is available, industry members are not motivated to seek and invest in alternative markets that may initially require selling the rock lobsters at a lower

price. But when demand and prices drop, when there is a need to rely on alternative markets, when no alternative markets have been developed, or when there are limited funds to invest to establish new markets, industry members suffer to the extent that they can lose their livelihoods. Market uncertainty has made fishers and processors concerned for the viability and sustainability of the industry, which is further affected by price squeezes and increased operating costs such as for fuel. Uncertainty has been exacerbated by falling market prices following global events such as Severe Acute Respiratory Syndrome (SARS) (Overby et al. 2004); and consequential fluctuations in air transportation from 2001 to 2003 and the Australian dollar also. Light (2003) notes the effects of unpredictable global events, the dependency of exporters on key markets and the need to reduce risks through market diversification in the New Zealand seafood industry in the study of two prominent New Zealand exporters. For this author, the Nelson-based Sealords Pty Ltd and Moana Pacific Fisheries Pty Ltd are examples of how seafood enterprises have minimised the effects of world events through market diversification (particularly locally), maintaining buyer-seller relationships and exploring new opportunities.

Why IS/IT?

In the late 1990s, information systems, technologies and electronic commerce became very popular among businesses as they strived to maximize returns by reducing costs and improving efficiencies along the supply chain (DFAT 1999a; DFAT 1999b; Kalakota & Whinston 1997; Turban et al. 2000). For primary producers, information systems / information technology (IS/IT) and electronic commerce (EC) provided new opportunities to improve market access through marketing and trading online and improving efficiency, increasing margins and shifting the power back to the suppliers. IS/IT and EC also became appealing for some supply chain participants, as it was seen as means to “by-pass the middleman” and, as a result, improve supply chain efficiencies, transparency and profit margins. The “middle man” was often attributed to many of problems associated with the supply chain from a producer’s perspective and IS/IT and EC was seen as a “quick fix”.

Technology has played a significant ongoing role in the Tasmanian rock lobster industry (Frusher 2001), particularly in regard to fishing technology such as Geographic Positioning System (GPS), echo sounders, gear technology and vessel design. Other technologies include mobile phones, weather faxes, Very High Frequency (VHF) radio, satellite phones and Vessel Monitoring System (VMS) (Richards 1999). Much technology has been focused on improving efficiencies in harvesting and post-harvest management and compliance; however little effort has been made to utilise technology to develop an information system for the industry supply chain.

In 2000, the fishery’s peak body, members of the Tasmanian Rock Lobster Fishermen’s Association (TRLFA) recognized the vulnerabilities of their industry supply chain. Tasmanian rock lobster fishers wanted more information and knowledge about their supply chain and wished to advance their individual and collective understanding of the power of information to mitigate the risks and

uncertainties of a global primary industry. These opportunities offered to address and ameliorate a widely-held perception that fishers and Tasmanian processors are 'price takers' for a product that has limited supply and is highly sought after in current major marketplaces. In trying to develop their knowledge of supply chains, the TRLFA sought IS/IT solutions to improve market access and communication and information flows and to allow its members more often to be 'price makers'. This search derived, at least in some measure, from a growing understanding that the supply chain was typified by lack of transparency, lack of equity in participation and lack of trust.

In collaboration with a third party that promoted the adoption of electronic commerce in Tasmanian businesses, the TRLFA launched an EC Project (information service website and electronic trading platform) in 2000. The aim of this solution was to provide a portal for the Tasmanian rock lobster industry community which would include an online information service and trading facility. The project involved three target groups: public/browsers/potential traders, fisher members and trading members. The public/browsers/potential traders and fisher members would be catered for through an information service website and the e-trading platform would be just for trading members

The vision for the proposed e-trading platform was for fishers to explore new markets by posting their catches on a website for prospective buyers to view. In addition, the industry members could foster fisher-buyer relationships based on an agreed price and product and customer service quality standards. The aim was to begin this platform at domestic level and progress to exporting product to overseas destinations. Apart from the logistic advantages of selling product domestically, even in 2001 the TRLFA saw opportunities in the domestic market for Tasmanian rock lobster. If successful, this alone would assist with diversifying markets and increasing transparency along the supply chain.

Research Approach

The industry's journey to seek a potential IS/IT solution was captured in research which applied a multi-disciplinary approach, drawing from qualitative social research and information systems and from fisheries policy, to help understand the industry supply chain and obtain feedback from key industry stakeholders about the proposed IS/IT solutions.

