Chapter 10
Scanalyse—A Case Study of the Role of Social Capital, Strategic Networking, and Word of Mouth Communication in the Diffusion of an Innovation

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Abstract In this chapter, a longitudinal case study is examined of Scanalyse, a technology spin-out company from an Australian university that grew from start-up to a global market position within a decade and was then sold through trade sale to one of its main competitors. The case provides an example of how a small innovative firm assesses the value of the economic rent it can secure from an innovation and the strategic decision-making and "pivots" it must undertake to create value. It also demonstrates the key role played by social capital, strategic networking, and word of mouth communication in facilitating the commercialization process.

10.1 Introduction

This chapter examines the case of Scanalyse, a high-technology spin-out from an Australian university that was able to successfully commercialize its technology within a global market. The focus of this case study is on the roles played by social capital, strategic networking, and word of mouth (WOM) communication in assisting the firm to undertake this commercialization. It analyses the process through the conceptual framework of an entrepreneurial innovation value model (EIV), and demonstrates how both social capital as well as economic capital influenced the diffusion of the innovation. Relatively little work has been published in the academic literature about the way commercialization takes place in small innovative firms and how they capture value. The case brings together theories associated with the role played by entrepreneurial rents (Amit and Schoemaker 1993; Alvarez and Barney 2004; Alvarez 2007), and the resource-based view

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(RBV) of the firm (Barney 1991; Mahoney 1995; Collis and Montgomery 1995; Fahy and Smithee 1999). The case provides evidence of a process that entrepreneurial firms go through in the commercialization of an innovation, with specific reference to the influence of social capital, strategic networking, and WOM. This case offers a good illustration of the importance of early relationships built on trust, on the power of the social capital of the manager, and of the role that WOM can have when engaging lead customers to "co-create" the innovation with the firm.

10.2 Commercialization, Social Capital, Strategic Networks, and WOM

The concept of commercialization is poorly defined within the literature (Aarikka-Stenroos and Sandberg 2009). However, it can be broadly understood as a process involving both the sale and the adoption of new products, processes, and services generated from an investment in R&D and new product development (NPD). It typically involves marketing communications, sales, brand development and distribution, with social capital networks playing an important role (Lehtmäki et al. 2008; Partanen et al. 2008). If the sales side is in the hands of the firm, the adoption side is more difficult to monitor, as it depends on the perception of the customer. Such a process relies heavily on human relationships between different actors. They include: (i) the innovators in the firm undertaking the commercialization; (ii) the people they are usually seeking advice from; (iii) the targeted customers, and (iv) other actors potentially impacted by the innovation.

Commercialization is therefore a process that can benefit from the presence of a strong strategic network through which the firm's management team is able to secure access to information, suppliers, customers and providers of technology, skills and financial capital. It is particularly important for small firms that typically lack the necessary resources to proceed alone in the commercialization process (Alvarez and Busenitz 2001; Alvarez and Barney 2005). This strategic network, and the development of social capital to assist the firm to bring its innovation to market, should allow it to engage freely with lead customers, key suppliers, and other network actors to exchange information and secure positive word of mouth (WOM) (Brooks 1957; Arndt 1967; Dodson and Muller 1978).

Although commercialization is often viewed from a marketing or technical development perspective, the importance of social capital, interpersonal networking, and WOM communications should not be ignored when trying to understand the process (Czepiel 1974; Mazzarol 2013). Managers seeking to commercialize a new product or service should acknowledge this and focus on the generation of positive WOM within target market segments and influential decision-makers (Kawakami et al. 2013). If the rate of diffusion will be influenced by the nature of the innovation, and the characteristics of both the innovators and the environment in which they exist, it can be dramatically modified by positive or negative WOM (Mahajan et al. 1984). However, firms must take into account that such a process

has to be built in advance, as the propensity of opinion leaders to provide positive WOM depends on their previous experience with the firm, on their commitment to it, and on their perception of the value offered by the innovation (see: Martilla 1971; Leonard Barton 1985; Valente and Davis 1999).

Marketing promotional activities that help to provide opinion leaders with early trials of the product or service, plus sufficient information to educate them as to its attributes and benefits are likely to boost their self-confidence in giving WOM (Rogers 1976, 1995). Moreover, this WOM will be better accepted by the receivers if the richness, strength, and valence of the message, as well as the credibility of the source and brand equity of the supplier are undisputable (Mazzarol et al. 2007; Sweeney et al. 2008, 2012). Building the message and gathering proofs will thus be critical activities.

Engaging customers, particularly lead customers, in a proactive dialogue aimed at reducing the perceived risk and uncertainties associated with the innovation is a key aspect of any commercialization marketing strategy (Mazzarol 2011). Customer education and collaboration in the NPD process builds trust, loyalty, and commitment that result in early adoption and the generation of positive WOM (Czepiel 1974; Mahajan et al. 1984; Kawakami et al. 2013). It is important that work on this process occurs long before the innovation actually reaches the market, and to also explore in advance who will be the most influential actors. Due to their resource constraints small firms are less likely to follow the same pattern of behavior in NPD and commercialization as that found in large firms; relying more on customer engagement and co-creation (Berends et al. 2014).

The dynamics of different markets and how disruptive the innovation is will also influence the nature of any marketing communications strategy (Corsaro et al. 2012). The more disruptive the innovation will be and/or the less innovative the market will be, the more convincing the evidence and explanations will have to be (Christensen et al. 2002; Sandberg 2002). The diffusion of innovation has been viewed as a social rather than an economic process (Rogers and Shoemaker 1971). Tarde (1903) observed that the diffusion of innovation is essentially a process of imitation by one individual of another. New ideas or practices are passed on from the originator of the invention to the imitator and then from imitator to imitator (Kinnunen 1996). Despite the influence of a range of communications media (e.g., mass media, social media), this social process still relies on the interrelationship between individuals and the capacity of the most influential to convince the more reluctant (Rogers 1976).

The success of an innovation is not so much its novelty, or even the merits of its technological sophistication or economic value. What is critical to its success is the ability for the invention to be imitated and adopted on a significant scale, and for this to be diffused as widely as possible (Grubler 2000). This continues to be the case as social media allows for the rapid diffusion of innovation at the global level (Hanna et al. 2011). The formal and informal network of relationships required to bring a product successfully to market form a key element in the successful diffusion of an innovation (van Hemert et al. 2013). Firms seeking to undertake the commercialization of innovations must create and sustain strong networks of lead

customers and key suppliers in order to leverage knowledge and other resources (Arias 1995; Laperche and Liu 2013). Relationships here must be based on trust and a willingness to share ideas and assist with the co-creation of the new product or service (Conway 1995; Senker and Faulkner 1996; Echeverri-Carroll 1999). It will be the ability of each of the firm's managers, in particular the owner or senior leadership team responsible for the innovation's commercialization, to use the social network that will be decisive (Rothwell 1991; Steward and Conway 1996). This suggests that the innovative firm needs to possess not only the physical and human capital it needs for commercialization, but also the social capital (Cooke and Wills 1999; McGuirk et al. 2015).

