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**NETWORK GOVERNANCE OF R&D:  
PURCHASER-PROVIDER AS PARTNERSHIPS IN A PUBLIC SECTOR AGENCY**

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## **NETWORK GOVERNANCE OF R&D: PURCHASER-PROVIDER AS PARTNERSHIPS IN A PUBLIC SECTOR AGENCY**

### **Abstract**

Network forms of organizing are becoming increasingly common, yet less is known about their governance mechanisms than either markets or hierarchies. In this paper, we examine the restructure of a large government R&D agency from a network governance perspective. This longitudinal study tracks the R&D agency as it implemented “purchaser-provider”, a popular public sector management reform with the intention of creating market-based competition as a governance mechanism to increase efficiency and effectiveness. In contrast, we found that this R&D purchaser-provider implementation behaved more like a partnership that was better characterized as network governance. That is, we observed a complex multi-stakeholder environment in which a mix of cooperation and competition work hand-in-hand, and social control mechanisms were prevalent. We analyze both the characteristics and the governance of this public-sector R&D network using several business network frameworks. To examine the characteristics of the network we drew mainly on the Scandinavian IMP group’s actor-activity-resource model of business networks. To analyze network governance, we examine the four social mechanisms proposed by Jones, Hesterly and Borgatti (1997). We find that while some mechanisms, namely reputation and macro-culture were prevalent, other mechanisms such as sanctions and restricted access were not observed. Through these analyses of a business network in a somewhat unusual context, we develop a number of managerial and theoretical insights about network governance.

Keywords: [Business Networks; Governance; R&D Management; Government]

## INTRODUCTION

Public sector R&D plays an important role in a knowledge-driven economy. This is particularly true in agriculture, where government R&D agencies are common in many western countries. The rationale for heavy investment in public agricultural R&D tends to focus on market failure and national parity.

The organizational and governance arrangements that are best suited to maximize the effectiveness of publicly funded R&D are contentious issues. Government R&D agencies, together with other public services, have been criticized for lack of transparency, accountability and alignment to industry needs. A popular public sector reform aimed at addressing these issues is Purchaser-Provider. Under this reform, the “purchaser” and “provider” of public services are structured as separate entities, and alternative providers compete for the purchaser’s business. More specifically, the “Purchaser” – which decides what public services are required - is normally retained by government. The “provider” of public services (or goods) are shifted to the private sector, and compete for business from the purchasers. Proponents of this reform argue that transparency, accountability and efficiency are all improved under this market-based model.

Within the agricultural R&D context, purchaser-provider has been implemented in a number of countries including Great Britain and New Zealand. In these implementations, former government laboratories were privatized and subject to market forces. The focus of this study, however, is a somewhat different and unique context - the implementation of an internal “Purchaser-Provider” restructure by the Queensland Department of Primary Industries (QDPI). The reform essentially separates the “purchaser” part of the department from the “providers” of public services (or goods), thereby introducing some internal competition (FitzGerald, 1996). However, all parts of the agency remain within government.

The purpose of this paper is explore the governance mechanisms within this context. First we argue that this internal purchaser-provider model has many of the characteristics of a business network That is, viewed from a traditional transaction cost economic perspective (Williamson, 1985), governance is not dominated by market-like competition, nor bureaucratic-like cooperation, but a fairly balanced mixture of both (Thorelli, 1986). We explore the characteristics of this business network using the IMP actor-activities-resources model (Hakansson, 1982) and in particular, examine the governance mechanisms using the Jones, Hesterly and Borgatti (1997) framework. We use these analyses of a somewhat unusual business network context to develop both managerial and theoretical insights.

The paper is structured as follows: First we discuss the context and site of the research. This is followed by the theoretical background for the study – modes of governance, business networks and network governance mechanisms. Next we discuss the methods used in the case analysis. The case analysis is organized by first exploring the R&D network characteristics and then examining in more detail the network governance mechanisms.

### THE PURCHASER PROVIDER INITIATIVE IN QDPI

This section provides the context for this study by discussing both Purchaser-Provider and its implementation within QDPI.

Commonwealth and State governments in Australia have been seeking to improve public-sector management systems in the last ten to fifteen years. An increasingly popular strategy has been to introduce elements of a market through a Purchaser-Provider structure (FitzGerald, 1996). Theoretically, the Purchaser-Provider model separates the purchaser function from the provider function in an attempt to achieve tighter targeting of clients and

outcomes, improved accountability and transparency, and improved efficiency and effectiveness in the delivery of services.

QDPI is a rural economic development agency bringing together the Queensland government and industry in partnership to increase the viability and profitability of primary industries on a sustainable basis. The Department's primary activities focus on research, development and extension (RD&E), information services and regulatory functions. These are essential to primary producers seeking to increase the competitiveness, efficiency and profitability of their enterprises. The Department's responsibilities focus on agriculture, forestry and fisheries, with a budget of \$350 million and a workforce of 4000 staff, with 74% located outside central Brisbane. QDPI's vision is to have a self-reliant primary industries sector confidently competing in a world market place.

