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**Title:**  
**R&D Projects Fostering Small Firms' Market-Sensing and Customer-  
Linking Capabilities: A Multivariate Statistics Approach**

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# **R&D Projects Fostering Small Firms' Market-Sensing and Customer-Linking Capabilities: A Multivariate Statistics Approach**

## **1. Introduction**

In order to compete and survive in dynamic markets where consumer demands and needs, buyers' requirements, competitive and other stakeholders' pressures and institutional and natural environment settings change rapidly, agri-food companies are pushed to become more responsive and adaptive to external conditions. One of the crucial aspects of the ability to adapt and respond to external changes that agri-food company managers are pushed to acquire and develop is market orientation (Kohli and Jaworski, 1990). A number of empirical studies have recently explored how market orientation (e.g. Martin et al. 2009) is crucial for a firm to gain an entrepreneurial proclivity (e.g. Holster 2008), to stimulate firm's innovation (e.g. Verhees 2005) and ultimately to increase the overall firm's performance (e.g. Micheels and Gow 2008). A much smaller number of studies focused on how agri-food firms can acquire the capabilities that are necessary to become market-oriented and innovative (e.g. Anderson & Narus 2007), specifically market sensing and customer linking (Day 1994). As a number of public-private partnership projects are attempting to enhance agri-food companies' market orientation and innovation, it is useful to identify which research and dissemination methods effectively develop these capabilities and under which conditions.

To attempt to start filling this gap, this study analyses under which conditions public-private research & development (R&D) projects based on research and dissemination manage to foster market-sensing and customer-linking capabilities of small agri-food firms. Fostering these capabilities in small firms is particularly challenging, as they have limited resources to absorb the new information, learn and apply strategic changes as a result of the learning process. We first follow a "grounded theory" method of investigation (Glaser and Strauss

1967, Eisenhardt 1989), where the case of five knowledge-building Australia Seafood Cooperative Research Centre (CRC) projects based on supply chain mapping and benchmarking methods with the oyster, wild prawn and farmed prawn industries provides the instrumental cases. We collect data both quantitatively and qualitatively to gain more insight on the cause-effect relationship among variables (Eisenhardt 1989). Then, we analyse data with a structural equation model, whose multivariate statistic approach allows a rigorous analysis of the relationships between latent variables such as market-sensing and customer-linking capabilities and attitudes. As this study is still under completion, we develop a conceptual framework with a set of testable propositions that will be tested once the data collection for the structural equation modelling is completed. Only partial results from the structural equation modelling are presented at this stage.

This paper is organized as follows. In section 2, the linkages found in the literature among innovation, entrepreneurship, market orientation, market-sensing and customer-linking capabilities are explored. In section 3 the research methods are presented followed by a selected background in section 4. In section 5 a conceptual framework is built with hypotheses developed on the exploratory empirical evidence found, as well as the preliminary results from the data collection are presented. Finally, in section 6 we conclude.

## **2. Literature Review**

### ***Market Orientation and its Linkages with Innovation and Entrepreneurship***

A large number of empirical studies have recently explored the processes and the conditions under which agri-food companies acquire and develop market orientation (Grunert et al., 2005; Beverland and Lindgreen, 2007; Lankinen et al., 2007; Martin et al., 2009), entrepreneurship (Knudson et al., 2004; Pannekoek, 2007; Holster, 2008) and innovation

(Verhees, 2005; Sankaran and Mouly, 2006; Trienekens, 2008; Vogels, 2008), which have been proven to have a positive relationship with their overall performance (e.g. Micheels and Gow 2008).

