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Titel: Towards a network model of innovation in sport – the case of product innovation in nautical sport clusters

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Abstract

Sport and sport equipment are permanently subject to innovation. Present research on innovation sources in sport industries has focused on user innovation and firm-internal sources of innovation. This paper uses the network approach to analyze external links as sources of product innovation in nautical sport clusters. It addresses the question: how can sport organizations effectively use interorganizational links for innovation? An empirical study identifies and compares innovation practices in the Auckland sailing cluster in New Zealand with the Victorian surfing cluster in Australia. In total 52 firms, non-profit-organizations, and governing bodies were interviewed. In spite of much existing research focusing on internal firm resources and end users as sources of innovation in the sport sector, interorganizational linkages provide rich sources of innovation for organizations located in clustered sport industries. This research identifies eleven practices that can be imitated by other organizations located in sport cluster or similar settings. Eight practices occur in both clusters while three only occur in one of both. This paper contributes to knowledge on mechanisms for information and knowledge transfer that leverage innovation via interorganizational linkages.

Keywords : interorganizational link, product innovation, sport cluster, network, sailing, surfing

1. Introduction

Innovation research identifies two main sources of innovation: the consumer and the producer (von Hippel, 1988). Consumers demand product innovation in response to emerging needs and desires. External factors related to the firm's environment "pull" the innovation into the market. Therefore this can be called exogenous innovation. In contrast, endogenous innovation is initiated from inside of the organization using internal resources, for example research and development (R&D) departments that "push" the innovation into the market (Di Stefano, Gambardella, & Verona, 2012).

In addition to the consumer as external source of innovation, links to other firms and organizations present a source of innovation (Barzi, Cortelezzi, Marseguerra, & Zoia, 2015; von Hippel, 1988; Woodside, 2005). Various collective settings such as supplier-buyer relationships (Un & Asakawa, 2015), alliances and partnerships (Le Roy, Robert, & Lasch, 2016; Pahnke, Katila, & Eisenhardt, 2015), university-industry linkages (Etzkowitz, 2012; Van Gils, Vissers, & Dankbaar, 2015), clusters and other networks (Greve, 2009; Kim & Lui), constitute possible contexts for interorganizational linkages as external source of innovation. In reality it is rare that only one source of innovation is solicited exclusively. Therefore the "open innovation" paradigm postulates the parallel use of internal and external sources of innovation (Chesbrough, 2006).

Present research on innovation sources in sport industries has focused on user innovation (Hyysalo, 2009; Lüthje, Herstatt, & von Hippel, 2005; Shah, 2000; Tietz, Morrison, Luethje, & Herstatt, 2004) and firm-internal sources of innovation (Desbordes, 2001; Hillairet, Richard, & Bouchet, 2009). Few studies investigate neither collective settings as a source of innovation nor open innovation in sport industries. The exceptions are a few studies in the French sport equipment industry in the Rhône-Alpes region (Hillairet, 2005; Richard, 2007) and in the Turkish yacht building clusters (Sarvan et al., 2012). Some recent research

investigates open innovation in the case of a French trails shoe brand (Boutroy & Bodet, 2015)

The purpose of this paper is to shed light on the predominant sources of innovation in sport industries with a focus on interorganizational linkages as possible source of product innovation. Two nautical sport industry clusters are subject of this research since these present equipment-intensive sports that are likely to produce product innovations (Andreff, 2009). The remainder of the paper is structured as follows. In section two the theoretical background of this study covers recent and relevant research on innovation sources, especially in the sport industry, and introduces the conceptual framework. Section three presents research methods, data collection, and data coding processes. The fourth section presents findings. The paper closes with a discussion and conclusion of the findings regarding relevant literature as well as limitations and implications of this study.

2. Theoretical background and conceptual framework

This paper contributes to knowledge on innovation sources in the specific context of sport industries. Present innovation research in sport industries has either focused on the end user or firm-internal resources as source of innovation. However, progressive innovation and marketing literature has argued for a network perspective regarding value creation and innovation (Vargo & Lusch, 2004; von Corswant, 2005). Instead of focusing only on bilateral buyer-supplier relationships and simple business transactions, this research stream argues that the reality of markets and business relationships is more complex. Value, including innovation, is created via the participation and contributions of a network of actors that are connected through multiple links of different kinds (von Corswant, 2005).

The following two section presents current research on sources of innovation in the context of sport industries and introduces progressive innovation and marketing literature that puts forwards a network perspective of innovation and value creation. The third section

presents the network model which serves as conceptual framework for this paper (Håkansson, 2006; Håkansson & Snehota, 2006).