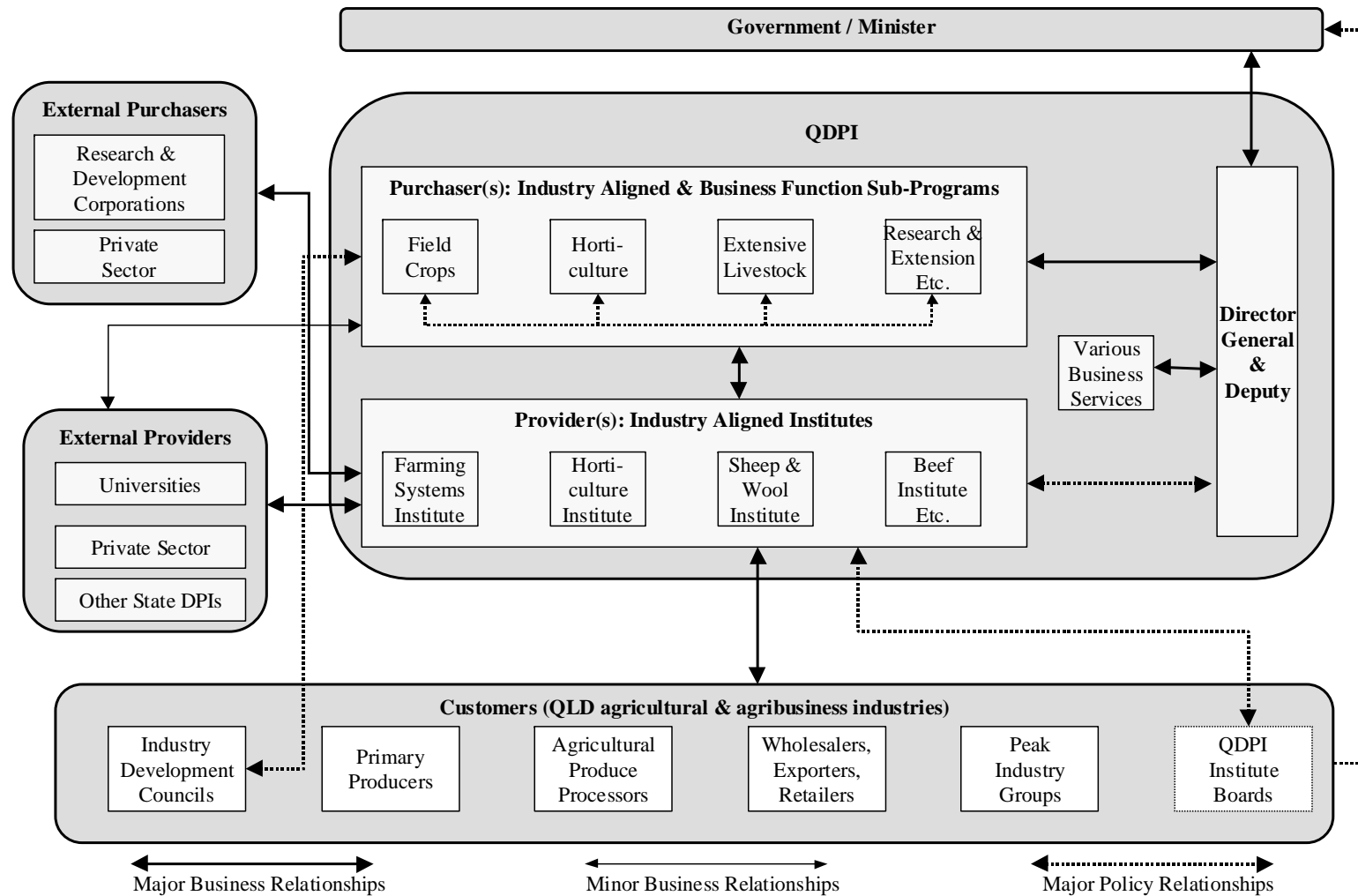
The essence of QDPI's new Purchaser-Provider structure is shown in Figure 1. The first step to Purchaser-Provider is the separation of purchasers and providers. A statewide network of industry-focused institutes was established to act as *providers* of RD&E services for QDPI. Simultaneously, Sub-Programs were established to act as *purchasers* of RD&E (and other) services.

The role of the purchaser Sub-Programs is a policy role, to set priorities for industry development and ultimately to decide what RD&E services should be purchased. Given the role of QDPI to enhance the sustainable economic position of rural industries, the above priorities are decided in partnership with industry through industry development councils (IDCs). "A modus operandi for DPI's investment in economic development is the purchaser/provider partnership" (Duffield, 1997, p3).

Each institute is controlled by a director and a board that is comprised mostly of industry representatives. These institutes perform services for the purchasers under a "memorandum of understanding". Under this negotiated agreement, deliverable outcomes from the institute's RD&E activities are specified against funding. Institutes are also free to seek funds from external bodies, most notably Commonwealth research and development corporations and directly from industry.

### **ADMINISTRATIVE, MARKET OR NETWORK GOVERNANCE**

The Purchaser-Provider model, on which the reforms introduced at QDPI are notionally based, adopts the neo-classical economics ideology of the efficiency of markets (Duffield, 1997; FitzGerald, 1996). Neo-classical economics sees markets as the most efficient mechanism for governing economic activity, where price and competition act as the controlling mechanism. QDPI formerly operated under administrative governance, where activities within firms are controlled through rule-based administration, or hierarchies, representing pure cooperation between actors. Below we argue, however, that the reality of the purchaser-provider implementation at QDPI operated more as network governance, with a balanced mix of cooperation and competition.



**Figure 1: QDPI Purchaser-Provider Network**



Business network theory provides a third perspective that may be useful for examining the implementation of purchaser-provider in QDPI. Thorelli (1986) proposes that networks act “between” markets and hierarchies, with a mix of cooperation and competition. Indeed, Williamson (1991) explores hybrid forms of governance from a traditional TCE perspective. He argues hybrid organizational forms are between markets and hierarchies for each of the four important transaction-cost dimensions – incentive intensity, administrative controls, autonomous adaptation and coordinated adaptation. As such, he argues hybrid governance forms are desirable at intermediate levels of asset specificity.