Market orientation has been broadly defined as the ability of a firm to acquire market intelligence and utilise it in the decision making process in order to produce and market a product that meets the needs of current and future consumers (Kohli and Jaworski, 1990). Studying the experience of Illinois beef producers, market orientation was found to be a key determinant of subjective performance (Micheels and Gow, 2008). Agri-food marketing literature has focused on determinants and processes leading to market orientation that are both internal and external to the firm. Processes that are internal to the firm and that influence market orientation include building market-sensing capabilities, transforming leadership and changing a firm's organisation (Anderson & Narus 2007; Beverland and Lindgreen, 2007; Lankinen et al, 2007; Martin et al, 2009). In the Finnish food industry, market-sensing capability - which is the firm's ability to generate knowledge about the markets that individuals in the firm use to inform and guide their decision-making – was found to be a precondition for market orientation (Lankinen et al, 2007). In order to gain distinctive market-sensing capabilities, firms need to focus on defining their targeted market, monitoring its competitors, assessing customer value and gaining customer feedback (Anderson & Narus 2007). In the context of New Zealand based agricultural co-operatives, market orientation was developed using a process of unfreezing, movement and re-freezing (Beverland and Lindgreen, 2007). The first stage in this three-step process involves identification of long-held assumptions within the firm that define current values and processes. The second step is to move the firm towards a new set of values by changing the role of leadership, using market intelligence and organizational learning styles. The final step is to re-freeze these new values by developing supportive firm policies that ensure closer relationships between the firm and

the marketplace (Beverland and Lindgreen, 2007). A study of chief executive offices and presidents of small manufacturing firms primarily manufacturing industrial products such as steel, plastic and rubber parts in the US Great Lakes Region found that market orientation management and implementation is a top-down process largely depending on firms' leaders (Martin et al, 2009). Specifically, the higher the level of market orientation present in the leader's cognitive model thought processes, values, norms and strategies, the greater the market orientation achieved by the firm.

External processes influencing a firm's market orientation mainly refer to the change of market orientation of other key players in a firm's value chain. Specifically, based on case studies of New Zealand lamb and Brazilian orange juice exported to the EU and Norwegian frozen cod and Danish bacon exported to the UK, market orientation of value chains was determined to be dependent on variation and rate of change in end user demand, relations among chain members and regulations that artificially set market conditions, such as production quotas (Grunert et al, 2005). The authors used an expanded definition of market orientation compared to Kohli and Jaworski (1990), defining market orientation of a value chain as chain members' generation of intelligence pertaining to current and future needs, dissemination of this intelligence across chain members and chain wide responsiveness.

### ***Market-Sensing and Customer-Linking Capabilities: Antecedents of Market Orientation***

A much smaller number of studies focused on how agri-food firms can acquire the capabilities that are necessary to become market-oriented and innovative (e.g. Anderson & Narus 2007), specifically market sensing and customer linking (Day 1994). As a number of public-private partnership projects are attempting to enhance agri-food companies' market orientation and innovation, it is useful to identify which research and dissemination methods effectively develop these capabilities and under which conditions. Day (1994), following Kohli and Jaworski (1990), explains that the distinctive capability of market sensing as the

capacity to gather market information, including information about customers, competitors and other chain members, distribute it effectively across an organisation and consequently exploit a commercial and competitive benefit from possessing and correctly using this information. It is important for a firm to have a good understanding of its market(s) and what its customers are demanding. Without this understanding it would be difficult to operate an efficient business producing products or services which meet the needs of the end users. Thus it is important to identify how these capabilities can be develop and the antecedents for the capability to exist. Day (1994) also suggests that this capability may also be the result of a market driven culture in a particular organisation. So rather than market sensing being a behaviour, it is rather an existing culture or thought process in an organisation which highly values the benefits of market information and actively seeks to exploit the competitive advantage that this information may allow for.

Customer linking capabilities are also a key driver of a firm being market orientated. Day (1994) describes having these abilities as “creating and managing close customer relationships”. Historically many businesses have focussed simply upon the transaction taking place; an exchange of money for a service or good with little consideration for the quality and/or establishment of a mutually beneficial relationship between vendor and customer. This is very pertinent in the agricultural context as the market has moved from a ‘push’ to a ‘pull’ interaction with customers where the focus has shifted away from producers supplying whatever is on offer to being forced to listen to the demand of customers (‘pull’) and tailor their production to meet these demands. Customer linking capabilities are important in order to build a loyal customer base, increase customer satisfaction and profitability of a business (Hooley et al, 2005). Thus it is another key driver for a firm to be market oriented. This along with market sensing capabilities lead to firms being market oriented which allows them to serve their customers in the most efficient and effective way

while having a competitive advantage over other firms whose capabilities are not as well developed.

