



PTI: Coping with the Covid-19 crisis from a resource-based view

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Abstract:	Small and medium-sized enterprises (SMEs) are suffering heavily from the Covid-19 pandemic. Pincode Telenet International (PTI) is a small company providing software solutions to the utility sector in the Netherlands. Its revenue depends entirely on outsourcing contracts given by utility providers. When the market environment is disrupted by the Covid-19 outbreak and its lasting impact, PTI is confronted with a 35%

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	drop in revenue and many uncertainties. This case illustrates how PTI copes with uncertainties by focusing on one certainty: the available resources. The resource-based coping strategy presented in this case engages students to reflect on how different resources can be used to strengthen collaborations and expand a customer base. It thus advances our understanding of opportunity recognition and entrepreneurial behaviour in times of crisis.



Introduction

The economic disruption of Covid-19 has been devastating. This is especially true for Small and Medium-Sized Enterprises (SMEs) because of their size and vulnerable financial position (Dimson et al., 2020). This case study is centred on a Dutch SME, Pincode Telenet International (PTI), that has serviced utility providers with software solutions related to meter-reading tasks for nearly 30 years. Under normal circumstances the utility sector generates stable revenue even during economic slowdowns. However, the Covid-19 pandemic has seriously disrupted the meter-to-cash process. When physical activities like manual meter readings and preventive maintenance are canceled, and capacity building and expansion projects are on hold, the demands for PTI's services decrease, and so do cash collection and revenue generation.

The impact of Covid-19 is expected to be long-lasting. The world is still full of uncertainty and unknowns. Nevertheless, the crisis is also pushing industries and service sectors to recognize the urgency for digital transformation and to speed up their transformation journeys (Booth et al., 2020), which can bring new opportunities for PTI. An urgent question is how to secure the revenue from the utility sector and seize the new opportunities in other sectors. The CEO of PTI, Jan Posma, and his management team believe the answer must be found within the organization by rethinking the use of existing resources.

The case data are collected from a 2-hour meeting with Jan Posma and 2 staff, in addition to a 1-hour interview with Ron Tuinenburg, Director of Innovation & ICT. The information published on the website www.PTI.nl and annual reports were other sources. This case study starts with a literature review of the Resource-based View (RBV), especially as it relates to SMEs in crisis times. The next section highlights the market developments in the utility sector, followed by an explanation of PTI's market position and emerging opportunities. Finally, a

suggested teaching plan is presented. This case study enables students to explore how the Resource-based View helps entrepreneurs to evaluate and grow their strategic resources and build integral resilience for coping with crises.

Resource-based View (RBV)

Because competitive advantages are difficult to identify, researchers have sought to investigate the characteristics of resources by linking input (resources) with output (performance) (Ansoff, 1965; Andrews, 1971; Ketchen et al., 2007). Specific criteria were developed for defining 'strategic resources' that allow organizations to sustain competitive advantages in the long run (Barney and Hesterly, 2006). These criteria are summed up as the VRIO conditions:

- it is Valuable in terms of reducing costs or increasing value to customers;
- it is Rare enough that competitors are not able to use the same resource to neutralize the advantage;
- it is difficult to Imitate and it is non-substitutable; and
- it needs to be Organized in an appropriate way to enable an organization to realize the full potential of its resources.

This way of evaluating resources can help entrepreneurs shape their understanding of performance differentials (Sok et al., 2016). Building on the foundation laid by RBV, the dynamic capability theory argues that it is not the resources themselves that are most important, but rather an organization's capability to reconfigure its operating routines to utilize its resources (Augier and Teece, 2009; Villanueva et al., 2012). The concept of competency stresses the coordination of the complex interplay of organizational processes, managerial cognition and social interactions within and between organizations (Reychav and Weisberg, 2009; Wahl and Prause, 2013). Another expanded view of the RBV is the knowledge-based

view that highlights the importance of know-how in resource accumulation and configuration (Grant, 1996; Curado and Bontis, 2006). A commonality among these views is their emphasis on intangible resources (capability, competency, knowledge), as these are more valuable in making effective strategic judgments (Priem et al., 2013), more firm-specific, and less imitable because they are tacit and embedded in the firm. These intangible resources thus contribute more to sustainable competitive advantage (Pereira and Bamel, 2021).