2.1. Current research on sources of innovation in sport industries

Much research on innovation in the sport industry context has focused on process, organizational, and service innovation in non-profit sport organizations and sport governing bodies (e.g., federations) (Hoerber, Doherty, Hoerber, & Wolfe, 2015; Newell & Swan, 1995; Winand, Vos, Zintz, & Scheerder, 2013). Newell and Swan (1995) emphasize the importance of interorganizational networks for the diffusion, adoption, and appropriation of new ideas in sport organizations. These authors refer already to the network model but do not focus on sources of product innovation. Winand et al. (2013) investigate the attitudes and perceptions of innovation determinants in sport federations regarding service innovation. They find that interactional determinants such as perceived competition in terms of financial and human resources are drivers of innovation. Hoerber et al. (2015) identify an open innovation approach employed by volunteer presidents of community sport organizations. These studies indicate that the network perspective is suitable as theoretical framework in the sport industry. The next paragraphs discuss examples of research concerned with product innovation in sport industries.

Only few studies investigated issues concerning product innovation in sport companies such as sport equipment manufacturers and distributors (Desbordes, 2001, 2002; Hillairet et al., 2009). Desbordes (2001) compared the case of the mono ski development by the French brand Salomon with product innovation in the sailing and cycling industry. One of the lessons learnt was that “collaborations with suppliers, laboratories, and other firms are essential, in order to constitute a network of competencies” (Desbordes, 2001, p. 145). This argument supports the research proposition that interorganizational linkages might be an important source of product innovation in sport industries. In another study on the sport equipment

industry Desbordes (2002) points out that sport equipment firms' behavior, notably collaboration, towards other organizations in the industry depends on the age of the industry and the stage of the product's life cycle within that industry. These findings also indicate a relevance of interorganizational linkages for the innovation process considering it as part of the product life cycle.

Hillairet et al. (2009) studies the case of Decathlon that started as sport equipment retailer originally. Decathlon decided to vertically integrate backwards by opening up their own in-house research and development (R&D) departments. Investment in internal innovation capacities has been an important success factor in this process. This case does not study the use of interorganizational linkages for product innovation but links between different departments and division of Decathlon play an important role in their innovation process.

Several studies investigate end users as source of innovation in sport equipment industries (Hyysalo, 2009; Lüthje et al., 2005; Shah, 2000; Tietz et al., 2004). All studies have in common that it was a special type of users or user groups that was at the origin of equipment innovations in action sports such as skateboarding, snowboarding, and windsurfing (Shah, 2000); kitesurfing (Tietz et al., 2004); mountain biking (Lüthje et al., 2005); and rodeo kayaking (Hyysalo, 2009). These studies confirm our case study selection of equipment-intensive action sports (surfing and sailing) for the study of innovation related issues. However, this study is distinct from existing ones by focusing on interorganizational linkages as external sources of innovation instead of user innovation.

Few researchers have studied collective settings in sport industries with regards to interorganizational linkages as sources of innovation (Gerke, 2014; Hillairet, 2005; Richard, 2007). The framework of innovative milieus in the field of sport (Hillairet, 2005; Richard, 2007) and sport clusters (Gerke, 2014) were used for the study of interorganizational linkages as source of innovation. Richard (2007) and Hillairet (2005) investigate the sport equipment

industry in the Rhône-Alpes region, but come to different conclusions. Richard (2007) finds that there is only a minor level of collaboration evident between firms in order to innovate. However, small-scale partnerships, so called ‘innovative micro-milieus’, exist. Hillairet (2005) is more positive about the presence of an innovative milieu in the Rhône-Alpes sport equipment industry and describes the reasons for progress and innovation as “far from endogenous”, hence interorganizational linkages are considered as source of innovation.

2.2. Toward a network perspective in innovation and marketing research

The new product development process and marketing activities are tightly interwoven. Kotler and Bliemel (2001) define eight phases for the new product development process: idea collection, idea selection, concept development and test, development of a marketing strategy, profitability analysis, technical and market development of product, test in the market, and introduction to the market. This understanding of marketing and innovation is based on the goods-dominant-logic (GDL) (Vargo & Lusch, 2004).

The GDL focuses on operand resources, exportable products, as unit of exchange. The core of economic activity is the production and distribution of tangible goods. These contain embedded value and utility for the consumer superior to those goods offered by competitors. In the last decades this view of the marketing and innovation process has changed towards a more relational and dynamic view of the processes. The focus has moved away from the operand resources on which an act is performed, to operant resources that produce effects. The latter include the customer but also relationships to other firms or organizations. The view of the value creation process changed from a simple input-output perspective towards dynamic exchange relationships that include co-creation with customers and other stakeholders (Vargo & Lusch, 2004). This approach is called service-dominant-logic (SDL) because services are considered as the fundamental basis of exchange (Vargo & Lusch, 2008).

