



Enablers of exit through trade sale: the case of early-stage research-based spin-offs

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Abstract A significant share of new technology-based ventures exit through trade sale at an early stage of firm development. While trade sale is an important exit route for entrepreneurs and investors, and a potential source of new innovations and technology for acquiring firms, we have limited knowledge about the factors that help to effectively achieve a trade sale. We employ a unique dataset tracking the population of research-based spin-offs in Norway and conduct in-depth case studies of nine trade sales. Building on 52 interviews and other secondary data, we inductively develop propositions outlining three dimensions that lead to a successful trade sale—potential synergies, credible alternatives, and uncertainty reduction. We show that these enablers of trade sales are not only linked to the focal venture but also related to the idiosyncratic dyad with the buyer, reflecting both the potential for and likelihood of trade sale. Consequently, our study contributes to the literatures on entrepreneurial exit and academic entrepreneurship by mapping the important but under-explored area of trade sale as an exit mode.

Plain English Summary Potential synergies and credible alternatives increase the potential of a research-based spin-offs' trade sale, but the likelihood of a trade sale depends on how uncertainty reduction is managed. A trade sale is an important exit route for entrepreneurs and investors, and a potential source of new innovations and technology for acquiring firms. Research-based spin-offs are often acquired during their early stages of development by large corporations. We track the population of Norwegian research-based spin-offs and study nine trade sales in depth. Our findings concerning the importance of synergy potential, credible alternatives, and uncertainty reduction have implications for both academic entrepreneurs and potential buyers for how they can complete an exit through trade sale. Since scientific research is critical for society, our findings have implications for policymakers in the form of interesting ideas for influencing trade sales, a potentially important route for commercialization of scientific research.

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1 Introduction

Entrepreneurial exit is an important event in the life of a new venture, yet it remains relatively understudied (DeTienne, 2010). Exits, in the past, were often confused with failure and often grouped together irrespective of their intentions and/or outcomes (Headd, 2003; Jenkins & McKelvie, 2016). More recently, entrepreneurial exits are treated as a multi-level concept—encompassing both an entrepreneur’s exit from the venture as well as a new venture’s exit from an industry or market (DeTienne & Wennberg, 2016). Scholars have explored various modes of exits both conceptually (DeTienne, 2010) and empirically (Balcaen et al., 2012; Headd, 2003; Wennberg et al., 2010) leading to an increased understanding of the phenomenon, including the potential positive aspects of exit. Exits can be due to financial distress or for financial or emotional gain and there are many exit routes to achieving these ends (Headd, 2003; Wennberg et al., 2010). Studies show that there are various strategies driving the exit decision—financial harvest, stewardship, and voluntary cessation (DeTienne et al., 2015). Despite this progress, Wennberg and DeTienne (2014) in their review of the exit literature assert that “it is surprising that there has been little qualitative work used to explore, challenge and build theory on exit” (p. 12). This indicates the need for a greater understanding of how various factors interact and lead to the exit event. In this paper, we take up this challenge.

Research-based spin-offs (RBSOs)—new ventures established to commercialize research from universities and research institutes—are important sources of new knowledge, knowledge-based employment, tax revenues and societal impact (Fini et al., 2018; Shane, 2004). Still, the significance of RBSOs has been questioned because they tend to remain small firms (Criaco et al., 2014; Salvador, 2011) with limited growth (Hayter, 2011; Wright et al., 2006) and limited direct economic impact (Harrison & Leitch, 2010). RBSOs in general tend to have higher survival rates (Rothaermel & Thursby, 2005; Toole & Czarnitzki, 2007) and lower profitability than new technology-based firms (Bonardo et al., 2010; Ensley & Hmieleski, 2005; Salvador, 2011), which may be due to the long and complex process needed to convert scientific inventions into profitable businesses (Fini et al., 2018).

Despite great interest in the developmental patterns of RBSOs, one relatively common outcome for these firms is surprisingly under-investigated—exit via trade sale (for a recent exception, see Woolley, 2017). This lacuna is surprising as exit through trade sale is often the preferred option among entrepreneurs and investors in RBSOs (Mathisen & Rasmussen, 2019). Moreover, RBSOs are critically dependent on complementary assets and competencies to reach the market (Rasmussen et al., 2011), suggesting that trade sales to industry incumbents is a mechanism to achieve further development and growth rather than a terminal outcome of the business. In addition to being largely overlooked by the RBSO literature, particularities such as long and complex development paths and innovative technologies, make the trade sale of RBSO particularly suited to study entrepreneurial exits.