The impact of market-sensing capabilities on market orientation has been empirically studied by Lindblom et al (2008). It was found that market sensing capabilities, derived from Day's (1994) concepts of sensing, sense making and response, are strongly correlated but the study did not find a strong link between market-sensing capabilities and business profitability. In many cases this is a very abstract concept and can be difficult to measure. Lindblom et al (2008) suggest other factors such as the location of a business, structure of an organisation or extent of competition may also have an effect on the profitability of a business. Even though a business may have good market-sensing capabilities they are not able to leverage any commercial benefit from this capability due to other independent factors.

The conditions under which market-sensing has an impact on market orientation were studied by Olavarrieta and Friedman (2008). In an empirical study of publicly traded Chilean firms they found that market orientation and the possession of market sensing skills is very significant to overall business performance and innovation. The study also highlighted the significance of having a market-oriented culture with a focus on understanding and utilising market information and the strong correlation of this culture with market orientation capabilities. This indicates that actually possessing these capabilities is very closely interrelated to the firm having a culture of searching for, and effectively utilising, market and customer information. Therefore it would be difficult to exploit these capabilities if there was no culture of actively gaining and using these skills and market knowledge within a particular firm. This study was particularly useful as it tested "theories developed mainly in the first world" in the business environment of a still developing economy in Latin America.



Finally, the impact of customer-linking on market orientation was analysed by Rapp et al (2010) and Hooley et al (2005). Hooley et al (2005) found that having good customer linking capabilities had a positive effect on the efficacy and success of a firm to deliver what their customers want. Rapp et al (2010) also found a positive relationship and determined that having close relationships, with open and frank communication, with customers allows a firm to “better understand customer needs and develop appropriate responses to those needs”. It should be noted that there are many different types of relationships and particular dynamics across types of agricultural businesses and particular industries and in many cases what constitutes a close relationship is very different and may be hard to measure in a standard format.

Compared to the existing literature, our study instead examines the impact of public-private research on market-sensing and customer-linking and the conditions under which these capabilities can be enhanced and/or developed. In many cases this needs to be done on an individual basis as there are many dynamics which may affect the degree to which this happens including, for example, the culture of a firm, individual personalities or type of business. Our study explores the antecedents for these capabilities to be developed and attempts to provide some recommendations to enhance the efficacy of public-private research partnerships.

### **3. Research Methods**

#### ***Grounded Theory and Structural Equation Modelling***

To understand which conditions determine the impact of public-private R&D projects on the development of targeted agri-food firms’ market-sensing and customer-linking capabilities, we use a combination of grounded theory (Glaser and Strauss 1967) and structural equation

modelling (Hair et al. 2006, Kaplan 2009). Grounded theory is an inductive research method based on the development of new hypotheses during the process of data collection and an interpretative work of observation of phenomena. It requires the researchers to be open and find new patterns throughout the process of data collection. The method requires a continuous iteration between the empirical data, the existing theory in the literature and the new theory developed along the process (Eisenhardt, 1989). We have chosen to use a grounded theory approach for this study as we found through the literature review that there is limited theoretical background on how a public-private R&D organization can foster the adoption of market which to base our research so a more exploratory approach is appropriate. The case of five Seafood Cooperative Research Centre (CRC) projects based on supply chain mapping and benchmarking methods with the oyster, wild prawn and farmed prawn industries provides the instrumental cases to the study.

Consistently with the case-based grounded theory approach (Eisenhardt 1989), we initially conducted a first round of interviews when we posed broad questions about the project partners' perceived importance of R&D targeted companies acquiring a broader set of capabilities and attitudes, as well as their perceived factors influencing the impact of R&D projects on those firm capabilities (see Appendix 2, Table 1). As a pattern of importance of some factors emerged across interviews with partners across various projects, we selected a few more projects and a number of samples to be included in the analysis with a purposive method (Yin, 1984). Also, we posed more specific questions to the interviewees and collected enough evidence to establish the conditions under which each hypothesized factor has an impact on the industry adoption of public-private R&D in marketing. We collected both quantitative and qualitative data to gain more insight on the cause-effect relationship among variables (Eisenhardt 1989). This stage of the research took place between May and December 2010.

After conducting an explorative investigation of the topic based on grounded theory and building a framework with testable propositions, we are collecting data and are in the process of analysing them with a structural equation model (Hair et al. 2006, Kaplan 2009). We found this method suitable to tackle our research questions for two major reasons. First, structural equation modelling allows the researcher to combine measured variables and latent, complex concepts (Kaplan 2009). Therefore, this multivariate statistic approach allows a rigorous analysis of the relationships between R&D project and targeted companies' characteristics and latent factors such as market-sensing and customer-linking capabilities. Second, it provides the unique opportunity of testing theoretical frameworks representing complex webs of effects involving a chain of impacts relative to the project, the sector and the industry on firm's adoption of marketing research and ultimately on firm's entrepreneurship, innovation and market orientation.