The SDL views services as application of specialized skills and knowledge. Knowledge is the fundamental source of competitive advantage (operant resources). Exchanges are indirect since goods are only vehicles for the provision of complex combinations of services. The role of goods changes. Value is derived through the use of tangible goods and hence the service that they provide therewith. The customer is an integral part of value creation since value creation is interactional (Vargo & Lusch, 2008). This paper links the SDL-logic to the network perspective (Håkansson, 2006; von Corswant, 2005).

2.3. The industrial network perspective and the SDL

The SDL focused initially on the customer as co-creator of value in dyadic firm-customer relationships (Vargo & Lusch, 2004; von Corswant, 2005) while the network approach includes all stakeholders of a firm (e.g., suppliers) (Håkansson & Ford, 2002). Recent research in sport marketing adapted the SDL framework to the sport context. Woratschek, Horbel, and Popp (2014) propose the Sport Value Framework that covers three levels of analysis: intra-level (within a firm), micro-level (dyadic and triadic links), and the meso-level (the entire network of a focal organization). The next paragraphs provide details on the industrial network perspective and how it relates to the SDL.

The actors in the network model include any individual, organization, or group of individuals or organizations who jointly control resources and perform activities. While any of these actors pursues proper goals, none of them acts in isolation. These actors are owners of tangibles or capabilities relevant to their network. These possessions and capabilities become resources once they are valued by specific other actors. Relationships and networks tie together resources of different actors and provide opportunities for new resource combinations, hence innovation (Håkansson & Ford, 2002; Schumpeter, 1942; von Corswant, 2005).

3. Methods

This study uses a multiple case study. Evidence from multiple case studies tends to be considered as more compelling and robust than single case studies because they allow for literal or theoretical replication (Eisenhardt, 1989; Yin, 2009).

3.1. The case studies

This study analyzes two cases from nautical sport industries. The cases were selected according to the logic of literal and theoretical replication (Yin, 2009). One case study deals with the Auckland sailing cluster and the other with the Victorian surfing cluster in Australia. Both cases consists of similar types of actors and are located in Western developed countries providing abundantly access to water and therefore good conditions to develop industries related to nautical sports. These similarities permit strengthening of results (literal replication). There are differences in the cases in terms of the size of the national and local economy, cultural norms and values, and the sport of the industry cluster. These differences allow deepening of theory through theoretical replication (Yin, 2009). The following sections provide details regarding the data collection and data analysis process.

3.2. Data collection process

Data collection includes semi-structured interviews and observations as primary data and organizational information and archival data as secondary data. Interviews transcripts served as main source of information complemented by observation reports and secondary data. Observations aimed to initial screen the field, identify interviewees, and collect secondary data. After each observation a report was written. Secondary data encompasses documents authored by interviewed organizations including product brochures, company reports, and company presentations. Archival data includes market and industry studies, newsletters from industry associations, and strategic planning documents from the local authorities. Table 1 illustrates the type and volume of data collected.

--- Insert Table 1 about here. ---

Initial respondents for interviews were key persons of the sport cluster that helped to identify major actors in terms of size, influence, and innovation. These key persons were the director of the marine industry association in the Auckland sailing cluster and the coordinator of economic development and tourism of the local council in Torquay, Victoria. A typology for cluster organizations was used to create a representative sample of responding organizations. This typology included core equipment manufacturers, system suppliers, accessory suppliers, service firms, media and communication firms, designers/architects, professional sport organizations, amateur sport organizations, governing bodies, and education/research institutes (Gerke, Desbordes, & Dickson, 2015). Table 2 lists the specific types of organizations per case according to these generic types of cluster organizations and shows how many organizations per type of organization were interviewed.

--- Insert Table 2 about here. ---

Respondents were mainly managers from the top management, marketing or R&D department. In few cases respondents were employees from marketing or R&D departments. Interview duration was in average 45 minutes. All interviews were conducted in person and followed an interview guideline. The first part of the interview guideline concerned the organization's environment and positioning in the cluster. The interviewees were then asked to describe any form of relationship with other cluster organizations. Interviewees were encouraged to provide concrete examples of those relationships to evoke information concerning interorganizational behavior. The next theme was innovation. The interviewer inquired about the role of innovation in the company in general and which type of innovation was prevailing. Then, the sources of innovation were addressed with questions like "Where do new ideas come from?", "Who is developing and testing prototypes?" and "To what extent do

interorganizational relations and behaviors and their outcomes influence or are related to innovation in your organization?

Interviews were fully transcribed. Transcripts were sent to respondents for verifications. Half of the respondents offered amendments to the interview transcripts, the other half was confirmed without amendments.

3.3. Data analysis process

All data was imported into Nvivo 10 for coding purposes. In a first deductive coding round “chunks of data of varying size” (Miles, Huberman, & Saldaña, 2014, pp. 71-72) were assigned to coding themes. The coding themes were the three main sources of innovation: internal firm resources, consumers, and interorganizational linkages. Results of coding were counted and coded data was separately saved in individual files to select relevant data. In a second inductive coding round the selected data for the coding themes “interorganizational linkages” was analyzed per case to better understand the practices corresponding to external links as source of innovation, the mechanisms, and their relevance. Table 3 and 4 show the results of coding per case and coding theme.