10.3 Methodology

The case study is recognized as a valuable methodology for the development of theory (Eisenhardt 1989), and also a powerful method for understanding the behavior of small firms (Chetty 1996). Yin (2009) suggests that this methodology provides an appropriate approach for addressing research that focuses on 'how' and 'why' phenomena occur. It is also particularly relevant where research is seeking to understand contemporary issues, is exploratory in nature and the researchers have little control over the events being studied (Yin 2009). The Scanalyse case is a single, longitudinal case that saw the first interview with the firm's CEO in 2006 less than three years after its founding. A second interview took place in 2012 after the firm had grown significantly and developed its operations globally. Following that interview the business was acquired by one of its main competitors in a trade sale thereby providing a "full lifecycle" perspective of the business case. This single case analysis is an appropriate rationale for a research methodology where the data collection at the early and later stages of the firms lifecycle offer an opportunity to understand how the business evolves due to changes to its environment and internal decision-making (Yin 2009). It was the rationale for the longitudinal single case study of 60-year history of the Canadian entrepreneurial firm "Steinberg Inc." undertaken by Mintzberg and Waters (1982).

10.3.1 Case Selection and Data Collection

Scanalyse, the company is an exemplar case to study the process of commercialization, WOM diffusion, and the role of social capital within innovative start-up firms. It meets the criteria of theoretical case selection as detailed by Eisenhardt (1989) and provides the ability to develop the emergent theory. As noted above, the first interview took place with the firm's CEO in 2006. At this point the company was just two years old. The firm had just been formally established following its spin-out from a university. It was essentially transitioning out of being a research

project within a university into an independent business located in separate facilities. Data was subsequently collected from a second interview with the CEO six years later in 2012. By this time the firm had grown significantly and was at the point where it was moving towards a trade sale. A key part of the data collection was the use of a diagnostic assessment questionnaire. This examined the CEO's perception of the value of the commercialization using a strategic forecast of the management's assessment of the economic rent that was to be anticipated from the innovation.

The assessment of anticipated rent was undertaken through a set of questions that evaluated the company's potential volume of sales over time, the rate of profit earned, and the length of innovation in the market (Mazzaro and Reboud 2005; Duhamel et al. 2014; Do et al. 2014). The questionnaire also examined the company's management of the NPD and commercialization process using a 40 item scale across four dimensions. The four dimensions covered: (1) likely market adoption and diffusion of the innovation; (2) the strength of 'isolating mechanisms' developed by the company; (3) ability to proceed given possession of the necessary technical, financial, and human resources required to fully commercialize the innovation and (4) the company's approach to the formulation of a coherent strategy for the commercialization of the innovation. This questionnaire was the basis of an in-depth interview with the company's CEO at both data collection points.

10.3.2 Coding and Analysis

The analysis of the case was undertaken with the NVivo qualitative software program that facilitates the drawing together, coding and organization of the data collected (Hoover and Koerber 2011). Additional interviews were also undertaken in the preparation of this chapter. Data consisted of interview transcription, field notes, documents from the company and other sources, as well as the innovation diagnostic assessment tools used in 2006 and 2012 interviews. NVivo provides a valuable tool for the coding and classification of qualitative data and is well suited to a case study analysis (Bazeley and Jackson 2013).

The coding and analysis was guided by the theoretical framework outlined in Table 10.1. This draws together the foundation literature relating to the identification of "innovation rent," how it is assessed by an entrepreneur or entrepreneurial firm during the process of commercialization, and the influence of social capital, strategic networking, and WOM communication for the diffusion of the innovation. The 2006 and 2012 interviews were undertaken by third-party research assistants who used a common case study protocol. As a result, the approach we took to the data analysis was to examine the data, coding it in NVivo into initial parent nodes defined by the theoretical categories listed in Table 10.1, and then grouping "emic" data derived from the CEO interviews and innovation diagnostic survey tool, with the "etic" data comprised of the field notes provided by the research assistants. Both kinds of data are important in order to obtain a comprehensive view of the phenomena being examined (Rovai et al. 2013).

A pattern matching approach was used with comparisons between the first and second interviews and a triangulation of the data against the theoretical categories (see Table 10.1) (Eisenhardt 1989; Yin 2009). This process continued with redundant nodes being removed and the remaining nodes nested as "tree nodes" into the operationalized categories outlined in Table 10.1, which grouped around the 5 main theoretical categories connected via layering (Rovai et al. 2013; Miles et al. 2014). In addition follow-up interviews were undertaken with the Scanalyse CEO to assist in the validation of the data and our conclusions (van de Ven and Poole 1990).

An additional method employed in the analysis was the critical incident technique (CIT), which is a procedure for collecting direct observations of human behavior so as to generate useful information for solving practical problems and meeting systematically defined criteria (Flanagan 1954). It is a research technique that has been used in a range of studies relating to entrepreneurship, management, and marketing (Tjosvold and Weicker 1993; Gremler 2004). This followed the stages of commercialization proposed by Santi et al. (2003) and Duhamel et al. (2014). However, these were modified as follows: (i) initial assessment of the anticipated (potential) rent; (ii) market insertion of the innovation, and feedback from customers and competitors; (iii) assessment of residual (quasi-rent); (iv) review of the firm's resource configuration; (v) assessing the strategies for capturing the value of the appropriable rent (Table 10.1).

10.4 Analysis of the Case

Scanalyse emerged from research work undertaken at Curtin University in Perth, Western Australia (WA). This research was conducted into the application of 3D laser technology to build three-dimensional digital models of objects such as the internal spaces of buildings and structures. The foundation research that led to the creation of the technology was carried out by the Department of Spatial Sciences (DSS) within the university's School of Surveying. The Curtin DSS is a major center within the digital spatial industries cluster in WA. It not only provides bachelor's degree programs for surveying, cartography, and geographic information systems (GIS), but also works closely with industry and other universities to undertake applied research that aims to complement rather than compete with mainstream industry (Mazzarol et al. 2004).