### ***Measures for Data Collection and Survey Procedure***

In order to test the proposed conceptual framework with structural equation modelling, we are collecting data through a questionnaire to be undertaken by the managers of agri-food companies (see Appendix 1) in order to quantitatively measure the impact of the

The basic outline for the questionnaire and base questions was adapted from the model used by Lindblom et al (2008) which drew on Day's (1994) work about conceptualising the market sensing abilities of firms. Lindblom et al (2008) surveyed a number of retail entrepreneurs to test the effect of market sensing capabilities on the growth and profitability of the retailers. The questions were split into three sub constructs; namely sensing, sense making and response (Lindblom et al, 2008). These categories were then adapted to form our survey in conjunction with seeking feedback about the survey from seafood industry experts, the Seafood CRC management, utilising our own new hypotheses

and our observations from the face to face interviews that we had already conducted. The oyster project leader was also consulted and he modified and added questions to better focus the survey. The survey was split into four sections dealing with awareness of the oyster project, the search and use of information on customers and markets, relationships with customers, and understanding customers.

In section 1 of the questionnaire it was necessary to establish whether the respondent had received information about the outcome of the project, the time of receipt of this information and the particular way it was received. This allows for analysis of the method and timing of dissemination of project outcomes and the most efficient or popular way to distribute the information. The second group of questions in section 1 is necessary in order to ascertain the extent or otherwise of use of the outcomes of the project. In order to determine whether or not firms are developing capabilities derived from the project outcomes it is necessary to identify what aspects of the project outcomes are most useful, if they were not useful, why not, and whether or not there has been a change to business practices from the project outcomes. Identifying whether a change has been made and what it is or if there is intention to make changes, and if there is some impediment to making those changes is also imperative. This will allow analysis of what specific aspects of the project are most useful for firms and whether other changes need to be made in the supply chain, regulations or operations of a particular industry in order to allow business to adapt and grow their capabilities.

Section 2 focussed on the sub construct of ‘sensing’ as adapted by Lindblom et al (2008) from Day’s work (1994). In order to understand an industry’s capability to sense the needs of their market the survey posed questions about what sources firms use to gather customer information, whether they exchange information with fellow growers to augment the information they find independently and how they evaluate the usefulness of this

information. The final 4 questions in this section analysed the degree to which the information that firms find about their markets and customers influence their business decisions. In business not all decisions are based on customers' needs, some decisions may be based on other drivers such as personal desires or the need to pay off debt. These questions were adapted from the 'sense-making' and 'response' sub construct as detailed by Lindblom et al (2008).

Section 3 aimed to analyse the relationship growers have with their customers. Hooley et al (2005) identified that creating good customer relationships, loyalty and satisfaction helped to build "superior market performance". The questions in this section were based on a list of marketing resources and performance items identified as key factors in building effective customer relationships (Hooley et al, 2005). The questions posed asked growers to rate their capability in building and maintaining good relationships in comparison to other growers and to clearly identify their main customers. This information helps to reinforce the results from the 'sense-making' section of the survey and determine the level of ability firms have in using the information in a profitable way to gain new customers, retain existing customers and build new relationships.

Section 4 drew on questions from both Hooley et al (2005) and some questions used to describe the norms operating in a selection of Japanese firms in a quadrat analysis of a variety of Japanese businesses as part of an organisational behaviour study conducted by Deshpandé et al (1993). The study posed questions about how well a firm knows their customers and if there is any procedure in place to measure or check that they their customers are happy and if they are using market and customer information effectively. In our survey we asked questions to determine how committed firms are to serving their customers, to what degree the firm's strategy is based on understanding customers and how firms go about increasing customer value if at all. Determining if there is a check system in place to

understand and monitor customer satisfaction was also important to cross check against other sections of the survey and ascertain whether or not firms are actually sensing the market correctly and responding to that information in the most effective way. The final question in the survey was added to ascertain which aspects of value are most important. This information will help to guide future value projects by helping to focus the project to better deliver useful outcomes for firms.