To better understand the enablers of exit via trade sale of RBSOs, we particularly examine the factors enabling a successful exit event. We draw upon a comprehensive dataset using secondary archival and qualitative sources to document the development of the population of RBSOs in Norway, established between 1999 and 2011. We use this data to identify nine cases of trade sales and we conduct 52 semi-structured interviews to get in-depth insights into these nine exit events. This empirical approach is unique because such transactions are not visible in any registers and rich data concerning such transactions usually are confidential and difficult to obtain, especially for RBSOs acquired at an early stage of development.

Our study makes contributions to two key literatures within the field of entrepreneurship. First, our findings inform the entrepreneurial exit literature by explicating how the various dimensions, i.e., synergy potential, credible alternatives, and uncertainty reduction, influence the completion of an exit event (i.e., trade sale). We separate the potential for a trade sale from the likelihood of trade sale, thereby focusing on how different enablers have the potential to impact an eventual trade sale in different ways. While prior research has extensively examined the impact of exit and some of the factors that may lead to developing exit strategies (DeTienne et al., 2015), there is limited work in regards to the enablers that lead to a successful exit. In doing so, our approach considers the bilateral nature of the dynamic relationships between the buyer and seller. This contrasts with the extant work adopting a singular perspective of exit (i.e., Botelho et al., 2020; DeTienne & Cardon, 2012;

Graebner & Eisenhardt, 2004; Wennberg et al., 2010) or that focuses on the financial performance antecedents leading to exit (Balcaen et al., 2012; Headd, 2003). Based upon our rich qualitative data, we are able to develop propositions outlining how synergy potential and credible alternatives influence the exit event, while uncertainty reduction comes into play only when the event has advanced to a potential trade sale and can influence the resulting exit. We believe this nuanced explanation of the exit enablers and the distinction between the potential for and the likelihood of a trade sale can advance the entrepreneurial exit literature.

Second, we contribute to the science commercialization and academic entrepreneurship literatures with a rare study of trade sales of RBSOs. To our knowledge, the only studies on RBSO trade sales have focused on RBSOs that have gone public (Bonardo et al., 2010; Cattaneo et al., 2015; Meoli et al., 2013). This is notable as RBSOs typically exit at much earlier stages in their lifecycle where there is still founder control (Wright et al., 2006). The involvement of universities and the commercialization of advanced technology that has taken multiple years to develop adds an important level of complexity to the understanding of exit (Fini et al., 2018). In recent years, trade sales have become both more common and preferred even by VCs as a route to exit compared to an initial public offering (IPO) (Achleitner et al., 2012; Clarysse et al., 2013; Gerasymenko & Arthurs, 2014; Mason & Brown, 2013). In this study, we broaden the understanding of RBSOs by demonstrating how trade sales can act as a distinct event in a potential longer-term path towards commercialization and impacts of research (Fini et al., 2018). Consequently, our findings pave the ground for future work on entrepreneurial exit and the development and impact of RBSOs.

2 Theoretical background

2.1 Entrepreneurial exits

Entrepreneurial exit is an important event in the life of a new venture (DeTienne, 2010). Within the entrepreneurship literature, the study of exit is relatively recent vis-à-vis start-up and growth (Wennberg & DeTienne, 2014). Exit is a complex concept with some suggesting that it is a multi-level construct (i.e., founder exit from a firm, or firm exit from an industry) and others indicating

that it could be both an event and a process (DeTienne & Wennberg, 2016). Both economists and entrepreneurship researchers have highlighted the importance of separating exit from failure since only a portion of exits are associated with failure (Balcaen et al., 2012; Headd, 2003; Jenkins & McKelvie, 2016). In addition to financial performance, entrepreneurial exit also takes into consideration many of the individual and personal considerations of the entrepreneur and the venture, as well as the potential continuation of operations in a different form (i.e., not necessarily a closure).