The main objective of the research was to determine whether IS/IT could help create a sustainable future for the Tasmanian rock lobster industry by managing uncertainty and risk and by creating resilience within the industry to cope with change (Dovers & Handmer 1992; Ingeborg-Myhr & Traavik 2002). This objective had a business focus from which a number of research questions were derived:

- 1) What are the major processes and information flows along the Tasmanian rock lobster industry supply chain?
- 2) What current trends characterise the Tasmanian rock lobster industry supply chain?
- 3) What trends might emerge in the short to medium term?

- 4) How can information systems and technologies help the industry become more sustainable?
- 5) How can IS/IT help the seafood industry, in particular the Tasmanian rock lobster industry, improve the business processes along the supply chain and help advance sustainable fisheries for the rock lobster fishers and their communities of place and interest?

These questions required a number of strategies. The first was to explore how IS/IT was already being used by members of the seafood industry, in particular those in the Tasmanian rock lobster industry. The aim was to understand how fisheries and the seafood industry were using information systems and technologies to improve their supply chain processes and quality assurance systems, improve knowledge, communication and information flows and improve trade and marketing strategies. The second strategy was to investigate areas in the Tasmanian rock lobster industry that had potential for the development and adoption of IS/IT. The aim was then to develop data models that reflected the current industry supply chain and the proposed IS/IT concepts for the Tasmanian rock lobster industry and to test the models with key industry stakeholders and participants. Based on the feedback from industry consultation, recommendations for industry were then provided.

It became apparent that to successfully achieve re-engineering of the supply chain, whether it be adoption of IS/IT or just improving the business processes, there was a need to develop a strong understanding of the industry supply chain. It was necessary to identify key participants and understand the issues, trends, relationships and attitudes of supply chain participants in terms of the business processes, price formation, marketing, communications and the economics of supply and demand driven by markets.

To achieve these strategies and address the questions, ethnographic/soft systems methodologies were used to capture the contextual information about the industry supply chain and map it. SWOT analysis was also used to analyse the findings gathered from participant observations and industry consultation and to develop a profile of the industry.

The research investigated the outcomes of two IS/IT solutions tested on key stakeholders along the supply chain. However, for this paper, the focus is on the outcomes from the first IS/IT solution experienced by key members from the TRLFA. The experience gained from this initial journey becomes an important lesson for the TRLFA members in order for them to develop more sophisticated strategies to improve their supply chain.

The IS/IT Journey

A pilot project was undertaken by the TRLFA to test the proposed e-trading model with selected members of the industry including fishers, packers, processors and buyers. The trials aimed to test the business rules, processes and logistics involved in the supply chain with a view to trade online. It soon became apparent that these trials were less about technology and more about the business processes necessary to trade. A standard would also need to be established for suppliers wanting to use this system. The criteria would be based on the assurance of supply, quality and

on the understanding of the need to work together as a community, similar to a cooperative.

Once trials were conducted and the model accepted by the TRLFA, it was envisaged that the project would be expanded to include the entire Tasmanian rock lobster industry. Useful spin-offs from the trial were to include the provision of a facility to post product and orders online and the capacity to foster better relationships between buyers and sellers.

However, problems quickly emerged as industry members began to need more time to adjust to the new model and the business processes. There was also a greater need for closer cooperation and communication among supply chain members participating in the pilot. At the time, the upstream supply chain members enjoyed high beach prices and, apart from a few, they could see little reason to change and adopt costly risk management strategies such as diversifying target markets. No one could foresee that within less than 12 months, the fishers' comfortable position would change.

The outcome of the trial was eventually unsuccessful but it did highlight to the TRLFA an important lesson that the adoption of IS/IT applications is more about business processes than technology, that all supply chain members play an important role in the industry and that better relationships between fishers and processors should be fostered to achieve greater transparency and management of the supply chain.

By this stage, new trends began to emerge in relation to using IS/IT as a tool for traceability and quality management of supply chains. These trends began to coincide with the incidences of SARS and disruptions in air freight transportation out of Tasmania. From this change in direction, it became increasingly necessary for TRLFA members to gain a better understanding about the Tasmanian rock lobster industry supply chain, with a particular focus on identifying the key information systems, information flows, business process and relations.

Profiling the Industry

During the TRLFA's exploration of IS/IT solutions, there were opportunities to consult with key industry stakeholders, participate in seafood industry meetings, forums and conferences and analyse relevant literature. From this work and by applying SWOT analysis, insights were gained into the Tasmanian Rock Lobster industry that highlighted current issues and emerging trends relating to the industry.