The division of these concepts may be clear-cut in theory, but in reality it is less so, because in the attainment of competitive advantage an organization's resources are inextricably bound to its capabilities and competencies (Newbert and Tornikoski, 2013). The term 'resource' is used in this study as a general term to refer to any inputs into organizational processes, including any asset to help the organization achieve its goals (Crook et al., 2008). This is not to deny the definitions given in the literature, but to respect the statement put forth by the entrepreneurs interviewed in this research that 'financial resource', 'human resource' and 'resource management' remain the most used terms for SMEs. This study applies the three categories of resources identified by Barney (1991, 2001) in developing RBV: *physical resources*, *human resources* and *organizational resources*. The concepts of 'dynamic capability', 'competency', and 'knowledge' are incorporated in the categorization of human and organizational resources.

Physical Resources include physical technology, the plant and equipment, geographic location, raw materials, etc. (Barney, 1991). A financial resource is an addition to this category and includes capital, cash, equity, retained earnings, as well as patents, copyrights, trademarks, trade secrets, etc. because of their hard value in accounting terms (Barney, 1997).

Human Resources include the manpower, experience, judgment, intelligence, relationships and insights of individual managers and workers in a firm (Becker, 1993). For a long time management's ability to recognize market demand, to combine the firm's available resources

with new resources and to accept inherent risks were considered the main reasons for business growth (Bae and Lawler, 2000). Later studies have found that companies which value their employees as a source of competitive advantage are more likely to attain higher performance, because these employees facilitate innovation, and carry skills and knowledge embedded in the organization (Wibisono et al., 2016). Especially in knowledge-intensive organizations (e.g. IT companies) where professional norms and occupational cultures dominate, the expertise of employees has further balanced out the ruling power of managers (Peng, 2001; MacGillivray, 2018).

Organizational Resources include internal components such as process, structure, control systems and inter- and intra-firm relationships. The latter can take the form of social networks and legal contracts, which are difficult to replicate (Mitchell et al., 2000). Moreover, reputation, brand, and innovative capability are important resources that also contribute positively to the building of competitive advantages (Barney and Mackey, 2005). These components exist in the collective knowledge and skills of a firm (Ambrosini et al., 2009), yet they can also be obtained from other organizations through networking and partnership (Malatesta and Smith, 2014).

Applying RBV to SMEs

SMEs have several specific characteristics which can impact their adoption of RBV. Scarce human resources, a lack of managerial intellectual capacity, limited financial resources and its adverse impact on innovations, a reactive approach to market change, and informalized and irregular processes are listed as the major weaknesses for SMEs (Garengo et al., 2005; Laforet and Tann, 2006; Bellone et al., 2010; Woschke et al., 2017). Meanwhile, SMEs possess strengths relative to larger organizations. For example, managers may have good personal

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3 networks for gathering information and may thus have more effective communication with
4 employees and customers (Rosenbusch et al., 2011; Bonfim et al., 2017). SMEs may also have
5 more exchange of valuable knowledge and lower barriers of sharing resources based on trust
6 among members (Aoki and Wilhelm, 2017; Isaac et al., 2019). They are also capable of rapid
7 decision-making, quick responses to changing customer needs, and may maintain better control
8 over their processes (Ates et al., 2013; Love and Roper, 2015; Zhang and Hartley, 2018).
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11 For SMEs that are good at using their strengths to compensate for weaknesses, solving resource
12 problems by networking with others will most likely obtain competitive advantages (Tian et
13 al., 2021). Because the VRIO conditions for strategic resources take a long time to develop and
14 are difficult to be understood, let alone copied, by competitors, they are the engine for SMEs'
15 innovation and development (Angulo-Ruiza et al., 2018; Roostika, 2019). RBV is also valuable
16 in crisis times because of its power in recognizing opportunities and threats: in particular,
17 entrepreneurs' knowledge of their existing resources is a key determinant of opportunity
18 evaluation (Olson et al., 2020). Entrepreneurs are more capable of identifying the opportunities
19 that are complementary to their existing resources (Haynie et al., 2009). Thus, a better
20 understanding of the configuration of existing resources can stimulate the innovation power of
21 SMEs and increase their chances of correctly interpreting opportunities and threats in times of
22 crisis.
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48 **A small company serving big clients**