Considering the critical nature of exit, it is not surprising that scholars have explored the various strategies driving the exit decision—financial harvest, stewardship and voluntary cessation (Balcaen et al., 2012; DeTienne et al., 2015). Headd (2003) and Wennberg et al. (2010) find that entrepreneurs exit firms which are in distress as well as those performing well and suggest that human capital factors and failure avoidance strategies differ across exit routes. The exit literature refers to many exit routes—IPO, trade sale, employee buyout, generational transfer as in family business, liquidation, and discontinuance (DeTienne & Wennberg, 2016). Other studies (e.g., Balcaen et al., 2012; Headd, 2003) find notable financial and firm-level factors predicting the different modes of exit.

Despite the rise in research on entrepreneurial exits, several aspects of the phenomenon remain understudied, particularly the underlying factors that lead to a successful exit (DeTienne & Wennberg, 2016, p. 155). In this paper, we look at exit through trade sale. For an exit through trade sale to come to fruition, both the buyer and seller need to agree on a set value and transaction price. As a result, any trade sale that is completed can be seen as successful because it involves a satisfactory agreement on price between both the seller and buyer. In the next section we highlight the need for greater inquiry into RBSO exit through trade sale.

2.2 RBSO exit through trade sale

The development path of RBSOs is typically long. It often takes more than ten years before the venture starts to grow (Smith & Ho, 2006), and few RBSOs reach an initial public offering (Woolley, 2017). A less-studied development path is the relatively frequent instances of trade sale, where industrial firms buy new technology-based firms at an early stage (Andersson & Xiao, 2016).

Being acquired by a larger industrial firm through a trade sale is often a preferred exit option for new technology-based firms, and the most likely exit route for VCs investing in such firms (Clarysse et al., 2013; Cumming & MacIntosh, 2003).

From the buyers' perspective, trade sales/acquisitions are seen as a route to gain access to complementary resources or capabilities to increase their innovation persistence and performance (Cefis & Marsili, 2015) or as a mechanism for growth (Burghardt & Helm, 2015; Lockett et al., 2011). In particular, RBSOs are attractive targets for being acquired (Bonardo et al., 2010) due to their specialized knowledge and need for complementary assets to reach the market (Agarwal & Shah, 2014; Miozzo et al., 2016). RBSOs originating from universities and research centers share many features of new technology-based firms and have a few defining characteristics—long development times, academic/scientist founders, distinct institutional constraints among others (Wright et al., 2006). Hence, trade sales are a particularly attractive option to scale-up the RBSO's business activities (Clarysse et al., 2007), and a specific mechanism of exit chosen by the RBSO (Mason & Brown, 2013; Meoli et al., 2013). While a trade sale often involves exit of the entrepreneurs (DeTienne et al., 2015) and investors (Clarysse et al., 2013), the business activities of the new venture often continue to grow under the new governance of the buyer (Coad et al., 2016). To that end, it is separate from a narrower consideration of firm exit with the general emphasis on closure or cessation of operations. Since most RBSO trade sales take place at a much earlier stage as compared to an IPO, it is important to understand how early stage RBSOs exit through trade sale. Our access to unique data about RBSO exits through trade sales in Norway provides an opportunity to increase our understanding of RBSO exits which we detail in the next section.

3 Methods

To explore the enablers of exit via trade sale in RBSOs, we designed an inductive study using an embedded multiple case design viewing the phenomenon from multiple perspectives and levels of analysis.

3.1 Research context and case selection

This study builds on a larger research project which has developed a database of new ventures established between 1999 and 2011 to commercialize research results from universities and public research institutions in Norway. This population of RBSOs was identified through the Research Council of Norway's FORNY-program, the key governmental policy initiative in Norway supporting the infrastructure for commercialization of research (Rasmussen & Gulbrandsen, 2012). All new RBSOs established at Norwegian universities and public research organizations were continuously reported (Rasmussen & Mathisen, 2017). This limits survivor bias typically associated with retrospective studies in entrepreneurship (Davidsson & Honig, 2003).

The FORNY-database was extended with several secondary data sources including (1) the original business plan; (2) the firms' annual reports (including the statement by the board of directors, detailed financial statements, and notes); (3) a comprehensive news archive with the firms' press releases and all relevant print and online news bulletins; and (4) all corporate announcements registered on the firms, obtained from the National Register of Business Enterprises in Norway. Through a careful examination of each case, we were able to identify that 32 of the 373 RBSO firms in the FORNY-population that achieved a successful trade sale to a significantly larger established industry incumbent.