10.4.1 Initial Assessment of the Anticipated (Potential) Innovation Rent

The commercialization pathway for the innovation was not initially clear to the Curtin DSS researchers. The team had access to new 3D laser technology in early

Table 10.1 Coding categories for data analysis

Theoretical categories	Operationalization	Selected references
Innovation rent	Entrepreneurial rent Quasi-rent Ricardian rent Schumpeterian rent	Schoemaker (1990), Makadok (2001), Alvarez and Barney (2004), Alvarez (2007), Lim et al. (2013), Do et al. (2014), Do (2014)
Assessment of the innovation's rent configuration via commercialization	Anticipated (potential) rent Residual (quasi) rent assessment following market insertion Appropriable rent following assessment of firm's resources	Santi et al. (2003), Mazzarol and Reboud (2005, 2006, 2011), Duhamel et al. (2014)
Commercialization process	Lean start-up Lean canvas business model Resource-based view (RBV)	Ries (2011), Osterwalder et al. (2005, 2015), Osterwalder and Pigneur (2010), Trimi and Bergegal-Mirabent (2012), Barney (1991, 2001)
Social capital	Trust Reciprocity Networks	Coleman (1988), Morgan and Hunt (1994), Mayer et al. (1995), Schoorman et al. (1996a, b), Dodgson (1996), Burt (1997), Cooke and Wills (1999), Anderson and Jack (2002), De Carolis and Saparito (2006), Lewicki and Brinsfield (2009), Maisch et al. (2010), Mazzarol (2013)
Strategic networking	Network connectedness Tie strength of network	Granovetter (1973, 1983, 1985), Brown and Reingen (1987), Rothwell (1991), Arias (1995), Valente and Rogers (1995), Senker and Faulkner (1996), Steward and Conway (1996), Echeverri-Carroll (1999), Narayan and Pritchett (1999), Aarikka-Stenroos and Sandberg (2009), Corsaro et al. (2012), Laperche and Liu (2013)
Word of Mouth (WOM) diffusion	Closeness of giver–receiver Organizational advocacy Richness of message Strength of message Valence of message	Brooks (1957), Czepiel (1974), Martilla (1971), Dodson and Muller (1978), Mazzarol et al. (2007), Mazzarol (2011), Kawakami et al. (2013), Sweeney et al. (2008, 2012)

2004 following the acquisition of laser scanner worth over AUD $250,000 that was purchased by the university. Curtin's DSS was investigating applications and uses for the technology that could be applied into local industries in WA. The research team went out and engaged directly with its existing industry networks, and

demonstrated the instrumentation to industry people, asking them for ideas on what could be done with the laser technology. The state of WA has substantial mining industries in bauxite, iron ore, nickel, and gold, and is home to major mining companies. It was into this sector that the research team found its initial customers.

One of the first places the researchers went to was Alcoa's alumina refinery based in Wagerup, located in the south west of the state. The staff at Alcoa gave the Curtin DSS research team a range of different applications that they could examine to determine whether they presented an opportunity for future research. One of these was a big grinding mill where Alcoa had a problem with determining when to replace the internal steel liners. The constant use of the grinding mills to process bauxite ore wore away the steel liners within the huge crushing drums. However, it was difficult to predict accurately when the liners needed to be changed due to liner walls wearing too thin. These grinding mills are 10–15 m in diameter and getting access to all parts of the mill in order to measure all points of the steel liner was virtually impossible. In response to this problem, the university researchers developed a process that enabled them to apply the 3D laser technology to the measurement of these grinding mill liners' thickness at all points across the internal surface.

During 2005 the Curtin DSS research team realized that the commercial opportunity for the technology was to develop a method of processing data from the scanner and thereby extracting something that normally could not be extracted from the scanner alone. It was this realization within the university research team that triggered the creation of Scanalyse in 2006. In that year the start-up process commenced, which required the transition from the transfer of the innovation and its prototype technology from the university's laboratory into a spin-out company with its own independent facilities. Offices were acquired in the technology science park adjacent to the university. A company board was formed and a professional CEO, Peter Clarke was recruited to help guide the commercialization process. Peter's background prior to joining Scanalyse involved an extensive career in R&D with roles as a research engineer for the WA State Government's Department of Agriculture, managing director of a small company engaged in robotic and automated systems, and R&D manager for two larger technology companies involving successful commercialization projects. Initial funding for the spin-out company came from the university via seed capital grants supplemented by federal government research grants. The ownership of Scanalyse at this stage vested with Curtin University (Table 10.2).

The creation of the innovation that triggered the birth of Scanalyse was therefore a process of strategic networking and interpersonal communication. The Curtin DSS research team had a strong track record of engaging with local industry partners in undertaking its research work in the field of spatial science (Mazzarol et al. 2004). This helped to position the university's researchers within a strategic network strengthened by the social capital that had been accumulated with partners such as Alcoa. This provided the trust and reciprocal exchange of value to foster the discussions and collaborative problem solving that led to the innovation's creation.

Table 10.2 Assessment of the anticipated (potential) innovation rent—perceptions of Scanalyse 2006 and 2012

With respect to the planned innovation:	2006	2012
• Can the innovation work alone or does it integrate into a system?	Alone	Alone
• Does the innovation substitute an existing product or would it create a new market?	Creates a new market	Creates a new market
• Is the innovation compatible with existing products and processes or does it create a new dominant design or new system?	Creates a new standard or system	Compatible
• How was the innovation generated?	With research centers	Via a wider network
• What would be the potential geographic diffusion of this innovation in your sector?	Very wide	Wide
• What would be the potential annual sales for your innovation on a worldwide basis after 3 years?	$16–$20 million	$5–$10 million
• What would be the potential diffusion of this innovation within segments of your market?	Very wide (10 or more segments)	Limited (2 to 4 segments)
• What could be the gross profit margin of your innovation?	61–80%	61–80%
• What could be the net profit margin of your innovation?	Over 40%	21–30%
• What best describes your innovation…	Creates new dominant design	Creates a new dominant design
• The technical base of the innovation…	Offers a new technical platform	Offers a new technical platform
• From a technical point of view how difficult is the innovation to copy?	Hard to copy	Easy to copy
• From a legal point of view how difficult is the innovation to copy?	Hard to copy	Hard to copy

During the 2006 interview the Scanalyse CEO assessed the anticipated (potential) rent from the innovation as a "Champion," which is a configuration that has above average volume of sales, rate of profit, and length of lifecycle (Mazzarol and Reboud 2005). As shown in Table 10.2, the innovation was initially viewed as creating a new industry standard or system, with a very wide geographic diffusion across a very wide range of market segments. It was also perceived to offer potential annual sales of between AUD $16 and $20 million, with high gross and net profit margins. In terms of its lifecycle the innovation was seen as creating a new dominant design and technical platform that was hard to copy from both a technical and legal perspective.

10.4.2 Market Insertion of the Innovation and Feedback from Customers and Competitors

From early 2007 *Scanalyse* developed its relationship with Alcoa from one based around research into a commercial arrangement whereby Alcoa became the firm's first customer. A new product *MillMapper* was launched with a three-year contract between Scanalyse and Alcoa to service the grinding mills of the big bauxite miner. This initial success with a high profile global corporation such as Alcoa as a lead customer enabled Scanalyse to embark on a pathway to full commercialization of the technology. The presence of many other large mining firms headquartered in the state capital city of Perth was a significant opportunity for Scanalyse. All these companies made use of similar ore grinding mills to that used by Alcoa. Interpersonal networking and WOM communication enabled Scanalyse to secure two additional lead customers for *MillMapper*. With the revenues generated by these three initial customers Scanalyse was able to build up sufficient financial reserves to enable it to purchase its own 3D scanner rather than relying on the device owned by Curtin University. Throughout 2007 the company expanded in size from four employees at the start of the year rising to six by mid-year. Sufficient contracted work had been secured with the three lead customers to underwrite the firm's financial situation for what was to become a sustained growth phase.