While it is generally agreed that this mix of cooperation and competition exists in networks, it is also widely acknowledged that networks operate in a distinct and separate way to either markets or hierarchies. That is, networks are not “between” markets and hierarchy on a single dimension (Powell, 1990). In essence, it is social dimensions, rather than a pure economic rationalist perspective, that others use to provide additional insights. For example, Thorelli (1986) posits that power, defined as the ability to influence the decisions and actions of others, as the essential ingredient of networks. He also acknowledges the importance of trust. Powell (1990) argues that networks are driven by various relational concerns – characterized by patterns of reciprocal, preferential, mutually supportive actions, interdependence, personal relationships and normative rather than legal sanctions. Ring and Van de Ven (1992) conceptualize reliance on trust as the key dimension that differentiates recurrent and relational contracts, from markets and hierarchies respectively. Adler (2001) further argues that trust is a central coordination mechanism within “communities”, although he argues that a modern “reflective” trust, rather than a traditional “blind” trust is most effective. Granovetter (1992) argues that all economic exchange, be it within hierarchies, networks or market, takes place in a social context where sociability, status and power act as central human motives. Hakansson and Johanson (1988) suggest a 2x2 typology of governance structures based, first, on whether the primary external forces are specific to a particular actor or general, market-type forces and, second, on whether the primary internal forces are norm based or individual interests. Using this typology they argue network governance (being external and norm based) can be contrasted from three other forms of governance - markets, hierarchies and organizational culture.

We argue that purchaser-provider as implemented at QDPI, a public sector R&D agency, should not and will not operate under pure competitive control, but in fact as a network we will term purchaser-provider partnerships. The bases for our assertions are twofold. First, from an empirical perspective, the purchaser-provider implementation described offers limited competition at best. While purchasers and providers are placed at an arms-length relationship, alternative providers for most purchased services do not exist. Some R&D services could be provided by alternative providers, allowing limited competition. Purchasers would be quite reluctant to go outside QDPI for any R&D services that could be performed in-house. In fact, it is difficult to conceive of a situation where this would occur. In essence, our empirical context represents far from an open market. Second, at a theoretical level, our argument follows a TCE logic – planning, coordinating and safeguarding R&D activities in an arms-length market-like contractual arrangement is too difficult due to both the high levels of uncertainty and asset specificity (particularly human) involved. Following Jones et al. (1997), task complexity also promotes closer cooperation.

## **BUSINESS NETWORK MODELS**

Business network perspectives introduce a number of concepts that, in our context, may capture the complex and dynamic nature of the relationships between the multiple



purchasers, providers and other stakeholders that characterize the reality of QDPI's evolving business environment. A potential contribution of business network theory in this context is to provide an analytical set of lenses for describing how businesses *actually operate*, as opposed to the normative or prescriptive approach of economics, which is more often concerned with how businesses and markets *should operate*. The literature on business networks is, however, is far from cohesive, with contributions from a range of disciplines. We draw on some literature from management, marketing and sociology.

Arguably, the most comprehensive descriptive framework of business networks comes from the International Marketing and Purchasing (IMP) group (Anderson, Hakansson, & Johanson, 1994; Axelsson & Easton, 1992; Ford et al., 1998; Hakansson, 1982, 1987; Hakansson & Henders, 1995a; Hakansson & Johanson, 1992; Hakansson & Snehota, 1995b; Moller & Wilson, 1995). This work has developed and refined a network approach through a focus on business networks and exchange relationships. A cornerstone of their approach is the actor-activity-resource model (Figure 2). Exchange relationships are defined as business relationships between autonomous business units built from a history of exchange episodes.

Four key elements of exchange are product or service, information, financial exchange and social exchange. Business relationships can be seen as having different substance as well as different functions (Hakansson et al., 1995b, p.26). The substance of relationships is viewed as having three different layers – actor bonds, resource ties and activity links – which characterize the relationship between the companies. The activity layer refers to the technical, administrative, commercial and other activities that connect internal activities of the two actors. The resource layer describes ties that connect the various resource elements (technical, material, knowledge resources and other intangibles) of two companies. In the actor layer, the actors become connected and bonds are developed that affect how the actors perceive, evaluate and treat each other.

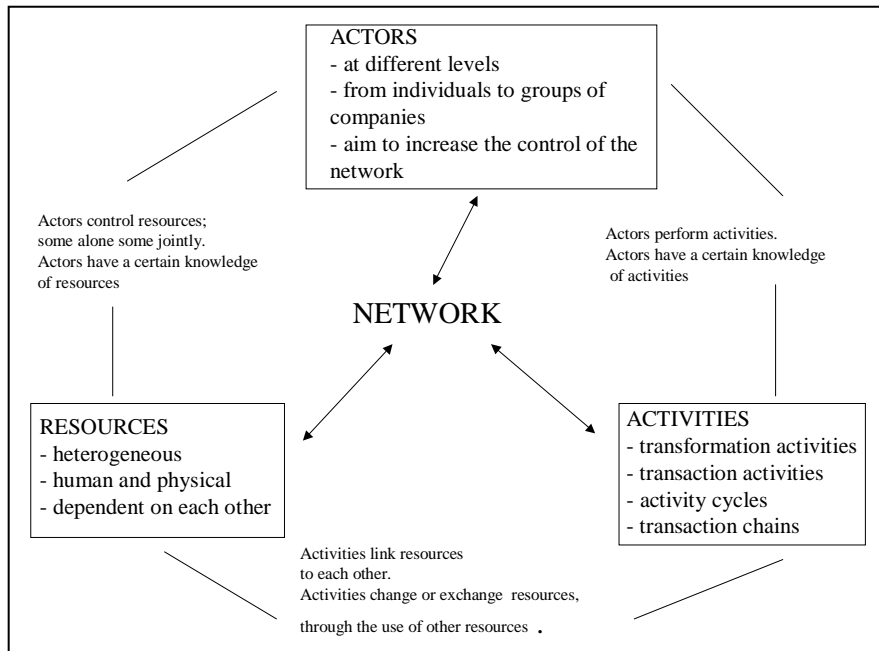
Relationships may be further characterized by varying levels of cooperation, commitment and trust, which affect the nature of negotiation and importantly, the flexibility of working transactional arrangements (Morgan & Hunt, 1994; Wilson & Moller, 1995). Unlike administrative or market control, network theory suggests that control systems are emergent: they take time to evolve, are path dependent and are non-deterministic (Hakansson et al., 1995a).