The 32 RBSOs that experienced successful trade sale events were from diverse technical domains (Industrial ICT, Material sciences, Engineering, and Electronics), at different stages of development (research/product development, commercial product, commercial sales; firm size), with varying levels of institutional ownership (TTO, VC), early industrial partners (present, absent), with/without patents, from different origins (Universities and public research institutes) and received different prices at trade sale (very low to very high). Based on the above parameters, we selected 9 cases providing a representative sample of the RBSO trade sales in Norway. Key characteristics of the selected cases are shown in Table 1.

3.2 Primary data collection

By using the available data sources, we documented the development of each RBSO, including key events such

as commercial breakthroughs, VC investments, ownership development, new subsidiaries, and internationalization. Furthermore, we identified key individuals involved in the firm since its founding (board members, CEO(s), owners). As such, we have a unique and detailed dataset, which allowed us to approach key informants for a primary data collection focusing on the factors enabling a successful exit event. We conducted 52 in-depth interviews between June and December 2015. Since informants might provide biased statements in the form of “retrospective sensemaking” (Eisenhardt & Graebner, 2007), we identified several informants in each case representing different roles: founders/employees, buyer representatives, investor representatives, and external board members/advisors. The number of informants per case ranged from three to eleven (see Table 2 for additional details). To ensure confidentiality, all cases are referred to with pseudonyms and the level of details provided about each case is limited.

The interview guide comprised one general section and four specific sections tailored to each informant group and was altered with progress over time (Strauss & Corbin, 1990). The interviews were semi-structured and afforded the informants the freedom to choose topics when needed (Suddaby, 2006). Nevertheless,

most conversations went through two chronological sections. First, we leaned on our secondary data, and relied upon the informants to corroborate richer details. Second, we focused on the details of the trade sale. The interviews lasted between 30 and 120 min, and we transcribed the taped sessions as soon as possible after the completion of the interview. We also entered written notes from interviews, discussions between the interviewers, and other reflections during the transcription process. We took this initiative to ensure that we also captured our own in-situ reflections as part of the transcript.

3.3 Analysis

We completed our analysis using four broad phases, working recursively within them. The first step involved a within-case analysis (Eisenhardt, 1989), where the objective was to obtain an intimate understanding of each case on a stand-alone basis. We used the interviews as the principal source of data for understanding exit enablers and referred to the secondary data from the business plans, annual reports, and news releases for validation where possible.

Table 1 Characteristics of the RBSOs at the time of the trade sale

RBSO Name	RBSO Age at Trade Sale	RBSO Revenue at Trade Sale	Stage of Development	Trade Sale Value	VC-Backed	Buyer	Structured Process	Retained Founders
<i>Alpha</i>	7	Med (5-10 MNOK)	Commercial Sales	Medium	Yes	Domestic (Public)	No	Yes
<i>Bravo</i>	4	Low (0-5 MNOK)	Commercial Product	Low	Yes	Domestic (Private)	No	Yes
<i>Charlie</i>	11	High (> 30 MNOK)	Commercial Sales	Very High	Yes	Domestic (Private)	Yes	No
<i>Delta</i>	8	Low (0-5 MNOK)	Research/Product Development	Low	Yes	Foreign (Public)	Yes	Yes
<i>Echo</i>	6	Med (5-10 MNOK)	Commercial Sales	Medium	No	Domestic (Public)	No	Yes
<i>Foxtrot</i>	2	Low (0-5 MNOK)	Research/Product Development	Medium	Yes	Domestic (Public)	No	Yes
<i>Golf</i>	4	High (> 30 MNOK)	Commercial Sales	Very High	Yes	Foreign (Private)	Yes	No
<i>Hotel</i>	5	Low (0-5 MNOK)	Research/Product Development	Very Low	Yes	Foreign (Private)	No	Yes
<i>India</i>	6	Med (5-10 MNOK)	Commercial Product	High	No	Domestic (Public)	No	Yes