A number of key themes emerged about threats and opportunities to industry and related to sustainability, accountability, quality assurance and the need for an integrative approach to management. This analysis identified significant strengths. Nevertheless weaknesses and threats dominated, among them industry fragmentation, lack of trust, market dominance, lack of market intelligence, trade agreements, quality management issues, lack of consumer awareness, freight logistic risks, research directions and costs of doing business. A number of opportunities were also identified, such as market diversification and improving supply chain transparency that could provide solutions to some of the identified weaknesses.

The current manual industry supply chain consists of a number of constraints: limited flow and sharing of knowledge and information about the Tasmanian rock lobster industry in relation to markets, consumer trends and business culture; limited knowledge about how these downstream processes affect the fisheries resource and fishing communities; limited knowledge of how fisheries management policies and plans impact on fishing communities; and lack of understanding about how fisheries management policies and plans have been undertaken in isolation of the downstream processes and trends.

Sustainability was a major concern for most key industry stakeholders interviewed, whether that term was construed as industry viability, resource management or managing change. An emerging trend associated with sustainability related to the 'emotion economy' where there has been an increase in customer/consumer expectations for food chains to meet standards in terms of quality, food safety and ethics. Industry accountability in operating and handling practices is another emerging consumer expectation. Codes of practice such as the impact of the industry on the environment, food handling and processing standards and conditions and transport conditions are some of the requirements that industry will need to address. These trends are reactions to global food chains where the product may consist of a number of origins and to increasing global consumer awareness and drive for quality assurance of food sources, traceability and standards of practice. To address these concerns, management systems for the environment and food quality and safety have been established. Examples include Environmental Management System (EMS), cool chain management systems and traceability systems such as Tracefish and Quality Index Method (QIM) (Bremner 2002a & 2002b; Denton 2002).

The sustainability of the industry also relates to managing the supply chain and enabling the industry to adjust to change. Ecological Sustainable Development (ESD) principles have been the backbone of many fisheries management plans and policies. However evidence from other fisheries around the world has indicated that managing industry based on quantitative catch and effort data and stock assessments may not necessarily produce a sustainable management plan and policy for the whole of industry (Bradshaw et al. 2001; Kaplan & McCay 2004; Pontecorvo 2003; Rossiter & Stead 2003). In saying this, fishing communities may suffer based on policies that use data that only come from one source. The management of a fishery/industry supply chain needs to be integrative and managed using both upstream and downstream information gathered from participants.

By observing the TRLFA's journey into IS/IT and gaining insights into the industry profile, an understanding of the "current" Tasmanian rock lobster industry supply chain was gained. This supply chain was largely a manual information system, which included a number of disparate information systems that reside with government agencies and other supply chain participants such as fishers, processors, transport providers and wholesalers (Figure 1).

Tacit knowledge is common with fishers and processors in terms of fishing and processing operations and product handling. This knowledge is particularly used in determining quality of product at point of capture, unloading, receiving, processing and dispatching. Fishers also use tacit knowledge during fishing

operations. The experience and unique knowledge of the sea, their vessel, the coastline and changes in the environment are extremely valuable for fisheries researchers and managers.

Such tacit knowledge can be formalized and it is collected and recorded by the Tasmanian Government's Department of Primary Industries and Water (DPIW) via a Quota Management System and an Integrated Catch and Effort System. This information is collected by fishers and processors and is monitored by fisheries compliance officers and Tasmanian police officers. The key information collected reflects the volumes and movements of the catch, such as areas fished, weights and numbers, unloading, receiving and dispatching details such as dates and times. Collecting and reporting this information is compulsory and non-compliance calls for severe penalties for industry.

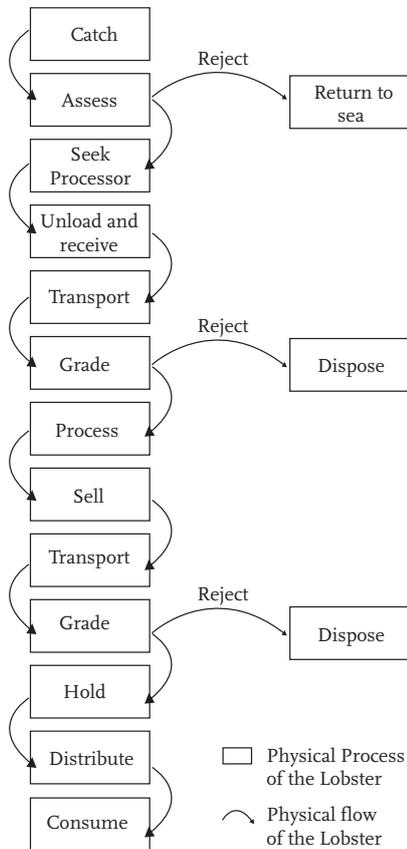


Figure 1: *The Tasmanian Rock Lobster Industry Business Diagram representing the physical movement of the rock lobster from catch to consumption*