Interpersonal communication between the Scanalyse team and the three lead customers provided valuable feedback on the technology and its application. This included some criticism over the value of the initial product offering. From the perspective of the customers the *MillMapper* technology was not viewed as sufficiently usable. For example the CEO of Scanalyse observed that at this time: "*A top issue for us is dealing with the unknowns associated with developing new information and data, and determining how to extract real information and knowledge from that data. No one else has produced this data so we are learning how to extract and read the data*" (CEO Scanalyse).

According to the lead customers the 3D scanner and the data it collected was not by itself of much value. The initial product offered was software that turned the data from the 3D scanner into a thickness map showing the structure of the mill liner walls. While this was of some value, its real potential was in how the thickness maps were interpreted. What the mining companies wanted was a management report based on the data interpretation from the thickness maps that gave them timely recommendations as to when they should change the mill liner walls, and whether all or some of the walls needed to be replaced. The customer value proposition (CVP) in the technology was therefore not a product solution but a service offering. This ability to offer clear evidence of the value of the technology was identified as a challenge by Scanalyse as noted by the firm's CEO: "*Our biggest issue is production of clear case studies demonstrating the value proposition of the technology. We need the ability to demonstrate the value of the technology.*"

This feedback led the Scanalyse team to undertake what Ries (2011) describes as a "*customer needs pivot*" within their business model design, shifting the focus of what was offered from a technology product to a specialist service. This pivot was a major turning point for the company. The work required to create this service package was undertaken extremely quickly. The 3D laser together with the data mapping software wrapped into the trending algorithm could now determine when the liners would need to be swapped out. This provided the breakthrough needed to disruptively change the way this measurement work was done at the crushing mills.

The interaction between the managers from Alcoa and the Curtin DSS research team was of sufficient strength that the company granted them access to a wide range of plant and equipment operations at the Wagerup Refinery. This helped to spawn the development of *MillMapper*. This interpersonal communication between the Curtin DSS researchers and the managers of Alcoa was critical as it enabled them to co-create the product through collaborative problem-solving. This is consistent with earlier research that suggests the level of network connectedness is what facilitates the interpersonal interactions (Valente and Rogers 1995). The closeness between the researchers at Curtin and the senior engineers at Alcoa contributed to the diffusion of the innovation and the development of a broader interest group interested in assessing the innovation. This closeness of the giver and receiver of WOM advocacy along with the strength, richness, and valence of the information provided has been identified as having an important role in enhancing the likelihood of the receiver accepting the message (Sweeney et al. 2008, 2012).

The appointment of Peter Clarke as CEO saw the project move from the university's research laboratories into commercial premises within the Technology Park opposite the university. Negotiations by the CEO with the Curtin University Office of Research and Development resulted in a mutually supportable agreement with all seed funding provided by the university. Strong interpersonal linkages between these two groups saw Scanalyse connect with further mining companies interested in trialing the prototype *MillMapper* product. It was the strength of the connectedness between Scanalyse and their foundation partners that enabled the product's limitations to be identified by the CEO and the subsequent rethink of the business model lead to the final breakthrough innovation. These interpersonal linkages have been recognized as being critical for an innovation to succeed and are often more important than the technical benefits of the innovation itself (Grubler 2000) (Table 10.3).

Table 10.3 shows the responses provided by the CEO of Scanalyse during the 2006 and 2012 interviews in relation to the perceived value of various network actors to the commercialization process. It can be seen that in 2006 the value of customers, in particular lead customers such as Alcoa, was considered to be very high with good value perceived from equity partners, lawyers, and other senior managers in the company. However, by 2012 the view of value in relation to legal advisors, equity partners had changed along with that of suppliers and other business people. In the case of suppliers the initial value of the company providing the 3D scanning technology had reduced. However, the benefit of networking with other business people as the process of commercialization unfolded had increased.

Table 10.3 Value of network actors to strategic decision-making—perceptions of Scanalyse 2006 and 2012

Type of network actor	2006	2012
• Customers, particularly lead customers…	Very valuable	Very valuable
• Suppliers, particularly key suppliers…	Some value	No value
• Directors of your management board…	Some value	Some value
• Equity partners/shareholders…	Valuable	Some value
• Other senior managers in the firm…	Valuable	Valuable
• Family members…	No value	No value
• Friends and social contacts…	No value	No value
• Other business people…	Limited value	Some value
• Accountants…	No value	No value
• Lawyers or legal advisors…	Valuable	No value
• Bankers or providers of debt financing…	No value	No value
• Providers of venture capital financing…	Some value	No value

It should be recognized that the Scanalyse board was comprised of representatives from the university and the venture capital firm who owned the equity in the business. While these actors provided the firm's management with value in the very early start-up phase they were of less value as the company expanded internationally. This highlights the importance of board directors to provide a young, fast growing company with valuable knowledge as well as access to strategic networks that can assist it in its future expansion (Borch and Huse 1993; Pugliese and Zhang 2007). Further, the decision to pivot the business model from a product focus to that of a service delivery mode made the value of legal advice relating to patents of less importance.

10.4.3 Assessment of the Residual (Quasi) Rent

The adoption and acceptance of a new technology depends not only on the customer's perception that the innovation is useful, but also that it is easy to use (Davis et al. 1989). It also needs to be relevant to the work being undertaken by the customer or end user, come from a credible supplier, and be able to demonstrate its ability to offer tangible benefits through pre and post adoption trials (Rogers 1995; Legris et al. 2003). The interaction by the CEO and design engineers at Scanalyse with their counterparts in the lead customer Alcoa played a critical role in assessing the likely adoption and acceptance of the new technology. They helped identify that the value to be created by the innovation was not a stand-alone product comprising a 3D laser scanner modified by sophisticated software to measure wear in large mills and crushers. Although this had some value it was of limited commercial benefit as it required the customer to take on the additional cost and expense of

training their own people to use the equipment on top of the up-front cost of the product itself.

The early insertion of *MillMapper* into the market confirmed it needed to be able to trend and anticipate wear and performance. This required the product to pivot and be modified as a continuous service rather than a stand-alone product. The market required a service that would compute and analyze surface damage on the crushers and develop trending algorithms from spot readings. Customers could then utilize the data and undertake planned maintenance which delivered a significant benefit over existing practice. Just in time change out of mill crusher liners also allowed for substantial cost savings in the area of liner wastage. However, there remained a lot more to do with the development of the software if this innovation was to achieve full commercialization. This was noted by the CEO as follows: "*A major challenge for us is highly automating the data processing techniques so as to eliminate the manual data processing currently required, and the aim of automating is to reduce our costs and enable us to scale up very rapidly in response to demand.*"

This "*customer needs pivot*" (Ries 2011) assisted Scanalyse to redesign their business model to deliver best value to the customer. Now with an innovative service available to the market, Scanalyse linked with actors in its social network to put them into direct contact with key decision makers within the mining industry. This phase was critical for the take up of the *MillMapper* service by the mining industry. The social capital available to the company through these actors amplified the diffusion of the innovation which otherwise would have been protracted and difficult (Coleman 1998).