49 PTI was established in 1993 as the first telecom service provider in the Netherlands to handle
50 customers' calls and orders in response to products advertised in magazines and newspapers.
51 In 1995 PTI was the first in the Netherlands to develop meter-reading software applications for
52 utility providers. Since then PTI has grown from 5 to 40 staff, with a turnover of over 10 million
53 euros.
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The utility sector includes the water and energy sectors. PTI’s revenue comes 60% from the water sector and 40% from the energy sector. The utility providers that PTI serves have customer bases varying from 200,000 to 5.6 million households, institutions and companies. Meter-reading is automatic, but other related tasks, like the maintenance and replacement of meters, are carried out manually. Depending on the weather, traffic and travel distance, a meter technician can handle 3-30 visits per day. With millions of meters installed in offices and residential buildings, in urban and remote areas, on industry and construction sites on land and at sea, it is a complex process for utility providers to manage the workflow of site visits and maintenance activities. Also, the data flow between meters and the data centre for billing and analysis must be safeguarded. The complexity is further increased when different utility users (residences, factories, shops, swimming pools, parks and resorts, etc.) require different information about billing and just-in-time communication. Since these tasks are not the core business of utility providers (which are instead focused on infrastructure, quantity and quality of supply, laws and regulations), they are usually outsourced to IT companies like PTI that specialize in workflow planning, process and data management.

Different market positions in the water and energy sectors

PTI has maintained a dominant market position in the water sector. Besides its first-mover advantage and reputation of excellent quality, another important factor is that the water sector is not yet privatized. Water suppliers still operate within the public potable water system because the priority is placed on water safety and public health. Water users cannot choose or change their water supplier but must accept the one contracted by the local government. The high standard for water safety and security set by the government forms a high entry barrier, limiting the number of newcomers joining the sector and preventing competition for public goods like water.

The energy sector ranges from the traditional sources of oil and natural gas to new sources such as solar, wind and biomass energy. Since the start of privatization in 2004, the number of energy suppliers has grown from 6 to almost 50, and 75% of the Dutch energy market is currently in foreign hands (Grol, 2019). Foreign energy suppliers are large corporates operating internationally, mostly using their own meter-reading service providers rather than choosing a local company that is unknown to them. Energy users can choose their energy supplier and can switch to a different supplier at will because contracts are annual. Privatization has made the energy sector a very fragmented and competitive marketplace, difficult for PTI to penetrate. However, this market has high profitability due to the high frequency of meter-reading and maintenance, plus the large-scale rollout of smart meters.

The march of smart meters: threats and opportunities

Smart meters involve sensors and algorithms, enabling quick problem notification and quality monitoring to be done remotely, and allowing billing to reflect near real-time consumption rather than estimates based on past or predicted annual consumption. With the rise of wireless computerization and remote-controlled devices, buildings can be installed with highly advanced, automated systems to control and monitor any function for efficiency (energy and time savings), comfort and wellness (temperature, air quality, sound, lighting), or safety (detecting fire, revealing gas and water leaks) (Bernstein, 2020). All this timely information generated by electronic devices can be connected to smart meters which allow utility providers to better control their production and distribution (Sinopoli, 2010), also enable users to better manage their energy use and reduce their energy bills (Toritti, 2020).

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The march of smart meters is strongly supported by the Dutch government and the European Union. In 2020 the Dutch state agency ‘National Energy Saving Fund’ provided €1 billion in funding for consumer energy efficiency upgrades. The European Commission DG Energy estimated the 2020 installed base to have required €18.8 billion in investment, growing to €40.7 billion by 2030, with a total deployment of 266 million smart meters (European Commission, 2019).

Increasing competition from other IT companies

The huge market potential is attracting more IT companies to enter the utility sector. Their competitive strategy of offering quicker solutions at a cheaper price is very attractive to utility providers seeking low prices, instant results and short-term showcases for marketing purposes.

The real challenge of automation is not in the regular processes and standard services, which are the easiest part to be automated, but in the irregularities such as malfunctions, incidences, errors and breakdowns, which cause the most damage and require the most reparations. PTI has a totality approach to take preventive measures in its software design phase, and also to detect and handle the irregularities quicker and better when they occur. Moreover, if a utility provider changes its software supplier, the risk of system crashes can be very high, as are the switching costs. But because of the fierce competition in low prices and instant results, the value of the totality approach is only recognized by those who see the whole picture.