Description: “Structured process” refers to whether the trade sale was the outcome of a structured sale process using a transaction advisor. “VC-Backed” refers to whether the firm raised capital from professional investors at some point, and where the investor(s) used the trade sale to exit their investment. “Retained founders” refers to whether the majority of the original founders continued to work for the firm after the trade sale

Table 2 Characteristics of informants

Company	Interviewees	Stakeholder Group	Interviewees
<i>Alpha</i>	7	<i>Founder/employee</i>	25
<i>Bravo</i>	4	<i>Buyer representative</i>	11
<i>Charlie</i>	11	<i>Investor representative</i>	7
<i>Delta</i>	4	<i>External board member/advisor</i>	9
<i>Echo</i>	5	Total	52
<i>Foxtrot</i>	8		
<i>Golf</i>	6		
<i>Hotel</i>	4		
<i>India</i>	3		
Total	52		

The three next steps were linked to cross-case analysis, more specifically aggregating from raw data into higher order theoretical dimensions. We used NVivo (version 10) as our data analysis tool. In the second step we used “open coding” (Strauss & Corbin, 1990), assigning initial descriptive labels to themes emerging from the data. The interview data were parsed thoroughly, carefully tagging sections with “in-vivo codes.” The codes were then compared to each other and grouped logically into categories. We assigned sections of informant statements to emerging themes supported by the relevant secondary data. We used constant comparisons to divide, delete, merge and alter codes, making sure to reduce the number of categories to a manageable number (Strauss & Corbin, 1990). We also categorized the factors considering seller and buyer characteristics respectively and stopped when the code structure was stable, i.e., when 26 first-order categories were identified (see Fig. 1).

In the third step, we performed a more abstract coding of categories (Locke, 2001). We looked for the presence of concepts across multiple cases, and refined emerging relationships using replication logic (Eisenhardt & Graebner, 2007). We grouped the categories logically, initially staying close to the data, and later comparing it with theory, resulting in conceptual themes. Our abstraction of categories resulted in six themes. In the final step, we further compared our themes with existing literature and grouped the themes into higher order theoretical dimensions. We compared the emerging theoretical concepts with the secondary data material during the coding until “theoretical saturation” was reached (Strauss & Corbin, 1990). This

resulted in three theoretical dimensions. Our final code tree structure showing three levels of abstraction—26 first-order categories, six second-order themes, and three theoretical dimensions—is presented in Fig. 1. Since the code tree only represents how the raw data led to the concepts, we developed a dynamic model (Fig. 2) and propositions to elaborate on the relationships.

4 Findings: emerging insights of trade sales enablers

Our analysis resulted in three dimensions that enabled the trade sale to take place: *synergy potential*, *credible alternatives*, and *uncertainty reduction*. The first two dimensions relate to the matching of buyer and seller which creates the potential for trade sale, while the third dimension increases an RBSOs’ attractiveness to potential buyers and therefore the likelihood of the trade sale event to happen. We now present these three dimensions and use illustrative quotes from the interviews to corroborate the findings. We outline propositions related to how each dimension can potentially enable a RBSO trade sale (see Fig. 2).

4.1 Synergy potential

Synergies refer to the additional value created in the combination of two firms compared to them being separate (Chatterjee, 1986). We find that synergy potential is related to two distinct issues: the scalability of the RBSO’s knowledge assets, and the complementary assets controlled by the buyer.