The initial assessment of the anticipated rent from the innovation was fairly realistic although the feedback from the lead customer Alcoa during the early insertion of the technology into the market did result in changes as outlined above. When the innovation rent was examined again during the 2012 interview the configuration of the innovation continued to be that of a "Champion." However, as shown in Table 10.2, the view that the technology would create a new standard or system was modified with the realization that it had to be made compatible with the customer's existing processes and systems. There was also an adjustment of the innovation's development with recognition that it was through the company's strategic network of customers and industry partners that the *MillMapper* was going to be further developed rather than through research in the laboratory.

It was also evident in the 2012 interview that the initial optimism over annual sales of AUD $16–$20 million across 10 or more market segments had been moderated to AUD $5–$10 million across a more modest 2 to 4 market segments. The net profit margin had also been significantly reduced from over 40% to a more modest 21–30% estimate. The adjustment from a technological product innovation to a technologically supported service innovation was also reflected in the recognition that from a technical point of view the innovation was easy to copy despite the company holding patents and other formal intellectual property (IP) rights protections. This adjustment of the anticipated rent from the innovation to what is often a more modest residual or "quasi-rent" outcome is recognized as logical

process through which the commercialization process must move as more information from the market about customer feedback or competitor threats becomes available (Alvarez 2007; Duhamel et al. 2014).

10.4.4 Review of the Firm's Resource Configuration

Following this fundamental adjustment to the firm's business model Scanalyse embarked in 2008 on an expansion into global markets. The first overseas market entry took place in Chile, followed closely by Brazil. Securing access to these markets was facilitated by interpersonal networking and WOM communication between the CEO Peter Clarke and locally based industry group Austmine, a peak body for the Australian mining equipment, technology, and services (METS) sector. This included the engagement of key network actors such as Peter Rossdeutscher, a director of Austmine with an extensive experience in technology and innovation in the mining and resources sector, who assisted Peter Clarke and the Scanalyse team to make the necessary contacts within the South American mining companies.

With the company becoming known through WOM diffusion within the minerals processing sector of the mining industry, a need for further funding became necessary. The company board and management realized they now had an innovation that was ready for full scale commercialization within global markets. Financial investment to fund this expansion was provided by a local venture capital firm Stone Ridge Ventures (SRV). This was facilitated by WOM referral from one of the firm's board of directors to Rob Newman, an experienced venture financier and director of SRV. Thus through informal networking and WOM communication Scanalyse was able to secure sufficient funding to underwrite the business through an investment of venture capital. This brought in a shareholder commercializing partner and the attendant needs of the partner. In this case the need for return of funds was within five years.

WOM diffusion of the benefits of the new technology innovation resulted in the continuation of the company's growth into international markets. In reality the foundation partners that were located in Australia were all part of a very tight global mineral processing network. Distance was not critical for engagement, but what was critical was the trust provided by existing customers to prospective ones in confirming the benefits of the *MillMapper* service. As noted by Narayan and Pritchett (1999) effective social networks consist where there are strong ties between the members. This minerals processing group offered opportunity for Scanalyse that saw the company invited to demonstrate their *MillMapper* service at their first international site in Chile in 2009. It was here the CEO realized that despite the social capital that Scanalyse had on board in terms of references from its foundation partners in Australia more strength was needed to secure its first contract in Chile. As he explained: "*One of our top marketing issues is linking with partners in the international market place, because our service will be delivered by local agents at mine sites."*

Initially the company was marketing directly from Australia, but soon moved to appoint a Chilean maintenance services company to represent Scanalyse technology. However, it met resistance from the Chilean customer's corporate hierarchy and competitive pressures within the local market. Notwithstanding the visible financial benefits of *MillMapper*, the engagement of Scanalyse (and the introduction of *MillMapper*) was proving to be a difficult decision. The solution came once Scanalyse appointed a Chilean national to take on the role of business development manager. This individual had a strong track record within the local engineering community and was able to significantly increase the level of trust in the Scanalyse product. Trust is an important element in the creation of social capital and can assist in building confidence in the innovation and thereby facilitating its adoption (Mazzarol 2013). This move achieved immediate success and provided the springboard for securing interest from further adjacent markets in Chile and Brazil.

What triggered this move was that Scanalyse was facing difficulties in securing contracts in Chile and it was not until it employed the local Chilean engineer to present for the company that it became successful in this market. The company realized it needed to operate a service-based model requiring strong interpersonal communication and local networking. Contacts had to be trusted and local agents were better able to communicate with and understand the needs of customers in each overseas market. In fact the company found that the best method of securing sales was to physically visit the mine sites where the ore crushing and milling plants were located and demonstrating the system while communicating its benefits. As noted by the firm's CEO: "*A major challenge for us is identifying and partnering with the best industry partners for delivery of onsite services.*"

When interviewed in 2006 before the company entered the Chilean market it was management's view that there was a need to strengthen the firm's marketing and service delivery resources. As stated at the time by the CEO: "*There is a need to look at a possible joint venture with large mining services companies as alliance partners and deal with marketing and site delivery.*" However, once the market entry to Chile had occurred and the reaction of customers experienced, this approach changed.

As explained by CEO Peter Clarke: "*We followed that direction in appointing the Chilean maintenance services company, but it was not successful. It was only when we appointed our own engineer to represent the technology directly that we started to get traction. This experience was repeated when we entered North America in 2009, firstly using a maintenance services company and then going to a directly employed representative with the necessary technical skills to sell the product.*"

Parallel with this international marketing and sales effort Scanalyse embarked on an expansion of its product portfolio. This included the product line extension from *MillMapper* to new offerings *CrusherMapper* and *TransferMapper*. All three products made use of the underlying platform technology of the 3D terrestrial laser scanner to industrial machinery to monitor performance in high cost assets. However, this expansion of the firm's product line also placed pressure on its

human resources, as noted by the CEO: *"A challenge for us is developing the in-house capability to provide advisory services in data analysis."*

During 2009 the company achieved further breakthroughs with market diffusion of its products in the Chilean market and market development in Brazil. This expansion required Scanalyse to increase its staffing with more local representatives in its overseas markets to provide the necessary services to international clients. The level of growth had in fact been so strong that the company board decided to resist entry into Europe, despite opportunities to do so, and focus instead on the United States and South Africa so as to make best use of its limited sales and marketing resources.

10.4.5 Assessing the Strategies for Capturing the Value of the Appropriable Rent

The final phase of Scanalyse as an independent firm took place between 2010 and 2012. The company had now secured access to a range of global markets operating a network of agents for the delivery of its technology supported services to major mining companies. The firm's innovation had developed from the initial prototype into a portfolio of service products drawing on the platform 3D scanning technology and the proprietary algorithms underpinning the company's software. It had survived its early years, expanded globally and essentially "crossed the chasm" that confronts technological innovations (Moore 1996).