The danger of insourcing

The quality of the data generated by smart meters is high because they are near real-time and provide more details; the large quantity of data also allows more accurate predictions of energy use. Going from one meter reading each month (or even fewer) to a meter reading every 15 minutes, or 96 million reads per day for every 1 million meters, results in a 3,000-fold increase

in data volume (Chen and Phan, 2018). Utility providers increasingly regard the data as a gateway that can give new insights into consumer behaviours and consumption patterns, allowing them to identify or stimulate new customer demands. When utility providers are eager to exploit the value and power of the meter data themselves, they are more likely to adopt an insourcing strategy to take back control of meter-reading services. In that case, the outsourcing contract with PTI will be terminated.

The risk of data leaks

Because the information collected by smart metering can present a detailed picture of what appliances are being used and other daily activities, data privacy and cybersecurity have become key issues in the academic and policy debate (Lee and Hess, 2021). PTI must strictly follow the European Union's General Data Protection Regulation (GDPR) to avoid possible data leaks. PTI serves different clients, but they are all in the same sector. Even third party allegations of data leakage can lead to brand damage, which in turn can quickly lead to bankruptcy. To mitigate this risk, extra investment has been made in PTI's operating system and in its legal compliance measures, which is costly.

Changing consumer demand

Consumers are becoming more sophisticated in selecting energy providers and are demanding more transparent invoicing. Since energy prices keep climbing, the residents of large rental buildings are becoming less willing to pay undifferentiated prices and more often require individualized billing. Also, consumers increasingly prefer the use of mobile applications: to take pictures of their meters and upload the pictures for reporting or problem diagnosis, and to compare tariffs with those of other energy providers and the average user. To meet these new

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3 demands, utility providers also increase their requirements on PTI to develop more applications
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5 with new functionalities.
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10 *Opportunities for diversification*
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12 Threats are inevitable, but every change also brings opportunities. PTI does not produce smart
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14 meters, nor does it have direct contact with smart meter producers. Maintaining the revenue
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16 stream from the utility sector is thus essential. Meanwhile, PTI must become less dependent
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18 on this single sector.
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22 In existing buildings and facilities, the installed meters and software were selected by utility
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24 providers. But for new buildings, construction and installation companies play an important
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26 role in the selection. According to the Dutch government report ‘The State of Housing
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28 Marketing in 2020’, 845,000 new apartments and houses need to be built by 2030, and all are
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30 required to have smart meters installed. To partner up with construction and installation
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32 companies may give PTI an opening to the fast-growing market of smart housing.
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36 PTI’s software applications are mainly designed for utility providers, but with adjustments they
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38 can easily be applied to other sectors. For instance, the ‘Work Schedule Planner’ application
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40 that helps utility providers to efficiently plan their meter maintenance visits can be re-
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42 developed for new customer groups. It could be used by healthcare service providers to plan
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44 visits to their patients living in different places, or by companies that send out technicians to
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46 place or repair kitchens and sanitary facilities in different regions.
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51 The pandemic is pushing SMEs to speed up their automation processes. Based on the same
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53 principle of software design for the utility sector, such as a monthly collection of data, invoicing
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55 and billing, PTI has developed software applications for SMEs to automate their debt
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57 collections. The re-development cost is low, and the urgency of automation is high, but
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maintaining customer relationships is very time-consuming when dealing with a large diversity of SMEs. Jan also noticed that most SMEs lack the knowledge of process automation and data security, and that digitization is a black box for many SMEs. With rich knowledge and experience, PTI has started offering free IT consultancy to SMEs during the Covid-19 crisis. Hopefully, this consultancy work will deliver more clients in the future.

PTI's resources bundle

Brainstede

In 2019 PTI renovated its nearly 1,300 m³ office building and renamed it *Brainstede* (brain city). The facility consists of quiet offices, meeting spaces of different sizes, a company restaurant, a game room and a nice courtyard garden. The new building aims to attract start-ups and freelancers in the field of data analytics, artificial and business intelligence by providing low-rent offices. PTI needs more expertise in these fields but has no capital or time to develop it on its own. What better idea could there be for attracting the people who already have this expertise? These entrepreneurial IT specialists like to build their businesses but are confronted with difficulties like having a company size of just one person, their savings being the only capital source, no market recognition and a limited business network. It is attractive for them to work with an established company and to take the advantage of PTI's rich market experience and broad networks. The arrival of these freelancers and start-ups brings fresh ideas and new energy. Another benefit for PTI in supporting these start-ups is that it can grow with them together as partners instead of as competitors.