The questionnaires are administered to oyster, wild prawn and farmed prawn managers through phone interviews by the two researchers and one enumerator and are designed to last around 10-15 minutes. The enumerator has been trained for one month by the researchers about the goals and the literature behind the research project. At this stage, between November and December 2011 we collected data only from eleven oyster farm managers, therefore we are still on a pilot test stage of the questionnaire. A number of other interviews are planned to be conducted between February and April 2011.

#### **4. Background**

The Seafood CRC is a public-private R&D institution, which since 2007, undertakes and disseminates research on production, post-harvest and marketing issues throughout the seafood sector collaboratively with research institutions and industry organizations. This is one of the many Cooperative Research Centres instituted by the Australian Government since 1991 to enhance collaboration between researchers and private actors in both agricultural and non-agricultural sector. It involves a seven-year plan of investment equal to Australian \$140 million from 2007 to 2013. Out of this amount, \$77 million is cash from the Commonwealth Government, the Fisheries and Research Development Corporation and the seafood industry, and in minor part from the South Australian Government and other research and development providers.

Three major R&D programs characterize the Seafood CRC: production innovation, innovation in post-harvest technologies and marketing, and education. Specifically, the Seafood CRC program on innovation in post-harvest technologies and marketing included more than seventy projects which are completed, being undertaken or just started. Overall, this program aims at improving profit margins of the primary seafood industry by 1) providing knowledge and expertise for the industry to seize profitable market opportunities and by 2) providing innovation concepts in post-harvest technology for the industry to optimize their operations (i.e. to reduce spoilage and losses). In particular, a set of projects in the Seafood CRC program on innovation in post-harvest technologies and marketing has the more specific aim of transferring knowledge and capabilities to the industry for expanding their vision and search of market opportunities. This set included among the others projects with the Australian oyster grower and farmed prawn industry, the Spencer Gulf wild prawn fishery in South Australia and the finfish industry in Western Australia.

The project with the oyster industry was based on a partnership between the Seafood CRC, the Oyster Consortium and an external consulting company as research provider. The research was conducted in 2008 and disseminated to the Oyster Consortium and oyster growers between 2009 and 2010. The project was designed as a broad information gathering exercise with no pre-defined commercial outcome. The project aimed to deliver information to oyster growers and the Oyster Consortium to achieve a better understanding of the supply chain from farm gate to the consumer's plate. The project had five main objectives: to map the entire supply chain and provide approximate numbers of oysters moving along each section of the chain; to calculate the volume, location and production for each species of oyster; to elicit and discuss drivers of oyster demand; to calculate the various transaction costs to ascertain where and to whom the profits are going and provide recommendations to help ensure the long term sustainability of the oyster industry. The study was conducted by

performing a detailed analysis of eight market channels tracking the oysters from the grower to the final stage of consumption by the consumer. This was conducted through research, observation of the chain and interviews with various players along the chain. This research resulted in a detailed supply chain analysis detailing each step in the chain. A detailed financial breakdown was also provided showing the margins along each step in the supply chain. Some of the retail margins were approximate due to commercial sensitivities from some players not wanting to reveal actual costs. Once the data collection and analysis was completed, the information was disseminated in a variety of ways including newsletters and hard copies of the report but mainly thorough presentations by the research provider at field days, Oyster Consortium meetings and state oyster association meetings. The Seafood CRC projects with the farmed prawn and finfish industry had the same approach of research and dissemination.

The project with the Spencer Gulf wild prawn industry was based on a partnership among the Seafood CRC, Spencer Gulf Wild Prawn Fishermen Association (SGWPFA) and a consultant at the Department of Primary Industries and Resources of South Australia (PIRSA). The project was conducted in late 2009 and the information was presented to the SGWPFA, the fisherman and the partners in the prawn value chain through meetings and distribution of the final report. The main objective of the project was to screen and analyse market opportunities which could derive greater profit from the fishery. This involved a detailed value chain analysis and close collaboration with various members of the value chain. The licence holders involved in the fishery involved were thirty-seven, six of the key portside buyers, as well as local retailer and restaurant managers. In this case, a rapid appraisal of the chain was performed to identify the partners along the chain and the expectations and requirements on prawn supply. This research also used secondary data from consumer research on prawns along with interviews with chain members. It followed analysis



of interview results, which involved mapping the product flow and information flow and establishing the strength of relationships along the chain. Finally, results from this analysis were disseminated to the industry with meetings to the group of prawn licence-holders and individual meetings with buyers, processors, retailers and restaurants.