Having made the decision to build the business model around a service delivery value proposition, Scanalyse built on its initial success in Chile and continued to expand its network of local agents in other countries. Negotiations commenced with further agents in North America and Africa. The model for business development was the same as used in Brazil, employing local agents who possessed the necessary social capital networks within the targeted market segments. Interpersonal WOM communication was the most powerful medium for the promotion of the innovation, as highlighted in the literature (Arndt 1967; Martilla 1971; Czepiel 1974; Dodgson 1996).

Throughout 2010 the company and its innovation gained credibility with initial contracts awarded with commercialization beginning to accelerate. During 2011 the market entry to Europe brought with it a need to build social networks and further challenges were identified with this market. Similarly the company secured its first contracts in Africa. At this point its major shareholders moved to develop an exit strategy that would allow them to on sell their shareholding.

The demand for further investment capital in the business was now recognized by the firm's board as a necessary step to enable Scanalyse to take full advantage of its market opportunity. Annual sales had grown to more than AUD $4 million by the end of 2010 and additional funding was required to undertake future growth within existing markets and expansion into new ones such as Europe. The original

investors in the company, such as Curtin University and SRV were keen to see their shareholding returned and were unable to provide the necessary additional funding for this growth. Future funding requirements demanded a shift from the initial foundation investors to new ones willing to provide the capital for market expansion, product upgrades, and new product development.

As explained by the Scanalyse CEO: "*A major issue is the lack of capital for market development and for new product development. Real challenges are getting onto the radar because we are presenting a profitable business, but not with the blue sky potential to give very high returns.*"

The Scanalyse board reviewed the company's business strategy and realized that its only option was to continue its growth path in order to consolidate its existing advantage as a pioneer of the technology. Within the market environment Scanalyse now found itself growth was the only option or competitors would have time to erode its market leadership position with alternatives. However, the raising of additional funding required either an initial public offer (IPO) on the stock market, with significant cost of capital and compliance issues, or look for a trade sale to a larger firm.

In early 2011 the CEO Peter Clarke opened discussions with one of Scanalyse's key competitors Outotec, a Finnish company headquartered in Espoo, Finland that specializes in technologies and services for metal and mineral processing industries. These discussions were aimed at exploring the option of making a trade sale to Outotec. The following year Scanalyse secured its first major contract in Brazil and its first contracts in Africa, which helped to make the firm more attractive to a buyer, but also required additional capital to support the increasing volume of business.

Throughout 2012 the negotiations between Scanalyse and Outotec continued with appropriate due diligence undertaken by the Finnish buyer. Scanalyse's sales were growing strongly over this period and its client base had expanded to include Australia and New Zealand, the United States and Canada, Brazil, Chile, Argentina, Venezuela, Mongolia, Sweden, Vietnam, Papua New Guinea, South Africa, Zambia and other African states. After only eight years Scanalyse had grown from a start-up spin-out from a university research program into a global technology leader. The final trade sale to Outotec was complete by the end of 2012 and saw the company sell for a very substantial premium over the original investment. This allowed the founder investors to exit satisfied and moved the firm's innovation into the marketing channels of a large company with the resources to undertake the required future growth.

10.5 Discussion

The Scanalyse case provides a useful insight into the commercialization process followed by a small company and the important roles played by social capital, strategic networking, and WOM communication in helping to facilitate a successful

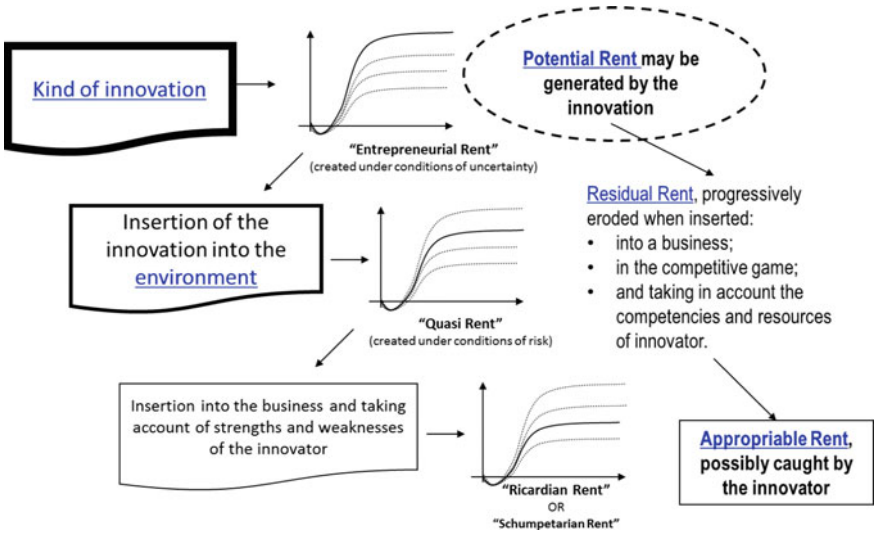

Fig. 10.1 Generation and appropriation of economic rents (adapted from Santi et al. 2003)

outcome. It also highlights the process through which a small, entrepreneurial firm assesses and appropriates the economic rent generated from an innovation. This process is illustrated in Fig. 10.1, where the initial assessment of the potential rent that might be anticipated from the innovation is made. As noted by Alvarez (2007) this is "entrepreneurial" rent, which is created under conditions of uncertainty when entrepreneurial actors combine resources in new ways to generate value. However, it occurs when the real value of these resource bundles is still unknown (Milgrom and Roberts 1990). This was the situation that confronted Scanalyse in its initial years when they were still determining how best to configure their product offer. The early insertion of the innovation into the market with the opportunity to get prompt feedback from the lead customers was made possible due to the social capital and strategic networking that the Curtin DSS research team and subsequently the staff at Scanalyse. Sufficient trust existed for the parties to work collaboratively to co-create the value that eventually emerged from the innovation.

Following the customer feedback to their initial product offer, Scanalyse was forced to undertake a major pivot in order to adapt their innovation from a product to a service offering. This need to get into touch with customers early with a minimum viable product (MVP), receive both positive and negative feedback, and then learn and adapt is a foundation process articulated in the Lean Start-up techniques advocated by Ries (2011). However, it also led the firm to reassess the economic rent that was likely to be extracted from the innovation. The reassessment slightly eroded the initial optimistic forecast, generating a residual or quasi-rent outcome. As noted by Alvarez (2007), quasi-rents are those created by parties under conditions of some certainty or known "probabilistically." While quasi-rents are

still being created under conditions of risk, the enhanced knowledge derived from having trialed the technology with lead customers ensures that much of the original uncertainty has been removed.