--- Insert Table 3 about here. ---

--- Insert Table 4 about here. ---

4. Findings

4.1. External links as source of innovation in the Auckland sailing cluster

This section presents the perspectives of the different types of cluster firms in the sailing cluster and the practices adopted by them to use interorganizational linkages for innovations sources.

Shipyard. Shipyard managers provide four examples of practices where interorganizational linkages facilitate innovation. The first example is *upstream information*

and knowledge flows, for example a systems supplier (e.g., sail maker) might suggest better products that the shipyard would not have chosen without the help of his supplier. This is because the shipyard has not the specialized knowledge that the suppliers have and the global view of products and solutions available on the market. The shipyard benefits from their suppliers' expertise. The same is true for naval architects and marine service firms that provide information and recommendations to the shipyard regarding designs or products in comparison to what competitors are offering. Naval architects and marine service firms work with several shipyards at the same time. Hence, they have a better global view of the market than the shipyards.

Feedback from other people, for example, working with [marine service firm] is helpful because he [director of marine service firm] goes and sails on all manners of yachts all over the world built by ourselves and our competitors. So here is a way that an individual can see and compare some very good (and bad) ideas and some very good (and bad) solutions to problems [...]. This experience and feed-back is very helpful.

(Shipyard 2)

Information flows and idea transfer downstream is equally one way to leverage interorganizational linkages for innovation. A shipyard helped a marine equipment firm to further develop their product to adapt it to the needs of a new market segment, the super yacht sector. Thus, the shipyard helped this supplier to open a new market segment: "Then we showed them and pointed out what was wrong and they designed a whole new one."

(Shipyard 4)

A third use of external links is active *sourcing of information and knowledge from research institutes* for specific problems. While the above mentioned approach refers to an initiative from suppliers, this concerns active search for solutions of problems by leveraging interorganizational linkages through the shipyard. These links can be directly to staff from

research and education institutes or to former apprentices and employees that have continued their studies and have become experts in certain areas: “Lots of them got doctorates, masters, and they run their own consultant businesses, but because we got so involved with them, you can pick up the phone anytime and talk to them and ask them for some ideas.” (Shipyard 3)

Shipyards mentions also *information and knowledge flows from professional sport* (i.e., professional ocean racing teams) *to firms*. On the hand ocean racing projects provide an important source of funding for innovation in sailing and especially ocean racing: “So the America's Cup and the Volvo have big budgets to allow for and to fund some innovation.” (Shipyard 3) Second, sailors, skippers, and technical staff of the teams provide an enormous potential for new ideas, technical realization of ideas in the boat, and testing of new solutions. This creates knowledge-spillovers to other sailing disciplines and supports like the Olympic sailing boats.

I have coached the New Zealand Olympic sailing team for a long time back ten years ago and I never really saw or very little that the other boats were using things that they would have got from the America's Cup or the Around-the-world-race. I didn't see other boats doing that, other than us. (Shipyard 3)

Shipyards mentions four practices how to use interorganizational linkages for innovation purposes: 1) upstream information and knowledge flows; 2) downstream information flows and idea transfer; 3) sourcing of information and knowledge from researchers institutes; 4) information and knowledge flow from professional sport to firms. In the next section systems suppliers's (e.g., rig/sail makers) perspectives are analyzed.

Rig/sail maker. Sail makers also emphasize *upstream information and knowledge flow* through the involvement of suppliers and naval architects in the entire boat design and construction process as important for innovation: “It is very important to actually engage the

suppliers and make them part of the whole process [so that they] also contribute to the design of our boat and therefore might be able to design a better sail.”

The *information and knowledge flow from professional sport to firms* is also mentioned as important to get relevant input for improvements of parts for the sailing boat. As one sail maker puts it:

They [the sailors] wander in and give me feedback there and then. The sailors are good so they understand. There is not really a formalized process other than emailing me back saying ‘We like those ones or we thought these could be stiffer or softer or different shape.’ (Rig/sail maker)

Another practice is indicated with the *information and knowledge flow between complementary firms* (a rig and a sail maker) *or competing firms* (two sail makers). For example a sail maker, rig maker, and a firm that makes batons needed to discuss and share information to construct the optimal product. “There is some interaction with us between the mast, the sail and the interaction between the sail and the mast as there has got to be a connection point,” (Shipyard 4)

Marine equipment firms. One marine equipment firm highlights a two way-process (upstream and downstream) of idea and knowledge exchange between them and suppliers:

Probably much of our innovation goes back to our suppliers in that we have on certain products worked hard and trying to liaise with the suppliers to improve the product and I think here of the anchor system. [...] When it first came out it had some weak points and our service manager worked hard with the supplier to improve it. And that is to the extent now where the supplier, if they are looking to review a product or any changes that he suggests, they usually come up with changes and they ask him to comment on it. So it's kind of a two way process. (Marine equipment firm 2)

Marine equipment firms refer to information flows from the professional racing teams: “Our innovation is driven by [...] the feedback that I have from the clients and primarily the people on the boats actually, the crew on the boats.” (Marine equipment firm 1) In addition to the contact with professional sail boats, this marine equipment firm emphasizes the feedback from and information exchange with sailors from amateur yacht clubs:

You gather all that up and you end up basically transferring it through the process that I talked about back to the head office. So, it's not directly innovative but it's indirectly innovative from the point of view of the feedback of the customers and probably we will tend to be more directly involved with our customers then elsewhere. And this is through the sailing, through the yacht clubs. (Marine equipment firm 3)

Marine service firms. One of the interviewed marine service firms indicates information and knowledge exchange with marine equipment firms. The marine service firm provides installation services for the marine equipment firm. Thus they can easily provide feedback on the product, whether it is easy to install, and whether it fits with other parts on the boat. This example corresponds to *knowledge exchange with complementary firms*.

We are always on the field. We are always hands-on and we are seeing how the product works and how it performs. Feedback we can provide back to [rig/sail maker], and we do give them a lot of feedback of ways to improve things and whether things have worked, new ideas that they have come up with, and tell them whether it has paid off or not. (Marine service firm 4)

A marine service firm cites a general influence from professional sport and innovations from other professional sports like car racing as major driver for innovation in material and design in sailing. Marine service firm 4 refers to the influence of close by located ocean racing teams.

The top guys are involved in these teams. They all have got their little tricks up their sleeves and you always pick up something new. They have got the top technology there. They are really pushing their limits so we have certainly learnt from having involvement with these guys. (Marine service firm 4)

Marine media/communication firms. The interviewed media firm notices that one of the forms of interorganizational exchange happens via *accidental informal discussions and knowledge exchange* between persons working for different firms from the sailing industry.

One of the things that we do in the marine industry, people have those conversations and then they go into their garages and tinker, play. [...] So someone is having a beer with someone and they have an idea about something and then guys will spend time and try to make it work. So, I think a lot of the innovation does come from that.

(Media/communications firm 1)

Naval architects. Interactions and knowledge from universities are mentioned as one practice to use interorganizational linkages for innovation and discussion with complementary firms as another one.

Overall nine different practices to lever external links for innovation are identified. Table 5 summarizes them.

--- Insert Table 5 about here. ---

Some practices refer to interorganizational linkages with other organizations than companies such as research/education institutes, governing bodies, professional and amateur sport organizations. We also collected data from these types of organizations that generally confirmed the identified practices, for example information and knowledge sourcing from research institutes, was confirmed by Education/research institute 1: “We worked with Team New Zealand and built a famous wind tunnel. [...] It twists the flow of the wind in the tunnel. [...] That wind tunnel helped Team New Zealand to design better sails.” The practice

information and knowledge flow from professional sport to firms was confirmed, too: “You can just go out and call up this company that is going to make the molding machine and ask to do another innovation. You can basically get everybody's feedback and just keep moving the process forward.” (Professional sport organization 3)

4.2. External links as source of innovation in the Torquay surfing cluster

This section presents the perspectives of the different types of cluster firms in the surfing cluster and the practices adopted by them to use interorganizational linkages for innovations sources.

Boardsport brands. Several practices to use interorganizational linkages for innovation are mentioned by boardsport brands. *Downstream information and knowledge transfer* is evident with the example of retailers that provide feedback back to the boardsport brands. The retailers are in regular contact to the end customers and have a neutral position regarding the different brands since they usually sell various different brands. Therefore retailers are well positioned to collect information from the customers and they are likely to send it back to the brands.

We often use retailers to gather information and feedback because it is about providing a product that is once again fit for purpose, [to satisfy] surfers or board riders' needs in their quiver of products. We talk to retailers directly because the retailers are talking to the consumers more often than what I am and more often than what our product managers are. (Boardsport brand 1)

Upstream information and knowledge is referred to in terms of new materials. The R&D manager of a boardsport brand explains:

We have been in the industry for so long, people like myself in R&D and our pattern maker who has been in this industry for 30 or 40 years. Over that time the stable, I call it, or the number of developments with external companies and the number of

relationships that we have formed are so wide and vast that there always seems to be an opportunity for collaboration, if the team came up with a hydrophobic coding or a softer sponge or a lighter sponge. [...] We have built up a whole vast range of external suppliers that we can just call on now very quickly to help us develop a product. So relationships are key for us. (Boardsport brand 1)

Also Boardsport brand 3 confirms: “We do work strongly with their suppliers and try to develop better materials and better ways of doing it, definitely.”