Both of these two R&D project methodologies involved detailed analysis of the supply chain in each of the fisheries. Similarly both involved interviews and detailed analysis of the each step in the chain through close collaboration with chain members, research providers and the growers or fishermen themselves. In both cases a large amount of information about the chain has been provided back to the relevant industry associations, growers and fishermen with suggestions to make strategic and operational changes or adjustments to how their businesses or industries are operated. The main difference between the projects is that the oyster project was focussed on providing information to the growers and industry whereas the prawn value chain project has a specific commercially-based outcome to expand specific market opportunities to increase the value of the fishery. This might include utilising a new brand emphasizing the local and sustainability attributes of prawns, changing the marketing strategy by switching to a single desk joint selling point or introducing new post-harvest technological innovations.

## **5. Results from Grounded Theory: Conceptual Framework**

Based on the results of the first stage of this study (following a grounded theory approach), we developed a set of hypotheses that will be formally tested in the second stage of this study (following a structural equation modelling approach). The stated propositions can be supported by the following evidence.

First of all, we found exploratory evidence that overall R&D knowledge-building projects on marketing and supply chain overall have a positive impact on market-sensing and customer-linking capabilities of the targeted agri-food firms. Exploratory evidence of significant development of capabilities came not only from a much larger set of Seafood CRC project than the five under study in this paper. Specifically, there is evidence of development of capabilities also on projects that did not have a successful commercial outcome. However, differences in the extent of learning across different projects are substantial and therefore tentatively discussed below. The first basic hypothesis is:

**H1. R&D projects focusing on innovations in marketing and supply chain are positively associated to targeted firms' market-sensing and customer-linking capabilities.**

Second, apart from an impact on individual companies, we found that R&D projects on marketing and supply chain overall have an impact on the market orientation and innovation capacity of the industry associations partnering with the Seafood CRC and the research providers. In the five cases analysed, the head and board of directors of the industry associations included recommendations from research providers in the business plans and took or are taking actions to apply research recommendations. Recommendations may involve generic promotion to expand demand of a seafood species, pursuing a new market channel or building relationships with a new chain player or exploring further opportunities related to the development of brands and certifications to signal product attributes. Therefore, it is hypothesized that:

**H2. R&D projects focusing on innovations in marketing and supply chain are positively associated with targeted industry associations' market orientation and innovation.**

Third, we found that developing market-sensing and customer-linking capabilities of individual firms has an impact on industry associations' market orientation and innovation. A number of heads of the industry associations declared that expanding consensus within the organization on strategic decisions was easier since when a number of members had a better understanding of market and competitive issues. Therefore, it is hypothesized that:

**H3. Firms' market-sensing and customer-linking capabilities are positively associated with industry associations' market orientation and innovation.**

Fourth, we found that firms learning the most from R&D projects on innovations in marketing and supply chain are those with a somehow medium initial level of capabilities. Firm managers having high initial level of capabilities did not find the R&D project useful for themselves but they found it useful for other firms. At the same time, firm managers with low initial market-sensing capabilities did not see the value and the interest on the R&D project. On the other hand, the firm managers with intermediate capabilities seem to be the ones that seized the opportunity of learning the most from the R&D project. Therefore we state:

**H4. The initial level of a firms' market sensing capability has inversed-U moderating role on the relationship between R&D projects and targeted firms' market-sensing and customer-linking capabilities.**

Fifth, we found that the level of centralization of the decision-making within the industry association partnering within the R&D project is instrumental to determine how much capabilities are transferred to the grassroots level of the organization and therefore to the individual firms. In the Australian seafood industry, associations that are localized in smaller areas often take highly centralized strategic decisions about markets, while fishermen and growers remain mainly focused on their daily operations. On the other hand, associations

receiving the project results, dissemination and training at national level often have a decentralized structure, such that R&D project information flows from the centre to the periphery with a larger number of members accessing and elaborating it. Therefore we state:

**H5. The level of industry association's centralization of strategic decision-making has a negative moderating role on the relationship between R&D projects and targeted firms' market-sensing and customer-linking capabilities.**