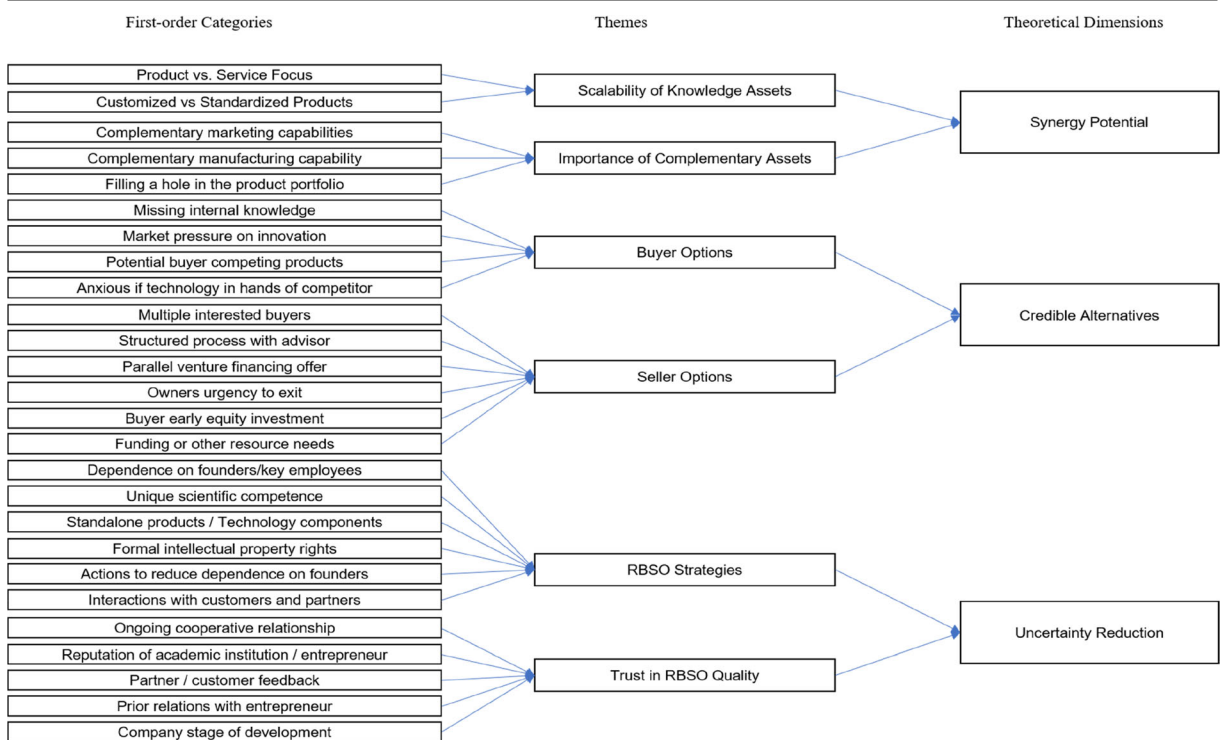


Fig. 1 Code tree structure

Scalability of knowledge assets We find that the scalability of the RBSOs’ technologies increases their attractiveness because buyers can predict higher future profit margins operating at larger scale under their management (Ahuja & Katila, 2001). The buyer representative of *Golf* illustrates this: “The technology was scalable, and we wanted not only [the RBSO] promoting

this technology, we wanted the full weight of our sales force and marketing power promoting this technology.” We observed differences of scalability in our sample. To illustrate, *Charlie* commercialized software for industrial use, but the services the firm offered required in-house specialist knowledge when deployed with customers. As commented by a transaction advisor for