Since 2018 PTI has partnered with two universities of applied sciences to involve university students through case studies and hackathons. The collaborations have proven to be very valuable, especially during the crisis time. University students are helped with internship and

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placement opportunities that are difficult to find. In turn, PTI can use the students’ work to gain more market insights and to score young talents straight from the universities. While many IT companies have difficulty finding new IT workers, PTI has a continuous recruitment pool of young students.

PTI platform

To stay ahead of the competitors, who are mainly SaaS (Software-as-a-Service) companies, a strategic decision was made in 2019 to transform PTI’s business model to PaaS (Platform-as-a-Service). The new platform functions as a one-stop-shop: all PTI software applications are configured on one platform. Through this platform, all data traffic can be easily connected and controlled, and different operational processes of one client can be integrated, which can speed up processes and reduce costs. Although the testing period with some potential clients was delayed, the pressure of the Covid-19 pandemic has accelerated the development process. The new platform was launched in 2021. Thanks to the new possibilities such as video conferences and live streams, various launch events have had far more online participants and reviews than any of PTI’s pre-Covid events. A new contract was recently signed with a utility provider in Belgium. Also the first order of installing PTI software in 1,600 smart water meters was completed in 2022.

Our people are our real capital

So says Jan, because PTI has no patented software and cannot rely on external capital investments. PTI has various software product teams, each linked to different clients using the same software. Each team consists of marketers, software developers and testers; is led by a product owner. Product owners are important members of the management team and key decision-makers of project executions. If a software product is at the end of its life cycle, the team members are trained and transferred to other teams, not laid off. All staff is informed

quarterly about financial status, project progress and new plans. Everyone, from the director to the secretaries, is encouraged to contribute their ideas, share their stories and give critical feedback. This open culture is again reflected in how staff deal with clients: for example, the monthly 'PTI lunch' is not only frequented by staff but is also popular among clients, who join in having lunch together.

PTI family

PTI staff describe PTI's culture as '*family-like, open, loyal, hardworking and no-nonsense*'. PTI has a flat organizational structure to enable rapid sharing and deployment of best practices between different teams. Looking back to the past years, Jan feels fortunate that he and Ron Tuinenburg, director of PTI's IT & Innovation department, have always teamed up like two riders on a tandem bike. Both of them had many years of experience in the IT industry before joining PTI. Together they intentionally strengthen the marketing and communication skills of all staff, especially training their software engineers to become more customer-oriented. Software engineers are generally passionate about making the best software solutions, but most of them are introverts, untidy, less communicative and consider their software designs to be the best rather than thinking from the customer's perspective. PTI's marketers often invite clients to come to Brainstede to meet the engineers. This strong customer orientation stimulates PTI engineers and marketers to work closely together and with the clients, supporting each other to build software solutions that best fit each client's needs.

Jan believes that a successful organization must be rooted in a supportive community. The PTI Academy was originally set up for PTI's internal personnel training, yet later, other local SMEs were also invited to participate. PTI recognized that the GDPR topic is of great concern to many SMEs, and so it invited entrepreneurs from other SMEs to participate in its 'Privacy &

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Data’ event. At the event, GDPR was explained by several experts from legal, data security and consumer behaviour perspectives, and all participants were given the free opportunity to ask questions that were especially relevant to their businesses. PTI is actively involved in local and nationwide charity projects. PTI’s clients are often invited to attend these charity events; some even become active participants together with the PTI family.

The problem

The Covid-19 crisis has placed a heavy financial burden on PTI. The revenue drop of 35% has delayed PTI’s plan of launching a new platform and entering new sectors. Jan believes the only way to survive any crisis is to fight through it. The diversification strategy seems promising but requires the re-development of software for different sectors and marketing towards new and different clients. Jan is facing the dilemma of whether PTI should continue its ‘full service and totality approach’ when pursuing its diversification strategy. To continue the totality approach can sustain PTI’s reputation and customer loyalty, but it is very costly and holds the risk of losing the price competition. The issue is compounded by the almost €1 million investment made in developing the new platform which still needs time to generate sufficient clients to be profitable.

Summary

PTI’s core business (its meter-reading service) has had a successful history but is now threatened by increasing competition. The totality approach is still a competitive advantage but seems to be losing its attractiveness. The comprehensiveness of PTI’s service ensures high quality but is less appealing to the price-sensitive clients who choose to insource or purchase partial functionality at a cheaper price. The Covid-19 pandemic has pressed PTI to move faster in pursuing a diversification strategy and seizing new opportunities within and outside of the

utility sector. This case highlights the importance of RBV in helping entrepreneurs to identify their strengths and weaknesses, and to evaluate their opportunities and threats. It enhances our understanding of innovative resource assemblage in the context of SMEs.