Finally, we found that a crucial component of the R&D research methods was the estimation of profit margins of players along the chain. This is information immediately gave to a number of firm managers the financial magnitude of the market opportunities that were in place for them if they had upgraded their services and supply to current customers or if they had switched to a different customer or channel. Based on this datum, firm managers could begin comparing potential benefits and costs of taking individual actions on marketing and supply chain. On the other hand, research methods that did not provide this quantitative information could not give this opportunity to firm managers, although a map of the chain and of chain players' requirements was still considered useful. Therefore we state:

**H6. Research methods involving a quantitative estimation of chain players' profit margins have a positive role on the relationship between R&D projects and targeted firms' market-sensing and customer-linking capabilities.**

Data collection to test these hypotheses developed in the first stage of this research is taking place and is currently in a pilot test phase. From the responses from the sample obtained so far, it is not possible to draw inferences even if discussions with the interviewees during the survey so far supported the stated hypotheses.

## **6. Conclusions**

Developing capabilities is instrumental to ensure sustainability of any R&D project outcome. Specifically, a firm developing market orientation has more chances of innovating and taking risks wisely to adapt to dynamic markets. While market-sensing and customer-linking capabilities have been already found to be key antecedents of market orientation (Day 1994), there is limited evidence of what are the conditions and processes that make R&D projects having a positive effect on developing these capabilities. This study has the aim of filling this gap through the analysis of the instrumental cases of a set of Seafood CRC projects within the farmed prawn, finfish, oyster and wild prawn sector.

Preliminary results from the first stage of this investigation following a grounded theory approach (Glaser and Strauss 1967, Eisenhardt 1989) can be summarized as follows. First, R&D projects have indeed a positive impact on market-sensing and customer-linking capabilities of individual firms as well as on their industry associations' innovation and market orientation. Second, firms developing most of the capabilities are those with initial intermediate levels of market-sensing capabilities, while those having initial low or already high levels of capabilities learn less from the R&D project. Third, the most effective research and dissemination R&D project methods on marketing and supply chain include the quantitative estimation of chain players' profit margins rather than qualitative information on identified chain players and their requirements.

The hypotheses developed on the basis of these exploratory results are in the process of being tested through a data collection and analysis as described in this paper. Also after the completion of this analysis and potential confirmation of these preliminary results, this emerging theory may be tested on different settings from the Australian seafood sector. This research extension would either extend the theory or contribute to define its boundaries.

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## Appendix 1 – Survey Instrument

### Survey to Oyster Growers

This research has been designed by Domenico Dentoni and Francis English at University of Adelaide for the **Seafood Cooperative Research Centre (CRC)** in cooperation with the **Oyster Consortium** to assess the effectiveness of its projects. *Your feedback is crucial for us and we greatly appreciate your time.*

Please respond to the questions below by circling your choice or crossing the appropriate number according to the following scale: 1=Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4=Somewhat Agree, 5=Agree, 6=Strongly Agree.

The **Oyster Chain Mapping project** has been funded by the Oyster Consortium and Seafood CRC and implemented by Shane Comiskey at CDI Pinnacle Management to give the oyster growers information on their markets and customers.

Section 1: Oyster Chain Mapping Project													
Did you receive information about the Chain Mapping project? <i>Please CIRCLE <u>only one</u> of the choices below</i>								Yes (complete this section)		No (proceed to section 2)		Don't remember (proceed to section 2)	
<ul style="list-style-type: none"> <li>When did you receive the information, more or less? Month or season: _____ Year: _____</li> </ul>													
If <b>YES</b> , how did you find out about the Chain Mapping project? <i>Please CIRCLE <u>one or more</u> of the choices on the right</i>								Attendance at field days		Oyster Consortium newsletter			
								Consortium/state website		State association newsletter			
Other source (s), please specify.....								Other growers		Participation in previous surveys			
From the Oyster Chain Mapping project, we learned something about our customers and market								1	2	3	4	5	6
<ul style="list-style-type: none"> <li>If you learned something, which piece of information did you learn the most from?</li> </ul>													
<ul style="list-style-type: none"> <li>If you did NOT learn anything, why? Info irrelevant ____ We already had all the info ____ Other _____</li> </ul>													
We intend to make changes in our business based on the Oyster Chain Mapping project								1	2	3	4	5	6
We made changes in our business based on the Oyster Chain Mapping project													
<ul style="list-style-type: none"> <li>If yes, <b>which changes?</b></li> </ul>													
<ul style="list-style-type: none"> <li>If you intend to make changes but you did NOT make them, <b>which is the constraint</b> limiting your ability to change?</li> </ul>													