Of course literature on business networks is vast and much other literature compliments the IMP description of networks. A large literature from strategic management focuses on dyadic relationships, such as strategic alliances, partnerships and joint ventures, that can be broadened to explore inter-organizational networks. For example, Ring and Van de Ven (1994), develop a three stage cyclic model (negotiations, commitments and executions) of inter-organizational relationship development. Management literatures (e.g. Miles & Snow, 1986, 1992) have explored network forms of organizations.

Offering an alternative perspective, social network theory has extensively explored the influence of interpersonal networks on behaviour. While the original and primary focus of this research stream is concerned with individual actors, many recent contributions have been concerned with organisational actors e.g. (Gulati, 1998; Jones et al., 1997; Uzzi, 1996, 1997). Central to the social network theory is the concept of embeddedness – the social structure of ties within which economic transactions are placed. Social network theory analyzes both the quality of dyadic exchanges (relational embeddedness) and the structure and architecture of the network (structural embeddedness) (Granovetter, 1992). Relational embeddedness perspectives stress influence through cohesion between actors with strong ties. Structural

embeddedness perspectives stress the informational value attained through position within the network.

Based on these business network frameworks, our first research question becomes: *What are the key characteristics of the R&D business network for the QDPI purchaser-provider implementation, and what impact do these have on its governance.*



**Figure 2: IMP Network Model**

## NETWORK GOVERNANCE

We now turn our attention more specifically to the character of governance mechanisms within networks. We adopt the Jones, Hesterly and Borgatti (1997, p.914) definition “network governance involves a select, persistent, and structured set of autonomous firms (as well as nonprofit agencies) engaged in creating products and services based on implicit and open-ended contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges. These contracts are socially – not legally – binding.”

We draw heavily on the conceptual model of network governance developed by Jones et al. (1997). They contend structural embeddedness (Granovetter, 1992) is the foundation for social control mechanisms to effectively operate. Based on social network and exchange literatures, they develop a typology of four social control mechanisms - restricted access, macroculture, collective sanctions and reputation. Here, restricted access is a strategic reduction in the number of exchange partners, macroculture is a system of widely shared assumptions and values between partner organizations in the network, collective sanctions involve group members punishing others who violate group norms, values and goals and reputation concerns an estimation of one’s character, skills and reliability.

They go on to argue that these four social mechanisms control exchanges through facilitating adaptation, coordinating exchanges and/or safeguarding exchanges. Specifically macroculture assists coordination, collective sanctions and reputation tend to safeguard transactions, while restricted access acts to both coordinate and safeguard transactions.

Other literature complements this model of network governance. Ouchi (1979) introduced the notion of clan control – an informal, socially based control mechanisms such as shared values, beliefs and goals so that socially acceptable behaviors are reinforced and rewarded over time. A considerable amount of related work has focused on dyadic business relationships such as strategic alliances and joint ventures. Ring and Van de Ven (1994) conceptualize control within cooperative business relationships where “psychological contracts” progressively substitute for legal contracts over time. Das and Tang (1998; 2002) explore the typology of behavior, output and social control mechanisms, which is widely accepted in the control literature (Eisenhardt, 1985; Ouchi, 1979). In the context of alliances, they emphasize the important difference between formal control mechanisms (behavior and output) which are rule based, and social control mechanisms which are people based. They hypothesize that social control acts to enhance two dimensions of trust – competence trust, trust that the partner ability to perform and goodwill trust, trust in a partners intentions to perform. Conversely, they hypothesize trust enhances the effectiveness of control mechanisms.

Das and Teng (2002) develop a typology for alliance constellations based on whether they are horizontal or vertical in type, and short- or long-term in orientation. They argue that the need for social control mechanisms (social sanctions and cooperative macroculture) varies with constellation type. Joint bidding alliances requiring the lowest degree of social sanctions, product bundling and R&D consortia medium levels and horizontal keiretsu the highest.

Based on these notions of network governance, our second research question becomes: *How did network governance mechanisms act to adapt, coordinate and safeguard transactions within the QDPI purchaser-provider implementation.*

## METHOD

A three-year longitudinal study of the QDPI network was conducted during the restructure and implementation of purchaser-provider. Since the focus of the research was concerned with understanding the contextual nature of this business network and associated governance mechanisms, and the how the networks operated, we were mostly concerned with a contextual and processual analysis approach (Pettigrew, 1995).

For our research hypothesis concerning the dominant mode of governance, our approach was to identify instances of market, hierarchy and network forms of governance. To address the first research question - describing the network characteristics - we examined the fabric of the business relationships according to dimensions of the actor-activity-resources model. To address the second research question – nature of network governance mechanisms and their influence on R&D management – our primary concern was to identify changes to R&D management as a result of the restructure, and explore the causes for these changes with regard to the Jones et al. (1997) topology of social governance mechanisms.

Case studies of two focal QDPI institutes, Queensland Horticultural Institute (QHI) and Farming Systems Institute (FSI), and their local networks were undertaken. Each case study involved multiple data sources, written histories, semi-structured interviews, observations at key meetings and document analysis, allowing data triangulation. Details of these data are provided below, followed by description of our data analysis.

**Written histories.** A key individual within both the horticultural and farming systems groups of QDPI were commissioned to develop a written retrospective history of the past 25 years. These histories described developments over time, drivers for change and current issues.

**Semi-structured interviews.** Interviews were held with senior staff of each business organization or unit identified within the network above. In all, 60 in-depth interviews were conducted. Specifically, interviews were conducted with each of the five members of the senior management team of QDPI, the director and business manager of each institute, the general manager (purchaser) for each institute, the chairman and another member of the board for each institute, and chairman of the relevant industry development council.

The interviews were semi-structured and followed a convergent interview protocol. Interviews were taped and transcribed, then returned to the interviewee for verification and annotations where desired for additional clarification.

**Observation.** Over a 3 year period, researchers were observed at key meetings within each institute and their key stakeholders. In all, 24 meetings were attended. These meetings included quarterly board meetings, management team meetings of senior staff of each institute every 4-6 weeks, and some early meetings of the industry development council meetings .