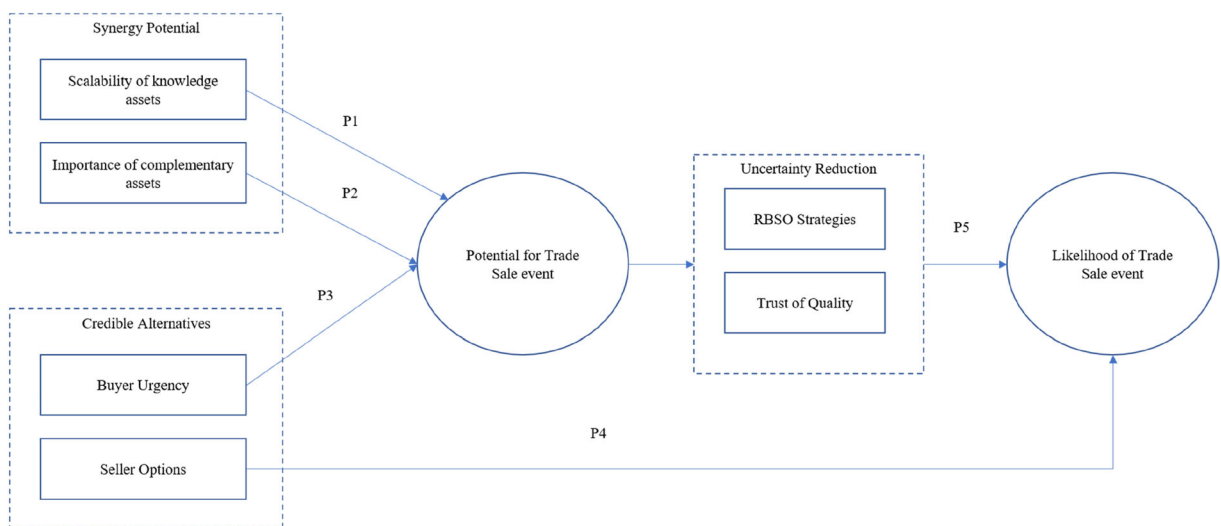


Fig. 2 Exit through trade sale—dynamics and causal relationships

Charlie: “It is a service company. [Charlie] offers a unique service because they have access to unique software. It is not actually a software firm [...]. [The customers] hire [the firm] on a project basis [...]. In that respect, it is fundamentally different from a software business, which means it is difficult to scale the business. [...]. You need to add people, simply said, for each sale you make.” The dependence on human interaction reduces the scalability of the firm’s knowledge assets.

In the cases of *Delta* and *Hotel*, the expected scalability in their technologies were quite significant. As an employee in *Delta* commented: “On paper they certainly did a technical ‘due diligence’ [...] They also had enough conversations with our partners and pilot customers. So, they probably figured out that if this technology succeeds then this can be huge.” In the earliest stages of development, a potential highly scalable technology is not enough to enable a trade sale since the expected synergies are speculative and hypothetical. Synergies can obviously only be exploited if the technology is proven and works as intended and will materialize after the two businesses have combined. In trade sales, where the technological uncertainty of the firm remains high, the necessary progress will mainly depend on the buyer’s additional investments after the trade sale. Hence, we propose the following:

Proposition 1: RBSOs have higher potential for exit through trade sale when buyers view their knowledge assets as scalable, as reflected by (a) lower dependence on the RBSO’s key employees and (b) later stages of the RBSO’s technology development.

Complementary assets Because RBSOs commercialize new scientific discoveries, they usually depend on developing or otherwise accessing complementary resources (Zahra et al., 2007). Incumbents typically control such resources and they can be extremely costly for new ventures to develop internally. In all our cases, both the RBSOs and the buyers emphasized the importance of complementary assets. Across the firms in our study, market-related capabilities such as marketing channels, established sales organizations, and customer relationships appeared to be most important. However, for two of the four firms commercializing physical products (*Delta* and *Hotel*), the buyer’s complementary manufacturing resources were of greater importance. In both cases,

end products based on their technologies needed to be produced in larger factories, which the entrepreneurs came to realize was infeasible. As commented by a founder of *Delta*: “The original idea was to develop a manufacturing company. [...]. We were going to set-up a factory [...]. But you can’t develop a technology and have a factory ready in four years. That was very unrealistic.”

Buyers also expressed the importance of complementarity. When the RBSO filled an open space in the product portfolio, the buyer could leverage existing complementary assets supporting other products. The founder of *India* stated: “The [Buyer] lined up three important components: sales people, they reserved two of their sellers; they lined up capital, about five million in share capital; and they also lined up access to their technology. So those three things meant that we saw a much greater opportunity to “pull” on both sales and technology development.” This notion of filling a gap in the product offering was seen in several other cases and captured succinctly by a chairman of *Echo*: “They looked at [Echo] as an extension of their digital media portfolio,” and by a board member in Charlie: “and that was their [buyer’s] whole business idea. Our competence was a significant gap in their [buyer] service offerings, especially what goes with verification of control systems.”

In sum, our study finds that the potential of a RBSO trade sale event increases when they attract buyers that control relevant complementary assets which could leverage the RBSOs’ knowledge. This leads us to the following proposition:

Proposition 2: RBSOs have higher potential for exit through trade sale if they are viewed as possessing complementary assets, particularly when (a) the RBSO can fill critical product or competency gaps for the buyer or (b) the buyer has assets that can accelerate the sales of the RBSO’s products or services.

4.2 Credible alternatives

The second dimension relates to the existence of alternative options for both the buyer and seller, which can influence whether an exit through a trade sale is likely to happen.