Second, for specific products and research questions boardsport brands seek assistance and expertise from research institutes and universities.

If we think that the project requires some external assistance from some research organizations, on a number of occasions we have used Deakin University and CSIRO (Commonwealth Scientific and Industrial Research Organisation) to assist us with projects that we may be working on. (Boardsport brand 1)

Boardsport brand 2 refers to additional support for innovation from the government through funding of projects that they run in collaboration with the university: “We pay X amount of money and the government puts in [money] to develop the research out of the Deakin University.” The same company mentions discussion and idea exchanges with specialized communications agencies to generate creative ideas for product launches. This refers to *information and knowledge flow between complementary firms*. Even though good relationships with other surf companies in the industry are important, Boardsport brand 2 emphasizes that it is important to look also outside of the surfing sector to get new ideas: “You build relationships and you have a lot of sharing etc. but it will probably end up getting smaller and smaller and smaller because you are not looking outside.”

Surf equipment specialists. *Downstream information and knowledge flow* through providing feedback on products from retailers is an important aspect for new product

development for Surf equipment specialist 2: “You are sort of cocooned by all of these other surf factories that you can make decision and know whether they are going to work very quickly through the feedback that you get through the stores.” The same firm mentions also the involvement of professional sport. Professional surfers are mostly associated to boardsport brand’s teams as their sponsors and team. Professional surfers and surf events are key concerning information and knowledge flow from professional sport to firms.

For the Rip Curl Pro [international surf competition], you get the world board [of surfing] to Torquay every year. So some innovation comes from that. You get to see a lot of different products that you will never see next to each other around the world. I think that definitely helps innovation for different products. It definitely did with our sleds because we got some international people that are like minded that wanted to have the same product. (Equipment specialist 2)

These professional surf events are also occasion between competitors to exchange information – by purpose or by accident. Feedback comes not only from surfers but also from regional or national sport governing bodies such as for example Surfing Victoria or Surfing Australia that provide feedback concerning their use and criteria in terms of safety, for example for a kids surf program. The general manager of Equipment specialist 2 testifies: “They gave us a purpose and our products didn't fit, so we developed a product to suit their goal, to make sure that our product is going to be fit for purpose.” This approach allowed them also to develop the new market segment Surf Live Saving that is organized in a separate federation than surfing in Australia. Also the diversification in the Stand-up-paddle (SUP) market was successful because Equipment specialist 2 listened to the specific requirements that a SUP club needed and they produced a customized product.

Surf accessory/clothing firms. Another form of interacting with professional surfers is to provide them with test material and gathering regular feedback after their training sessions.

We are getting credibility of it but we are also getting design input. We have done some talking with them and me being an athlete I want to understand their needs and they feel quite comfortable talking to me because I am an ex-athlete. Then we can try different stuff because we are the maker, the designer, you can just talk to them and find out what is not working and what can be improved. They, athletes, are always looking to improve something. That drives the innovation and improvement. (Surf accessory/clothing firm 1)

Furthermore accessories/clothing firms indicate downstream information and knowledge flows with the fact that bigger firms in the surfing industry are able to develop new material with suppliers that are often based in Asia.

Surf service firm. Surf service firm 1 is a surf school that uses beginner surf boards. The surf school provides regular and important feedback back to the boardsport brand: “We have about 330 [boardsport brand] surf boards that we are using. So he [boardsport brand] gets a lot of feedback from us on how the boards are performing.” (Surf service firm 1) This indicates *information and knowledge flow between complementary firms*. Also in the following case the board manufacturer contacted the user (surf school) first to provide a customized product adapted to their needs.

When they first started up they did come down to us and asked us what we want in the surf board or what we need and what our expectations are. They asked us where the previous surf boards have come from. So when [boardsport brand] started their surf boards, they spoke to us. They wanted to make a product in which we were interested and provide characteristics that we wanted in a surf board. (Surf service firm 1)

Surf service firm 2 is a surf school that is part of a boardsport brand’s R&D program. This is another example of cooperation between complementary firms to innovate. The surf school’s instructors are perfect testers of wet suits: “We get the new wetsuits and because we

are in the water more than anybody, they give them to us to try them out. The R&D is feedback to [boardsport brand] and that is how the development of wetsuits works.” (Surf service firm 1) One material innovation that came out of this process was a new glued seam to seal wetsuits so that water does not rush through the wetsuit all the time. While the boardsport brands that design wetsuits ask the surf school for feedback on their products, the school does also actively provide criteria and product specifications that the products should have: “I tell them how to cut the suits so that it is less stress on the suit. I want extra protection around the bottom of the zip, all these different things that I want extra, they probably utilize in their own suits.” Surf service firm 3 mentions also collaborations with universities and research institutes for innovation purposes.