**Archival Documents.** The study focused on a major restructuring exercise for QDPI. As such, there was a rich source of documents describing this context. The most important of these included several positioning papers described the QDPI restructure and its purpose; charters for each research institute and their boards; memorandum of understanding between each QDPI program (purchaser) and research institute (provider); a broader background paper by Queensland Government concerning the phased implementation of purchaser-provider.

**Data Analysis.** Transcripts of interviews were initially coded using a schema developed from the business-to-business network literature, that captured the main constructs from the IMP Actor-Activity-Resources model. The coding was performed manually using NUD\*IST4. The data was further explored using axial and selective coding techniques (Strauss & Corbin, 1998) to uncover the nature of the model's constructs and relationships between constructs in the specific context of this case. The interview data were augmented from the other sources of data, such as notes taken at meetings and archival documents. These data sources were selectively coded where relevant to the research issues and cross-matched manually.

## CHARACTERISTICS OF THE NETWORK

We start our analysis by examining the characteristics of the network, and their impact on governance at QDPI. We first examine the overall structure of the network, then explore the IMP actor bond – activity link and resource tie framework to guide our analysis.

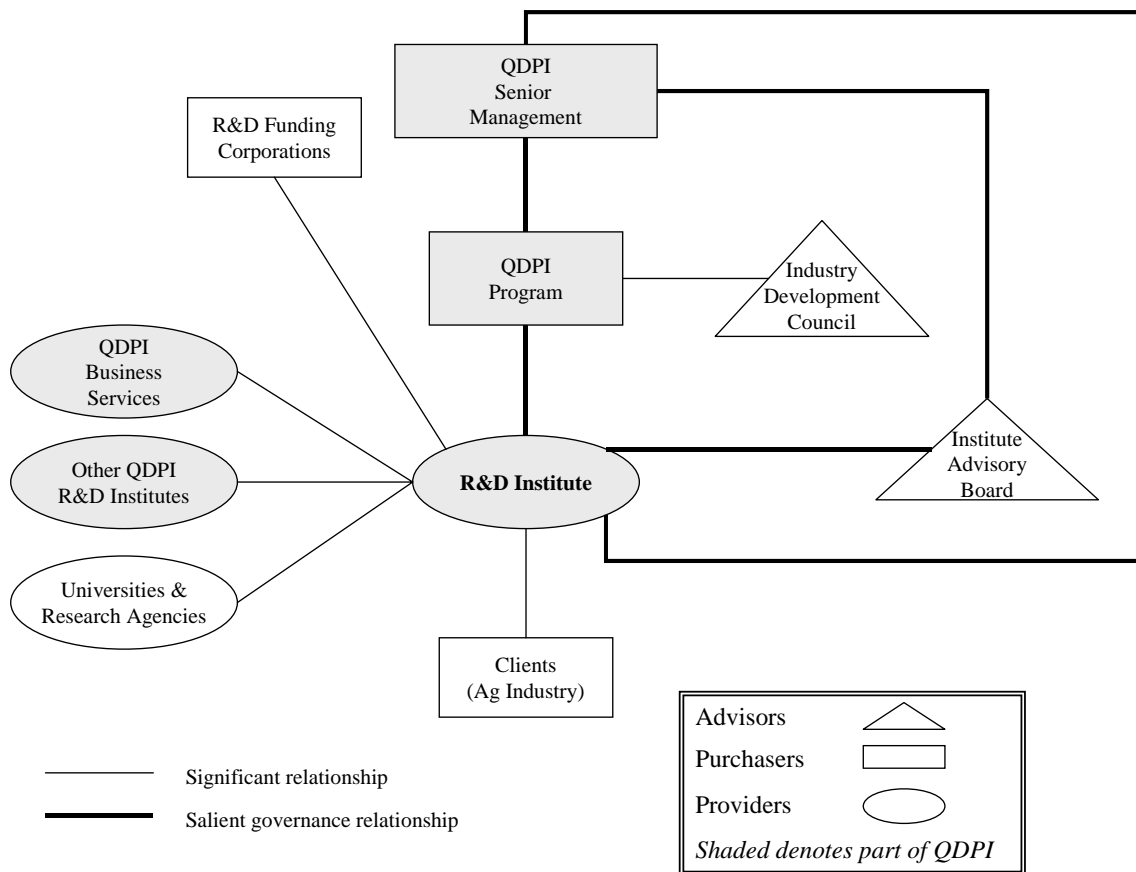
The structure of the overall QDPI network is provided in Figure 1. This figure tries to capture the full scope of the network. However, following the IMP approach we now identify a focal relationship (Anderson et al., 1994), and the most salient network relationships. In our case, the focal relationship for each case study is between the institute and its associated QDPI program.

Figure 3 indicates the salient governance relationships and the significant multiple relationships between the RD&E Institutes and the stakeholders in their networks.

The institutes and their Boards need to be considered together. Institutes were providers of RD&E services and were dependent on the QDPI Program and the QDPI Senior Management as internal Purchaser for financial resources that were largely allocated to fund the salaries of the Institute permanent R&D staff of the Institutes. The salient governance relationships were between the Institute and QDPI Program and overtime the QDPI Senior Management Team

and the Institute Board. The Institute Director was accountable to the Senior Management Team and also to the Board. Institute Directors largely resourced the Chair of the Board, attended Board meetings though could not vote and Institute staff coordinated the Board meetings. Most Institute Directors had regular informal discussion with their Board Chair. The Chair of the Institute Board communicated independently with the Executive Director of QDPI.

The institutes also needed financial resources from external funders such as the R&D Corporations and at times direct funding from the agricultural industry.



**Figure 3: Network Structure of R&D Institutes**

The Institute Board provided advice and guidance on the strategic direction setting and also good business practice. Industry Development Councils which looked at the broader futures for particular commodities such as export markets, and sustainability issues had tenuous relationships with the Institutes in a somewhat evolutionary process. Other advisory/collaborative relationships existed with other service providers such as universities and research institutes at different times.