Section 2: Search and Use of Information on Customers and Markets													
We actively look for events and field days to attend to gain information about our market and customers.								1	2	3	4	5	6
We gather information regularly from different kinds of sources.								1	2	3	4	5	6
<ul style="list-style-type: none"> <li>Count number of sources that you use to gather your market information (name them)</li> </ul>								#:					
We actively exchange information with other oyster growers.								1	2	3	4	5	6
<ul style="list-style-type: none"> <li>Name your state association _____ and/or growers' network/group: _____</li> </ul>													
We use a considerable amount of time to evaluate the information we get.								1	2	3	4	5	6
We actively assess information before taking decisions that influence our market and customers.								1	2	3	4	5	6
Evaluating information is useless when taking decisions that affect our market and customers.								1	2	3	4	5	6
We use information on customers' needs and intentions when making business decisions.								1	2	3	4	5	6
Our products and services are based on the information that we get from our customers.								1	2	3	4	5	6

Section 3: Relationships with Customers							
We have stronger relationships with key target customers than other growers.	1	2	3	4	5	6	
<ul style="list-style-type: none"> <li>Who are your customers? General Wholesaler/Distributor __ Oyster Specialist Wholesaler/Shucker/Distributor __ Fishmonger __ Food service __ Direct consumers __ Export __ Others _____</li> </ul>							
Compared to other growers, we are good at understanding what customer needs and requirements are.	1	2	3	4	5	6	
An advantage we have over other growers is that we are good at creating relationship with our customers.	1	2	3	4	5	6	
We are good at maintaining and enhancing relationships with customers relative to other growers.	1	2	3	4	5	6	
<ul style="list-style-type: none"> <li>Did you have new customers recently? (meaning, without asking, after you received the CRC/OC Supply Chain Info?)</li> </ul>							

Section 4: Understanding Customers							
We are strongly committed to serving our customers' needs.	1	2	3	4	5	6	
Our business strategy is based on understanding our customers' needs.	1	2	3	4	5	6	
Our business operations are set up to increase customer value.	1	2	3	4	5	6	
Satisfying our customers is a key objective for us.	1	2	3	4	5	6	
We frequently assess if our customers are satisfied with our oyster supply.	1	2	3	4	5	6	
After selling our oysters, we make sure that customers are satisfied with the product.	1	2	3	4	5	6	
How do you try to create value for your customers? (circle answers)							
Supply consistency	Special pricing	Usage advice	Develop brand reputation	Tangible product quality	Product packaging	Other (specify).....	



## **Appendix 2 – Table & Figures**

**Table 1 – Hypothesized Conditions Moderating the Impact of Public-Private Research on Firms' Capabilities**

### **Sector Characteristics**

- Vertical Coordination among Partners along the Chain (from disintegrated to integrated)
- Sector Focus (from local to global)
- End-User's Perception of Market Opportunities (from low to high)
- End-User's Perception of Competitive Threats (from low to high)
- End-User's Perception of Changes in Industry Profitability (from negative to positive)

### **Project Characteristics**

- Extent of Consultation between Research Providers and Industry Partner (from small to large)
- History of Collaboration between Providers and Industry Partner (from short to long)
- Number of previous CRC projects (from low to high)
- Time Range of Realization of the Value Proposition (from short to long)
- Extent of Initial Investment by End-Users (from small to large)

### **End-User Institutional Governance Characteristics**

- Organizational ability of the association to change strategy when needed (i.e., organizational flexibility) (from low to high)
- Perceived risk of industry leader/association manager (from low to high)
- Number of firms within association (from few to many)

### **End-User's Initial Individual Characteristics**

- End-User's Initial Level of Innovation in recent product/processes (from low to high)
- End-User's Initial Interest in markets (i.e. from studies, participation to workshops, personal info) (from low to high)
- End-User's Initial Level of Collaboration (from low to high)
- End-User's Initial Exposure to Environment External to Its Daily Business Operations (from low to high)