Designers/shapers. Surf board shapers and designers usually know each other and exchange easily their opinion on new surf board shapes and designs. This refers to information exchange between competing firms.

No media/communications firm was identified and interviewed in Torquay. Overall ten different practices to lever external links for innovation are identified. Table 6 summarizes them.

--- Insert Table 6 about here. ---

Some practices refer to interorganizational linkages with other organizations than companies such as research/education institutes, governing bodies, and professional and amateur sport organizations. We also collected data from these types of organizations that generally confirmed the identified practices, for example the practice information and knowledge sourcing from researchers institutes is confirmed here:

I have said this is what we use in cycling. How about we transport this into a concept in surfing? [...] I think that's what makes research interesting and innovation interesting.

We might be specifically looking at a wetsuit but there is no reason why that wetsuit

can't be influenced something from nature or something from snowboarding or something from cycling or tennis. We never know where that next good idea will come from. So it's about being very open minded and I think that is one of the reason why [boardsport brand] is engaging in university to have that very open minded academic rigor.

Overall nine practices of how to use external links for innovation are identified for the sailing cluster and ten for the surfing cluster. The first eight practices occur in both clusters. One practice is specific to the sailing cluster and two appear only in the surfing cluster. In the next discussion these different practices are discussed and also related to current literature.

5. Discussion and conclusions

This research identifies practices that illustrate how interorganizational linkages can be leveraged for innovation purposes. The next section discusses differences and similarities of main practices employed in both cases with regards to current literature.

Upstream information and knowledge flows occur between supplier and equipment manufacturers on three levels in the sailing cluster but only at one level in the surfing cluster. Different type of equipment manufacturers are distinguished: 1) those that manufacture the core equipment (i.e., the shipyard for the boat-building and the boardsport brands for the surf boards); 2) the systems supplier that supplies essential material without which the sport equipment is incomplete and the sport cannot be practiced (i.e., rig and sail maker in sailing); and 3) accessories supplier that supplies additional products that are not indispensable to practice the activity (e.g., marine electronics for sailing). The lack of involvement of the latter two types of organizations (e.g., surf leash producers and apparel brands for surfing) in the upstream knowledge transfer in the surfing cluster can be explained with the lack of interconnectedness of the production process across those different firms in the sailing

industry. However, in sailing industry there is a strong technical integration and thus, organizational proximity between the three types of product manufacturers (Boschma, 2005).

Downstream information and knowledge flow is closely related to the consumer as source of innovation. However, it refers not to a normal individual user but to specific user groups that are often grouped together in organizational form such as teams, clubs, or informal customer groups. Furthermore in sailing this concerns business-to-business (b-to-b) relationships as for example marine installation firms (service) and shipyards or marine equipment firms. A typical b-to-b relationships in the surfing industry is between surf schools, surf shops, and the boardsport brands that provide surf boards and wet suits to the surf schools. In terms of downstream information transfer more organizations in the surfing cluster indicate this type of practice than in the sailing cluster. This can be explained with the strong influence of end consumer on innovation, especially in action sport (Hyysalo, 2009; Tietz et al., 2004). However, this research highlights the role of institutional or organizational frames for customers in sport such as a team, club, or customer interest group. This formalization in groups makes it easier for the firms to identify relevant customers and get in contact with them.

Information and knowledge sourcing from research institutes was emphasized as practice by the same kind of organization in both clusters, core equipment manufacturers. It can be concluded that core equipment manufacturers tend to have the resources and legitimacy to engage with universities and research institutes for joint product development. These insights confirm the role of university in new product development and the importance of the development of industry-university linkages (Barzi et al., 2015; Etkowitz, 2012)

Information and knowledge flow from professional sport to firms occurs via teams, athletes, and institutional bodies. This paper show that a full integration of athletes in the construction process of a race boat is largely beneficial for innovation purposes throughout

the entire innovation process. Professional sport contributes to the idea generation process as they can speak from experience; they can support the invention phase through product testing, and they can promote the product in the commercialization phase. These mechanisms were more evident in the sailing cluster than in the surfing cluster which can be explained through a higher level of formalization of professional sailing teams than professional surfing teams and athletes. Previous research considered lead users in the innovation process of sport material but no research has looked at the impact and role of athletes organized in teams and clubs and their collective impact on innovation (Shah, 2000).

Information and knowledge flow between complementary firms is a typical characteristic of co-opetition (Bengtsson & Kock, 2000) that often occurs in clusters (Porter, 2008). Complementarity is evident in both clusters between equipment manufacturers and service firms, but also regarding the naval architect in the sailing cluster. *Information and knowledge flow between competing firms* is also a typical characteristic for clusters due to cognitive proximity (Boschma, 2005). *Accidental informal information and knowledge exchange* can be explained with social proximity (Boschma, 2005) and the embeddedness of economic activities in social structure (Granovetter, 2005). *Input from other sectors* can be interpreted as knowledge spillovers (Breschi & Lissoni, 2001) and *funding or information from governing bodies* as institutional proximity (Boschma, 2005).