Several features of the new structural arrangements impacted directly on governance. The most obvious were the stronger industry orientated focus of each institute's R&D activities. Stronger ties to industry based actors increased their influence over R&D activities. Moreover, within the boundaries of each institute, the effectiveness of administrative control was improved. Each institute operated under a smaller span of control. Networks of researchers within specific industry applications were strengthened with the new structure, building in the co-location and frequency of interaction known to be important for development of new ideas and research and development. This is illustrated by the following quotes:

*“... while we had horticulture people in most of the major regions, we had this fragmentation. ... The institute has effectively refocused the whole horticulture group and brought us back together to the stage where we now have a much better focus on what we're doing and a much greater opportunity. Even though there are five programs, because we've got so many people that are split across programs, nobody sees those programs as a boundary in the way they used to see the region as a boundary. So we've actually managed to refocus and bring things back together again, which is good.”*

*“The other thing is that we can put together project teams across disciplines. For example, we might be putting a project together on strawberries but in that project team you might have a plant pathologist, an entomologist, a post harvest expert and even an economist involved in it, bringing their various skills to a project to deliver better outcomes. ... we can put a skill based project team together to deliver better outcome which can be taken up by industry”.*

### **Actor bonds**

The research revealed many dimensions of actor bonds within the overall network. These bonds are the foundation for the social governance mechanisms discussed in the next section. Here, we briefly describe some of the observed characteristics of the bond.

The importance of personal relationships (social bonds) between actors was clearly apparent. Many of the QDPI staff had been with the organization for many years and had established a rich web of personal relationships, and the importance of personal relationships was repeatedly in interviews.

*“My relationship with the directors is that I try to work hard on the personal relationships.”*

*“...and those sorts of relationships, you often exchange an awful lot of information very quickly about what's happening, and I really value that.”*

*“I want to find out what really makes these sorts of relationships work and not work; and when they're not working, we're not learning.”*

The importance of maintaining and utilizing a very complex network of both formal and informal relationships was also consistently articulated in interviews.

*“Where I think independence will come from will be in their ability to manage their complex relationships inside and outside the organization, and in what they can gain from those relationships.”*

*“It's more about the informal relationships and the way dollars flow and the way priorities flow.”*

*“We try to have relationships with all of these people, vertically and horizontally and all the rest of it... So there are inter-relationships at all levels, and you've got to have them to make it work.”*

*“And particularly if we're chasing business outside, there will be all sorts of groups that we might decide to have an alliance with.”*

*“In the longer term, I think that the director will be accountable to both the CEO of the purchaser and to our own internal board of management. The board that we have should really represent the stakeholders. ... That's a board of management that sits there, but I think probably one of the key relationships has to be between the CEO and the provider as in the QHI director and the CEO of the purchaser.”*

Finally, the network was deliberately structured with a series of interlocking directorates and representations to ensure each stakeholder interests were widely represented and maintained. These measures included: representation on the boards by QDPI senior management team, attendance of institute senior management team meetings by QDPI program leader and common membership of the institute board (often director) and industry advisory council.

### **Activity links**

As a result of the revised structural arrangements, linkages of business activities altered. Activity links within the areas of commodity production of each industry were strengthened. At the same time, links with stakeholders in the value chain from post harvest treatment and storage to market activities were enhanced. Staff were now part of an organization with a new focus and this lead to better negotiation of activity links with external groups of researchers in national projects and industry consultants.

One area of improved linkages occurred between the Institute and the non-R&D sections of QDPI, particularly in issues of market access. The more focused, industry-specific concerns of the institutes lead to a stronger imperative to establish these linkages:

*“I think, if anything, they're bringing them closer together, because there's always been a divide between research and some of these other things. In fact one of the good things that's happened is that some of the marketers out of rural industry business services have now been aligned to institutes.”*

*“Also for example, in the export development area, we're working closely with those people to bring resources to bear on export development and provide some direction.”*

Importantly, the industry specific focus created by the institutes encouraged improved linkages with their ultimate client base – industry:

*“Feedback from industry is that they know exactly where to come to for assistance. They've got a point of contact and they feel it's theirs, because it actually says Horticulture Institute, rather than I'm the entomologist from QDPI, or I'm the extension officer or whatever. I think it also gives further credibility and depth to what QDPI can deliver.”*

Renegotiation of relationships with external R&D funding bodies (i.e. other providers) involved shifting from contractual provision to collaborative processes to identify common goals and purposes.

*“So, again, it's a joint venture type arrangement (with other Providers) that we should be looking at, not a contractual arrangement. If they paid the full cost of a project, then I'm quite happy for them to put whatever conditions upon it they wish. But while they're only contributing 20% or 30%, which is the norm, then it should be a joint venture arrangement.”*

Institute scientists and QDPI business services worked together more closely to plan and execute projects.

*“They formed teams, they then sorted out who was going to be a project leader across the whole lot, and those projects that they talked about were all about the whole range of things that were needed to get the project running. And it involved a combination of market development, transport arrangements, technology etc.”*

As institutes focused more on the R&D they were contracted to deliver, some QDPI managers in other parts of the department were concerned that the institute focus on R&D was taking them away from the broader service responsibilities of the QDPI. One senior QDPI manager wanted to

*“pull together the senior people from each of the institutes and from the other business groups in each of these geographic areas, sit them down regularly and say, now the prime purpose here is to make sure we've got integrated service delivery, that we've got these projects coordinated, etc.”*

*“But also to coordinate on committees so that we're applying the best resources and best people to a particular problem.”*

The QDPI human resource (HR) system, acting as an activity link across the department, was also observed to constrain R&D management within the Institutes. This HR system made it difficult, and costly, to terminate staff contracts for full-time staff. As a consequence, quantum changes in areas of research activity that did not leverage the existing discipline areas of expertise (i.e. shifting human resources), were difficult to initiate.