Questions

1. What are the resources that have strategic importance for implementing PTI's diversification strategy?
2. What are PTI's strengths and weaknesses, opportunities and threats, considering the impact of the Covid-19 crisis?
3. How can PTI balance the resources spent on its core business with those needed for new business expansion?

Acknowledgements

This case and the research behind it would not have been possible without the generous cooperation of Jan Posma, Ron Tuinenburg, and the staff of PTI. The case has been reviewed and given consent by PTI for the purpose of education and academic publications.

Teaching Notes

Teaching objectives and target audience

The developments in the utility sector described in this case, such as privatization and the march of smart meters, are not unique to the Netherlands but are common in many countries (Burger and Weinmann, 2019; Alejandro et al., 2014). In addition to the current energy crisis in Europe, the challenges confronting this Dutch company relate to the experiences of teachers and students in many European countries.

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Many students of business and management are not confident to study a case of IT companies because of the presumption that they lack the technical knowledge, and the industrial applications of IT seem very distant from the students’ own lives. This case study of meter-reading service enables students to gain a better understanding of IT applications in daily life. This case study is suitable for both undergraduate and postgraduate students studying innovation, entrepreneurship, marketing, and strategic management.

Learning objectives

- to understand the unique challenges presented to SMEs in the smart industry and a complex utility market
- to understand entrepreneurship in making strategic decisions with social responsibility and caution in times of crisis
- to apply the Resource-based View (RBV) model in resource assemblage and leverage it to exploit new market opportunities
- to apply the results of RBV in developing a SWOT analysis and to examine the interplay between the two models in terms of strategy and culture

Teaching approaches and strategy

This case can be used to provide students with basic knowledge about the contemporary development of the energy sector transition, smart industry, and digitization. It helps students to discuss and apply RBV and SWOT analyses in understanding the importance of resources in sustaining competitive advantages. Especially during the Covid-19 crisis, when the external environment is full of uncertainties, the good use of available and attainable resources can help SMEs to gain strength and resilience. This case thus enables students to understand the

characteristics of SMEs and their dynamic environment and to learn how to deal with strategic management challenges through resource reconfiguration.

There are three stages of using this case in an educational setting:

1. Preparation:

Although the general trends and development may be the same as described by the Dutch case, certain contextual factors may vary between countries (e.g. the utility sector structure and government policies regarding smart meters). Therefore, lecturers can add short articles, videos and internet links as supplemental reading materials that can help students to understand the contextual factors. The preparation time may differ per student, estimated between 3-5 hours.

Tip: Ask students to take a picture of the energy and water meters in their residence, to find out how they provide meter information to and receive bills from the utility providers.

2. Classroom discussion (30-45 minutes):

The lecturer starts with a general introduction by asking students to share the results of their preparation. This central discussion can help students to recognize and justify the demands of consumers. These activities can make the discussion more vivid and close the knowledge gap between the IT industrial application and the students' experiences.

Then the key questions and RBV/VRIO framework are introduced.

Students can be then divided into small groups (3-4 students, depending on the number of students). Their group discussion is centred around the three questions. The lecturer may alter some of these questions according to the needs emerging from the central discussion. Each group may write their VRIO framework and SWOT analysis on a flip-over or digital posting that can then be demonstrated to other groups.

3. Presentation and feedback (30-60 minutes):

Students may come up with different advice regarding whether the totality approach can be continued and how, as long as their advice is formulated based on their answers to the three questions. The lecturer may ask one or two to present their advice. Other groups can ask questions or add different options. The lecturer can direct the discussion by challenging students to defend their advice against the ideas of other groups. To conclude the session, the lecturer might consider asking students to vote for the top 3 solutions and to summarize what they consider to be the main learning outcomes. Alternatively, students can hand in their digital version plus a summary – either as a group or individually – to give feedback to the lecturer about the usefulness and shortcomings of the case study.

Analysis

The following answer keys should be seen as suggestions rather than the absolute correct answers. Students should be encouraged to express their own opinions and learn from different perspectives.