The final capture of the appropriable rent from the innovation is only achieved once the firm can reconfigure its resource bundles to construct a business model able to sustainably deliver the CVP over time (Kemp and Verhoeven 2002). As with many small firms Scanalyse could not fully exploit the potential of its innovation due to resource constraints. Despite its success in securing initial seed funding from Curtin University and later venture capital funding from SRV, the company still required more financial resources to allow it to build on its early success. Further, the pivot from a product to a service focus shifted the risk from the technical side to the market side. As a service the ability to create legal isolating mechanisms to protect the innovation became more difficult and increased the urgency of getting the innovation diffused into the global market as rapidly as possible.

This need for rapid growth placed significant pressure on the firm's financial resources and led the foundation investors to seek an exit strategy. However, the options for exit were now limited. The high net profit margin forecast in the initial assessment of the firm's potential rent, had been eroded to a more modest level by the time the "reality check" of the market insertion took hold and the residual rent had been estimated. This made the business less attractive to third-party investors and also changed the nature of the appropriable rent from a "Ricardian" to that of a "Schmpetarian" one (Makadok 2001).

"Ricardian" rent is associated with value created through control over assets, while "Schumpetarian" rent is derived from the ability to create value via capabilities (Do et al. 2014). In the transition from the product to the service business model, Scanalyse lost the relative benefits of strong isolating mechanisms such as legal IP rights protections and the sale of tangible products. Instead it was building its competitive edge around a service-based model where its competitive advantage was invested in its ability to develop knowledge and skills within both its in-house staff, and its global network of agents. This presented a more challenging value proposition for future investors and limited the options for the firm's growth to the trade sale to Outotec. Nevertheless, its success in both growth and final exit was enhanced through the application of a board and senior management that leveraged social capital, networks and WOM communication to support its R&D, NPD, and commercialization process, as well as its funding and ultimate trade sale.

This pattern of activity is echoed in an earlier study by Feldman and Klofsten (2000) of a technology spin-out known as IV from Sweden's Linköping University. That company grew rapidly to medium-size only to be subsequently limited in its growth due to financial resource constraints, plus internal organizational and external market challenges. A particular constraint was the ability of the university to continue to provide the necessary support for what became a long-term growth path. While able to supply the necessary R&D and technical experience in the early stage of its life, over time the university was unable to provide the type of support that a firm like IV, with global aspirations and a need for a strong customer-focused

culture required. Other problems highlighted in that case were the breakdown to effective communication between the marketing and operations staff, and the need to forge and maintain effective networks with other firms.

While Scanalyse experienced similar financial resource constraints to IV it did not suffer from disconnects between its technical and sales teams in relation to communication, and in fact demonstrated a very close and mutually productive flow of communication, learning, and adaption throughout its lifecycle. Attributes recognized in the literature as being important to successful innovation (Monge et al. 1992; Conway 1995; Kivimaki et al. 2000). It also retained, expanded, and strengthened its networks, a characteristic also found to be related to success in innovation (Arias 1995; Cooke and Wills 1999; Kandampully 2002). Strategic networks of the type developed by Scanalyse have been acknowledged as playing an important role in facilitating the internationalization of high-tech firms. Social networks play a mediating role and help to boost market awareness, while interpersonal relationships and communication provide valuable knowledge about overseas markets (Komulainen 2006).

10.5.1 A Model of Entrepreneurial Innovation Value (EIV)

The Scanalyse case offers some useful insights into the process of value identification and capture within a small entrepreneurial firm. The longitudinal nature of the case over the firm's entire lifecycle provides a unique opportunity to examine what it reveals about the commercialization process of small firms and the relationship this has with some of the theories associated with creation of economic rents from innovation (Alvarez and Barney 2004; Alvarez 2007; Mazzarol and Reboud 2005, 2006, 2008, 2011; Do et al. 2014; Do 2014; Duhamel et al. 2014). Also of interest is the lessons it can provide about the relevance of some of the conceptual frameworks that have been developed to help facilitate better performance in business start-ups and business model design (Ries 2011; Osterwalder et al. 2005, 2015; Osterwalder and Pigneur 2010; Trimi and Berbegal-Mirabent 2012).

Figure 10.2 illustrates a model of Entrepreneurial Innovation Value (EIV) that aims to draw together a range of theories and conceptual frameworks relevant to the recognition, development, and capture of value from the commercialization of an entrepreneurial innovation. The starting point for the process is the identification of the innovation and its initial assessment in relation to the anticipated (entrepreneurial rent) that can be derived. The assessment can be undertaken by assessing the potential volume of sales, rate of profit, and length of lifecycle (Santi et al. 2003; Mazzarol and Reboud 2005, 2006, 2008, 2011; Do et al. 2014; Do 2014; Duhamel et al. 2014).

In the Scanalyse case this process was initially undertaken as the firm was pursuing a product-based CVP and generated a "Champion" configuration. However, once the innovation had been developed into a MVP prototype and

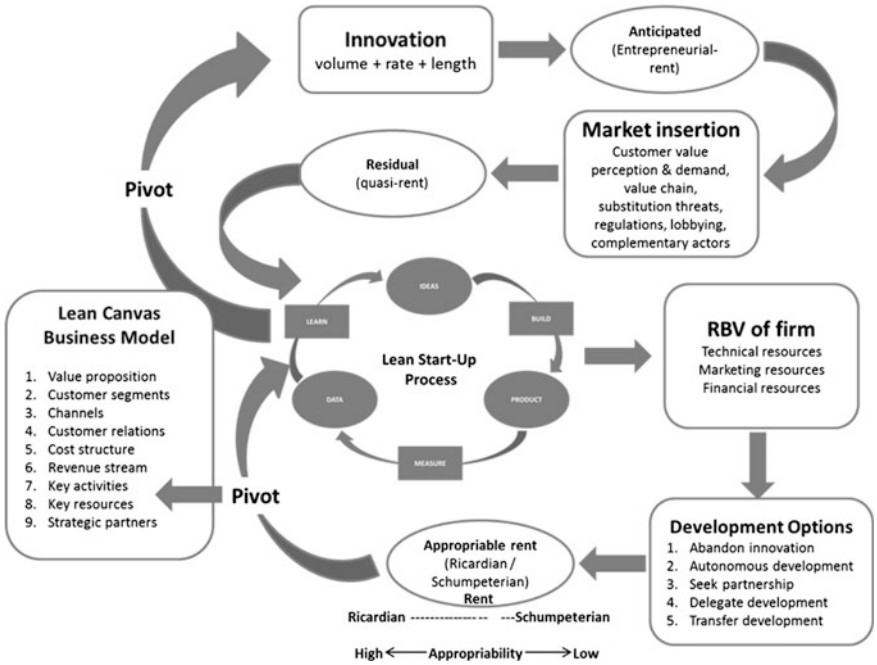

Fig. 10.2 A model of entrepreneurial innovation value (EIV) (Malone et al. 2015)

inserted into the market via lead customers like Alcoa, it became clear that the value perceived by the people at Scanalyse did not accord with that of the customers. The cost and complexity of the 3D laser technology offered as a stand-alone product did not offer customers sufficient ease of use, nor was it compatible with their existing systems. This market feedback required Scanalyse to review their product and undertake a "*customer needs pivot"* (Ries 2011) developing the technology into a service-based CVP. Although this was of more value to the customer, the residual quasi-rent outcome did not capture as much value as originally anticipated.