Research links between institutes, that is those involving cross-industry research priorities, were reduced as a result of the restructure. This was an inevitable and unwanted consequence of the new structural arrangements. While the intention of the purchasing group was to coordinate and advocate cross-industry issues and priorities, they were rather ineffectual in this regard. As expressed by a senior QDPI executive:

*“It (the institute structure) comes with its own negative which was that we tended to get a silo approach to service delivery, each institute being very separate and very focused on its own business and very difficult to get focused on cross-industry issues and whole of government issues.”*

## **Resource ties**

Strong resource ties exist within the QDPI network. The most obvious is the common “corporate support” across the entire department. This includes common information systems, accounting systems, legal services, HR services, RD&E policy advice, export development, and rural industry business services. These resources are shared by all internal



QDPI actors. This has a variety of consequences, including Staff movements and implementing software to facilitate activity links. Strong physical resource ties also exist horizontally between institutes. It is not uncommon for institutes to share sites and equipment. This facilitates the potential for horizontal activity links between institutes. However, shared resources can inhibit the independence of institutes. With regard to the independence/interdependence of ties, one of the most important issues that has emerged from the new structural arrangements is corporate identity – in particular, the degree to which institutes establish a separate legal and/or market-based identity. Several important resource elements of corporate identity are the use of the QDPI name and its logo, and ownership of intellectual property. This resource tie has been an important factor shaping the relationship between institutes and sub-programs. More importantly, corporate identity influences the relationship between institutes and industry groups, since it is crucial in shaping the external perceptions of institutes. This provides an example of resource tie between two actors (institute and sub-program), influencing the relationship between third parties (industry groups).

The Institutes, especially industry representatives, saw the financial information system used by QDPI as inadequate to inform important strategic decisions in a timely way. However, the Institutes were constrained to comply with the existing information system, which acted both as a resource tie (common IT resource across QDPI) and an activity link (sharing financial information). In practice the institutes established financial management systems in parallel to the QDPI system, which gave them better and more business oriented planning and monitoring processes.

As expressed by an Institute Director

*“it really comes back down to the financial control. If you knew exactly where the money was in a bit more detail and a bit more regularly, you've probably got a better chance of trying to reallocate it and move it around. And control the spending a little bit.”*

Shared infrastructure such as research stations, shared by several Institutes, acted as a resource tie. These acted to constrained shifts in R&D activities that would lead to either under-utilization of these resources, or lead to competition with other Institutes for this scarce resource. One Institute Director suggested that specific processes should be introduced in the management of assets which included planning and limiting access to these assets for particular projects to maximize their efficiency.

*“If I were running a business and I had control of ten research stations as I do now, and money was tight, I'd be looking at those assets and saying, which ones of those can I actually sell or sub-divide part of and which ones do I need to upgrade using the money that I've obtained. Now, the incentive to actually do that is not there because if we decide to give up an asset, then we've given it up. Treasury sells it and the money goes to the best bidder for a road or a bridge or whatever else might be the flavor of the month. I find that a bit frustrating, that we have responsibility for these things, but no control or ability to manage them properly.”*

Each institute, as a provider, received funds to deliver services. Their business managers were now aware of the costs that were appearing on their ledgers as they were charged for the cost of utilities at research stations which they ‘shared’ with other institutes. The institutes began to review their areas of responsibility and the cost of support services which were not relevant to their day to day practices and to suggest reallocation of costs in line with responsibilities.

*“I think we should be revisiting what costs are billed to the Institute because we're trying to save money”.*

## **NETWORK GOVERNANCE MECHANISMS**

We now turn our attention to the mechanisms of network governance as observed at QDPI. We use the Jones et al. (1997) conceptualization (macroculture, reputation, restricted access and collective sanctions) as the starting point of our analysis. As discussed below, we found macroculture and reputation to be the most important mechanisms. The role of restricted access was rather trivial in our context, considering that the composition of our network was pre-determined by the QDPI restructure, rather than networks where firms are free to selectively choose collaboration partners. The use of collective sanctions was not observed.

### **Macroculture**

Evidence of a reasonably consistent “R&D culture” across the network was quite strong. This is not at all surprising given that most of the business units had come from a single hierarchical organization, and were still, in a legal sense, still part of the one organization. In fact, this culture acted as significant source of inertia stifling change, as illustrated by this observation:

*“ many have seen restructures before and gone on doing the same old thing for 30 years ...it's very difficult to motivate those people to move in a different direction, or even have them believe that the direction is a real one”*

As such, this overarching culture acted to safeguard transactions, provided they were consistent with the long-standing shared understanding of QDPI's direction. Conversely, this source of inertia could act to undermine any new directions considered in conflict with this established culture. One Institute program manager remarked:

*“The Purchaser-Provider split has put a division in the Department that wasn't there before, more of a ‘them and us’. Internally, within the institutes, with division in staff, some see it as a positive move to really progress and do things that maybe they weren't allowed to do before or do things that they see that allow them to get closer to their clients and meet their clients needs which they've been maybe hindered in before and then there are other staff who are looking at the institutes at just another change that's happening, that's been going on for ages and this one will go away in a few years' time, we'll move back to the old regions or whatever, like we always were. So there's a split in the culture there in a number of areas. So that's the first thing that's hindering cohesion and taking a lot of resources away from focusing on the main issues. If management is strong enough at all levels to believe in this and push it through, slowly that culture will change and more and more people will realize that it's a serious attempt to be more effective in delivering client needs.”*

This illustrates both the strength of the existing culture and the resistance to change, in the early days of the Institutes. As Institutes grasped the challenge of setting priorities, focusing on R&D and forcing through changes, the staff either became more aligned to new ways of working or made other choices.

We note, however, that our research methods which focus on change since the establishment of institutes, do not allow us to adequately explore the role that this established macroculture plays in governance.

We found, however, that macroculture does not necessarily rely on a static, established culture to be effective. Two prominent observations of the role of macroculture relate to cultural shifts associated with the newly established institutes.