Other information flows include beach and market prices, condition of product (including state of shell and number of legs), consumer preferences such as colour and size and product availability. It has been observed by fishers and other supply

chain members that supply and demand is manipulated by the 'middlemen' to determine beach and market price and ensure they have healthy margins. From a fishers' perspective, the lack of transparency along the supply chain erodes trust and fosters poor relations and lack of understanding of the business process and culture of other supply chain participants. Market information is subject to supply chain members passing on information through price and order specifications. Very little feedback is provided to fishers from the marketplace on the quality and end sale price of their product.

Transport providers including freight forwarders and airline carriers also have information and knowledge stored in their systems that do not always flow to processors or importers. Airway bills and consignment details hold key information about the product being shipped including the sender and receiver details, destination, carrier, product type and airport transfer details. The airways bills are necessary for international flights and are useful to track product for the freight forwarders. Many perishable primary industries are adopting cool chain management techniques to monitor environmental conditions of the product during transit. Technology such as Radio Frequency Identification Devices (RFID) can be used to collect information such as temperature and altitude, which is then read by a handheld reader at the end of the flight and downloaded onto a computer and made available to senders of product over the web. For exporters, there are many risks and uncertainties associated with the transportation of rock lobsters. As the transportation of rock lobsters are dependent on passenger flights, "offloads" can be an issue where freight is removed from the plane to make way for passenger luggage. This issue often causes delays in the shipment of the product to the destination and can affect a sale if there is a tight deadline.

Finally the destination for produce is another influence. As the major market place is China and the current major entry point is Hong Kong, there are three main issues facing exporters: border closures, airport closures due to weather conditions e.g. hurricanes; and lack of transparency of product movement from airport to importer's factory. There is therefore uncertainty for the exporter with regard to the validity of quality claims from buyers associated with the rock lobster.

In the light of the processes involved in assessing the suitability of an electronic trading system for the Tasmanian rock lobster industry, the industry's journey has disclosed some important lessons. These lessons highlight that all members along the supply chain play an important role and therefore bypassing them may not necessarily improve supply chain transparency, relations, business processes or information flows. In order to mitigate risk and uncertainty and improve confidence along the supply chain, more effort should be devoted to fostering better relationships among players, namely fishers and processors, through the development of information sharing strategies that promote transparency, trust and also aids the decision making process (Christopher & Lee 2004). For example, by improving the understanding of the business processes and price formation along the supply chain, buyer-seller relationships can improve. In this instance, the modest margins challenge the perceptions that Tasmanian rock lobster fishers and processors are price takers because of price formation. In fact, the industry's

reliance on these markets is what makes Tasmanian industry members price-takers. By realising that IS/IT may not be a quick fix for the problems affecting the industry supply chain and taking a more integrative approach to managing the supply chain, new IS/IT opportunities began to emerge for the industry.

Conclusion

IS/IT and global market trends are significant change agents in primary industries such as the fishing industry and have considerable effects on how industry members address trade and marketing, technology and communications or environment.

To explore how IS/IT could help the Tasmanian rock lobster industry improve its business processes along the supply chain and assist in advancing sustainable fisheries for the rock lobster fishers and their communities of place and interest, a multi-disciplinary approach was applied. By drawing from qualitative social research and information systems and fisheries policy, a contextual understanding about the industry supply chain was achieved.

The outcomes from this tested proposed IS/IT solution also provided valuable insights and important lessons for key TRLFA members about the relationships, information flows, business processes and markets associated with their industry. The industry profile analysis also highlighted a number of issues associated with sustainability, accountability and quality assurance that are interrelated and instrumental in formulating a strategic business plan for the industry. The experience also demonstrated the importance of social capital attributes such as trust and sharing of information in order to establish a more transparent and resilient supply chain.

From this understanding, issues associated with the current industry supply chain can be addressed and improvements of the supply chain can be made by sharing information among supply chain members in order to identify and minimise risks and uncertainty. Members can also become more proactive and make more informed decisions about their resources, environment and quality management.

In conclusion, for a fishing/seafood industry that wishes to remain competitive and sustainable in a global economy, there is a need for an integrative approach to managing seafood industry supply chains. To achieve sustainability and manage risk and uncertainty, SCM and the appropriate utilisation of IS/IT may be a strategy in achieving this outcome provided there is understanding about the industry supply chain.

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