Although Scanalyse did not specifically use the "Lean Start-up" process (Ries 2011), or "Lean Canvas" business model design principles (Osterwalder and Pigneur 2010) in any formal way, the general process the company followed in its commercialization process mirrors these conceptual frameworks. Further, the role played by social capital and communication within the firm's strategic networks was of prime importance to shaping this process. As suggested by Ostrom (2009), social capital deals with the relationships and shared values that are created by individuals, groups, or organizations to collectively solve problems.

The link with Alcoa provided the genesis for the creation of the product *MillMapper*. However, it was not until the arrival of an entrepreneurial leader such as the CEO Peter Clarke that an innovation value was created. The measuring capability of *MillMapper* for the customer was of some value, but it failed to meet the generic conditions of ease of use and compatibility with existing systems that

tend to be the hallmarks of successful innovation adoption and diffusion (Rogers 1976, 1995). The decision by the CEO to undergo a pivot after feedback from lead customers was the key that delivered the creation of *MillMapper* as a service. This breakthrough brought together the process of the static mapping of the wear and tear of the mill liners with the ability to combine a trending algorithm thereby generating a continuous real-time analysis of the liner thickness. This transformed the benefits to customers over their existing processes enabling just-in-time replacement with substantial cost savings.

The interaction between the Scanalyse management and engineering team and their lead customers and wider network of alliance partners led to the exploration of different ways the platform IP and core competencies contained within the firm could be configured into new service products. This generated the *CrusherMapper* and *TransferMapper* innovations, as well as developing the firm's knowledge and networks in the development of new markets around the world. The early years (2004–2006) saw the leveraging of residual networks built on the existing social capital formed by the Curtin DSS researchers. This enable the company and its lead customers to collaborate in order to solve the customer's problems using the 3D Scanning technology and essentially co-create the innovation. In each case the development of these products involved the iterative learning loop between customer and firm as defined by the EIV model shown in Fig. 10.2.

In its growth phase (2007–2009) Scanalyse used networks and WOM communication to strengthen the market acceptance of its innovation. Having developed a radical innovation and being a relatively unknown small firm, Scanalyse lacked brand recognition and significant marketing and sales capacity. As suggested by Ostgaard and Birley (1994) small entrepreneurial firms must rely on WOM and their ability to leverage personal networks to secure competitive strategies. This process provided Scanalyse with the ability to gain its first international customer. Here the company's innovation was diffused through the networking channels of the international mining company maintenance engineers. The positive WOM from the company's foundation customers provided the comfort for the firm's first international customer to sign on.

For innovation to cross over social networks acting as a mechanism for diffusion, there is a need to create 'structural holes' between the networks with the information diffused through influential people providing 'bridges' as 'gatekeepers' (Burt 1992a/b). This reflects the Scanalyse experience in Chile and it became the format for all international contracts going forward. It facilitated the company's subsequent entry into Brazil, and then the USA and South Africa. All four international sites experienced initial problems that related either to the clients' not fully understanding the CVP that Scanalyse was offering, or a lack of identification of the relevant 'gatekeepers' for WOM diffusion.

From the perspective of the conceptual model this understanding reinforces the second step in the assessment of the residual quasi-rent value. Once the innovation was inserted into the market the rent value was adjusted after accounting for the erosion effects on volume of sales, rate of profit, and length of selling of the innovation. Complimentary actors, regulation, and substitutes all contributed to an

understanding of the residual value. This provided an opportunity to gain access to expansion capital to drive the company forward. Through utilizing strategic networks the CEO was able to link with a fund and deliver further financial capacity to the company. Over the three-year period, the pivoting of the innovation to adjust for market requirements was undertaken delivering a residual rent.

The final period from 2010 to 2012 saw the company extend its product range and bring out two new products *CrusherMapper* and *TransferMapper*. This extension to the product line increased the target customer base and strengthened the company's capacity to deliver tangible benefits to a broad group of customers. The ability to move quickly was through the diffusion of the innovative product and service through their industry partners. This period saw the innovation go mainstream with sales and revenues rising.

However, as outlined above, the resource constraints and limited exit strategies facing the company led it to opt for the trade sale to Outotec. The CEO Peter Clarke expressed the view that more return to the innovation might have been secured had Scanalyse been able to secure an IPO or form a joint venture alliance. However, the nature of the business model and the board's appetite for further risk in a dynamic global market where speed to market was critical made a trade sale more attractive. Despite this the final exit delivered a very substantial return to the investments made by the original owners. It also ensured that the innovation would continue to provide value to customers around the world through Outotec as an established global service provider.

10.6 Conclusion

The Scanalyse case offers an end-to-end example of a new technology start-up, growth and trade-sale lifecycle. It highlights the stages through which a commercialization process for a small innovator firm can move, and offers evidence to support the EIV model (Malone et al. 2015), and the multi-stage process of how economic rent from innovation is identified, assessed, and finally captured by such firms (Santi et al. 2003; Duhamel et al. 2014). It also shows the importance of social capital, networking, and WOM communication in the diffusion process (Steward and Conway 1996; Partanen et al. 2008). In addition the case demonstrates the argument suggested by Sandberg (2002) that proactivity in the market, particularly at the early stages of a new product launch is important to successful commercialization. It also suggests that a university spin-out can be a success if it has the necessary leadership, industry connections and adaptiveness, as well as an ability to work closely with lead customers and network support actors to co-create the product/service offering. This ability to make best use of the firm's limited resources and remain closely engaged with customers while retaining the full engagement of the original university research team can overcome problems found in other spin-outs (e.g., Feldman and Klofsten 2000).

Scanalyse was able to effectively utilize social capital in gaining access to strategic customers. This provided the company the ability to discuss the concept of *MillMapper* and in the process discover where the real opportunity lay for commercialization. The ability to utilize the social network by the firm's CEO generated the information that was the breakthrough. It was the continuous reporting feature that lifted *MillMapper* from a product of some value to one of immense value. The problem of knowing when to replace the steel liners in the huge crushing mills was a global challenge confronting all mining firms, and until the arrival of Scanalyse it was not being addressed. Historically it had been a function of time with firms typically replacing the liners earlier than required at substantial cost rather than risk a failure before a scheduled replacement occurred. Scanalyse changed maintenance in this area forever. Being able to monitor wear and tear on steel mills allowed real-time control over all maintenance aspects delivering substantial savings to operations. However, the problem would not have been solved without the interpersonal communication between the Curtin DSS/Scanalyse team and their counterparts in lead customer firms such as Alcoa. The strong social capital built on trust and a willingness to collaboratively problem solve was the key to the creation of the *MillMapper* solution.

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