These findings indicate numerous parallels with the network model (Håkansson, 2006; Håkansson & Snehota, 2006). The network model argues that interorganizational linkages go far beyond simple price mechanisms and rational input-output exchanges. This proposition is confirmed with the findings of this study as numerous types of interactions (practices) are identified that impact innovation. Furthermore this paper identifies a larger network of organizations that are relevant for firms in sport cluster: amateur and professional sport organizations, education/research institutes, and governing bodies. Further research is

necessary to better understand the role of these types of organizations in the interorganizational network of sport companies and their innovation process.

Overall this paper contributes to literature in sport management and to innovation management. In terms of sport management this research demonstrates that other sources than the end customer and the firm internal resources are important for innovation purposes. It presents eleven practices that indicate how to use external links for innovation. **Six** of these practices are quite general because they are used in different industry contexts (sailing and surfing) and by different types of actors (cluster firms).

In terms of innovation management this paper contributes to knowledge on mechanisms for information and knowledge transfer and other practices that leverage innovation via interorganizational linkages. It would be interesting to compare traditional sources of innovation (customer and firm internal resources) with interorganizational linkages as source of innovation and how the combination of those can be optimized. The practices identified in this research can be considered as best practice for organizations based in sport clusters but also for organizations in other interorganizational settings.

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Tables

Table 1: Overview of collected data

	Auckland sailing cluster	Torquay surfing cluster	Total
formal semi-structured interviews	27	25	52
direct observations	4	2	6
organisational information*	12	8	20
archival data*	1	11	12

* number of retained documents after scanning

Table 2: Number of interviews per type of cluster organisation and case

Generic type of cluster organization*	Specific sailing cluster organization	N	Specific surfing cluster organization	N
core equipment manufacturer	shipyard	4	boardsport brand	3
system supplier	rig/sail maker	4	surf equipment specialist	2
accessory supplier	marine equipment firm	3	surf accessory/clothing firm	2
services provider/consulting	marine service firm	4	surf service firm	4
media/communications	marine media/communications firm	1	surf media/communications firm	0
designer/architect	naval architect	2	designer/shaper	1
professional sport organization	professional sport organization	3	professional sport organization	1
amateur organization	amateur organization	2	amateur organization	1
education/research institute	education/research institute	1	education/research institute	3
governing body	governing body	3	governing body	8
	Total	27		25

* Gerke et al., 2015

Table 3: Number of quotations and sources coded for Auckland sailing cluster

	Number of times a theme appears in data	Number of sources for each theme	Type of source			
			Interviews	Observ.	Org. Info.	Archiv. Data
consumer	19	12	12	0	0	0
interorganizational linkages	96	27	25	0	2	0
internal resources	46	16	15	0	1	0

Table 4: Number of quotations and sources coded for Torquay surfing cluster

	Number of times a theme appears in data	Number of sources for each theme	Type of source			
			Interviews	Observ.	Org. Info.	Archiv. Data
consumer	18	12	11	1	0	0
interorganizational linkages	96	27	22	0	3	2
internal resources	28	12	11	1	0	0

Table 5: Summary of findings for Auckland sailing cluster

Practices to lever external links for innovation	Shipyard	Rig/sail maker	Marine equipment firm	Marine service firms	Marine media/comm. firm	Naval architects
1) upstream information and knowledge flow	X	X	X			
2) downstream information and knowledge flow	X	X				
3) information and knowledge sourcing from research institutes	X					X
4) information and knowledge flow from professional sport to firms	X	X	X	X		
5) information and knowledge flow between complementary firms		X		X		X
6) information and knowledge flow between competing firms		X				
7) accidental informal information and knowledge exchange					X	
8) input from other sectors				X		
9) information flows and feedback from amateur yacht clubs to firms			X			

Table 6: Summary of findings for Torquay surfing cluster

Practices to lever external links for innovation	Boardsport brand	Surf equipment specialist	Surf accessory/clothing firm	Surf service firm	Surf media/comm. firm	Designer Shaper
1) upstream information and knowledge flow	X					
2) downstream information and knowledge flow	X	X	X	X		
3) information and knowledge sourcing from researchers institutes	X			X		
4) information and knowledge flow from professional sport to firms		X	X			
5) information and knowledge flow between complementary firms	X			X		
6) information and knowledge flow between competing firms		X				X
7) accidental informal information and knowledge exchange		X				
8) input from other sectors	X					
9) funding of innovation through government schemes	X					
10) information and feedback from sport governing bodies			X			

Word count: 8068