A prominent example of macroculture was a shared identity with a specific industry and its needs. This represented a change from the institute's perspective, but was welcome by staff as it created clear sense of purpose.

*“I think the first thing is that it's actually focused our R&D efforts more closely with industry and industry priorities. ... actually having an institute dedicated to research and development for horticulture has given a focal point for the industry and also I think for the staff. And from my discussions, certainly it's been embraced by the staff and I think by industry, as being a very positive development to have an institute which has been dedicated.*

*“I think staff morale has been lifted across the institutes. I think there's a strong ownership by staff of the institute model. They see it as a “belonging to” thing. They have been able to associate themselves with the name of their institutes in a better way than they have with most parts to the organisation ... A family type thing for them”*

This focus on the priorities of specific industries was shared across the majority of the network. The relevant QDPI program, institutes, industry development councils and R&D funding bodies and clients all shared this industry orientation. As such, this component of macroculture acted to safeguard transactions aligned with industry priorities, and adapted transactions where industry priorities shifted. This mechanism was frequently evident during the deliberations of the institute boards and senior management teams.

A second example of the role of macroculture involved a shift to a more commercial focus, and the role institutes should play in the commercialization of R&D. This shift was consistent with a trend in publicly funded agricultural R&D, and had been an evolving cultural change process at QDPI prior to the establishment of institutes. In fact, the establishment of the institutes acted to accelerate this cultural change process, by establishing a clear business orientation. Of importance from a governance perspective, a shared view of the importance of industry and commercial outcomes of R&D was established across the majority of the network – the institutes, QDPI senior management and programs (purchasers), institute boards, industry development councils and R&D funding agencies. As such, viewed as a cultural shift it acted to adapt transactions – albeit slowly and imperfectly due to the inertia discussed above. Indeed, the modified macroculture also acted to safeguard transactions.

### **Reputation**

Jones, Hesterly and Borgatti (1997) describe reputation as an estimation of one's character skills, reliability and other attributes and they contend that “reputation is important to exchanges and is important under exchange conditions of uncertainty and customization ( p932). Kay (1995) argues that the reputation of a firm is created in a specific market. Matthews & Shulman (Forthcoming) contend that in an R&D context, the reputation of the firm has a close relationship between the reputation of the scientists and the reputation of the organization with consequences for relationships with stakeholders and funding bodies. In QDPI, the reputation of individual scientists had previously been well established and the formation of specific business groups built on the previous good reputations and thrust many into a more major role, providing opportunities to highlight the work of these scientists. Indeed, the good reputation of QDPI as a research and development organization was one reason one person nominated for the Institute Board.

*“The fact that QDPI had gone from being a relatively good performer, but not an outstanding one, to being the best in Australia by far. The best of the State departments by far..... So I saw QDPI as a really outstanding body.”*

Since the creation of institutes, some project teams have become preferred suppliers of R&D, and on the basis of their reputations, have received direct invitations from external funding organizations to carry out specific RD&E programs. Other project teams have increased their sources of R&D funding from R&D corporations.

“The nature of a firm’s reputation is of course competitive and reflects the context of the organization, its relationships with others, closeness to the customer and reputation for the delivery of quality products and processes. The R&D institutes recognized that as part of the competitive world they operate in, considerable attention and resources devoted to being seen to deliver on key performance indicators were needed to maintain one’s reputation. At the level of the project, staff also recognized that it was their reputation as scientists that needed to be developed, maintained and communicated for receiving funding (Matthews & Shulman, forthcoming, p5).

“Reputations have economic consequences for participants in network governance” (Jones et al., 1997). In a R&D context the consequences are good performance, repeat business and potential for new projects. The importance of reputation was clear to institute staff, the management team and the Board.

*“ the fact that we are so successful in getting projects up with R&D Corporation and things like that, that we are seen as very relevant. The R&D Corporation sees (our institute) as "the leader in Australia". And they use a lot of the things and even our operational things, things that our project manager does and the way we report our milestones and the way we interact with them, they continually say, we wish we could get the other States to be as good as Queensland. So from their point of view, it's given them the confidence to put Federal government money with us, they're getting the outcomes, they're getting the deliverables, they can relate to a specific focal point and that suits them down to the ground. I think the same is true of international projects. Again it gives them a focal point, we are the repository of all the scientific good that resides in horticulture in Queensland. You want to know something about horticulture in Queensland, you go to our institute.”*

The development and nurturing of the reputation of the institute as an organization focused on the needs of industry and targeting new markets. Each institute was the engine in which the research and development was planned, shaped and implemented and reputation was a driver in the Institute’s relationships internally with QDPI, and with external funding bodies. It was also both a driver and a response to performing in a business like manner, such as balancing budgets as well as the delivery of R&D outcomes, meeting milestones and “doing good science”. As such, reputation acted as an important safeguard of transactions from the perspective of purchasers, R&D funding bodies and Institute Boards.

## CONCLUSIONS

We present a case study of the restructure of QDPI, a public sector R&D agency, in which a number of R&D institutes were established under a Purchaser-Provider type reform. We analyze the structure and governance from a network perspective. The R&D network characteristics are examined using the IMP actor-activity-resources model, revealing interesting insights into managing R&D in this context. Both actor bonds and activity links within vertical industry domains acted to facilitate both strategic alignment and operational

effectiveness of R&D and cross-functional integration. This was not true of horizontal, cross-industry initiatives. Resource links acted as a substantial barrier to change.

Finally, network governance mechanisms are investigated more closely. We find evidence that macroculture played a role in adapting R&D to shifting industry priorities, safeguarding that R&D outcomes met industry needs, and enhancing a shifting emphasis towards an increased commercial focus. Reputation played a substantial role in safeguarding delivery of R&D outcomes, meeting milestones and R&D quality. The generalisability of these observations to other R&D networks provides an interesting avenue for future work.

Restricted access and collective sanctions are not employed in our context. It is an interesting avenue for future empirical work to explore whether or not restricted access and collective sanctions are employed in other R&D network contexts.

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