1. *What are the resources that have strategic importance for implementing PTI's diversification strategy?*

For example, an established reputation and the PTI culture are valuable, unique/rare, difficult to be imitated and embedded in the organization (marked with ✓). The start-up, freelancers and interns are valuable (marked with ✓) but are not tied to PTI by employment contracts; therefore they are not embedded in the organization (marked with ✕). Working with them is not a unique concept, nor difficult to imitate (marked with ✕).

Resources		V	R	I	O
Physical	the office building 'Brainstede' owned by PTI	✓	✗	✓	✓
	existing IT infrastructure (e.g. PTI platform)	✓	✗	✗	✓
	revenue	✓	✗	✗	✓
Human	PTI staff	✓	✓	✗	✓
	start-ups and freelancers, interns	✓	✗	✗	✗
Organizational	an established reputation, especially in the water sector	✓	✓	✓	✓
	customer relationships	✓	✗	✗	✗
	specialized in software development for almost 3 decades	✓	✓	✗	✓
	PTI family culture	✓	✓	✓	✓
	specific management skills and organizational knowledge	✓	✓	✓	✓

2. *What are the strengths and weaknesses, opportunities and threats for PTI, considering the impact of the Covid-19 crisis?*

The resources that are related to the S-W-O-T are indicated: PR (physical resource), HR (human resource), OR (organizational resource).

<i>Strengths</i>	<ul style="list-style-type: none"> ✓ own building, not rental cost (PR) ✓ an established reputation in the utility sector (OR) ✓ full-service and totality approach (OR) ✓ trustworthy customers in the water sector (OR)
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	<ul style="list-style-type: none"> ✓ PTI family culture (OR) ✓ the synergy between marketing and IT department (OR, HR) ✓ PTI new platform (PR) ✓ a talent pool of university students and start-ups (HR)
<i>Weaknesses</i>	<ul style="list-style-type: none"> ✗ price (PR) ✗ revenue drop (PR) ✗ the new platform is not yet generating a sufficient number of clients (PR) ✗ no external financial resource (PR) ✗ focus on Dutch utility providers, no relationship with foreign utility providers (OR) ✗ no brand recognition in other sectors (HR, OR)
<i>Opportunities</i>	<ul style="list-style-type: none"> ✓ government financial incentives (PR) ✓ partnership with installation and construction companies (HR) ✓ develop relationships with new (mostly foreign) utility providers by using established reputation (OR) ✓ SMEs need consultancy for automation, data protection and cybersecurity (HR) ✓ the entry barrier remains high in the water sector, where PTI has a dominant position (OR)
<i>Threats</i>	<ul style="list-style-type: none"> ✗ the impacts of Covid-19 can last for years; expanding into other sectors will need more manpower and other expertise that PTI cannot afford (PR, HR)

	<ul style="list-style-type: none"> ✘ existing clients may choose insourcing or a cheaper alternative (PR) ✘ the entry barrier for newcomers in the energy sector is low, and price competition is high (PR) ✘ costs of regulatory compliance related to data protection and cybersecurity are increasing (PR, OR)
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3. *How can PTI balance the resources spent on its core business with those needed for new business expansion?*

Students need to be aware both of SMEs' disadvantages and their advantages. Finding possible solutions for PTI's problem is about using these advantages to compensate for the disadvantages. For example, re-developing existing software can save time and money, lower the price, and therefore make PTI more attractive to new clients. Offering a trial period or a basic version with the most needed functionalities at a cheaper price can attract clients that are not willing to invest in the full package. Moreover, students learn to not evaluate resources in isolation but to seek complementarity in the value-creation process. PTI staff are specialized in software services in the utility sector. Expanding to other sectors needs extra human and physical resources, while PTI is under financial pressure (PR) and has no additional manpower (HR). Therefore, it is important to use the established reputation (OR) to ask a utility provider to recommend PTI to its meter manufacturer or installation companies, or a new client. Accessing external resources, like university students and start-ups located in Brainstede, can help to counter the shortage of manpower (HR).

Further suggestions:

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This case study was tested during the Covid-19 pandemic by two undergraduate courses at the Rotterdam University of Applied Sciences. Lecturers who wish to use this case are encouraged to consider taking advantage of online teaching tools. Students can share their information, add comments, and give feedback in their online learning environment. You could invite a utility provider in your city to participate – in person or via video call – in the class discussion. This firm could also act as a new client that students need to convince or with whom they could negotiate a new outsourcing contract for PTI.

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