Buyer options We found buyer options deriving from both internal and external sources. Buyers could find it too risky to attempt developing the relevant knowledge assets internally. Even if the buyer considered developing new technical competencies in-house, the RBSOs often had specialist expertise difficult to obtain in the market. The CEO of *Charlie* explained: “[the buyer] bought themselves an opportunity to close the gap they have in their expertise. So, even though there are 16,000 employees, they still have a gap in the field of control systems, software, complex integrated systems.”

Buyer urgency also originated from the market in the form of expectations for new innovations. Except for one case, all buyers published the trade sales through press releases or in promotional materials, displaying the need among buyers to be viewed by the market as innovative and forward looking with their offerings. This is well captured both by a buyer representative of *Bravo*: “We wanted to acquire more products in our [buyer] offering portfolio. What we lacked in the early 2000s was the type of products that Alpha represented. [...] So simply, the main motive was to get more products into both our sales case and our portfolio. Then we could put this together with our other good products.” and a buyer representative of *Foxtrot*: “One lesson to note is how much it means to build credibility in your product roadmap. You can sell dreams, and if you can provide the market with a sign of credibility, this has enormous value in itself.”

Urgency could also be materialized in more indirect forms. Some buyers were concerned that the RBSO’s technology would end up with a key competitor. This anxiousness translated into a willingness to consider the trade sale. The CEO of *Charlie* echoed this sentiment: “They saw that they had a skills gap, and Charlie was a way to help them fill it. It made strategic sense. [...] Also, there was probably some fear that some competitors would get Charlie.” This leads to the following proposition:

Proposition 3: RBSOs have higher potential for exit through trade sale when the buyer perceives lack of alternative options, such as when there is (a) a higher need internally for the RBSOs product/competencies, (b) a lower chance of the RBSO technology being developed internally, and (c) a higher chance of RBSO being acquired by a competitor.

Seller options Trade sales became more likely when several potential buyers competed to acquire the business. Three of our cases used structured trade sale approaches. They employed transaction advisors with the objective of gathering a group of motivated potential buyers and entice pricing competition between them. As commented by a transaction advisor of *Charlie*: “We were in contact with approximately 20 industrial players.” It is the buyers’ impression of their competition that matters, as the buyers usually cannot be certain who and how many other bidders are in the process. Buyers were aware that transaction advisors always seek to maximize competition. Another possible option for the RBSOs was VC financing. Seven of our cases had raised institutional VC financing at some point. In two cases, the RBSOs had negotiated term sheets from new VCs as a concrete alternative to the trade sale. This had a corresponding effect on negotiation as the sellers leveraged this with the buyers. The CEO of *Echo* elaborated: “And when [buyer] was talking to us, we also had a bid from [VC fund] that wanted to invest a significant amount. [...] They also envisaged a 3-5 year run against an industrial acquisition.”

The urgency of completing a transaction can obstruct the likelihood of completing the trade sale. RBSO owners can be eager to exit their investment and rush the sale process, especially in the case of VC owners. In several cases, we identified conflicts between founders and investors over when and how to initiate a transaction. In one case, the VC investor initiated a structured sale process just after the firm had finalized a commercial product, but not yet completed any commercial sales. Potential buyers did not meet the investor’s value expectations, and the process was eventually stopped. Further, the financial situation of the seller can create urgency. Three of the nine RBSOs needed to attract funding promptly to ensure continued operation. Negotiation strength is reduced when the company needs to attract resources because it does not have the time to generate other alternatives. As expressed by an employee of *Delta*: “It was the only possible “exit”. Otherwise we would be bankrupt. The point was to further develop the company, technology and product. Not primarily to try to get a big financial return yourself.” Buyers became aware of the firms’ current financial situation, which put the RBSO in a weak position during negotiation. Our analysis identifies that having several alternatives creates negotiation dynamics which positively affects trade sale. This leads to the following proposition:

Proposition 4: RBSO exits through trade sales are more likely to be completed when RBSOs (a) use a structured process for trade sale, (b) have lesser access to alternative venture capital, (c) have higher urgency to exit among existing investors, and (d) do not have a strong financial position.

4.3 Uncertainty reduction

The third dimension is related to reducing uncertainty, and thereby facilitating the trade sale event. In contrast to the above two dimensions that influence the potential of a trade sale event, we found uncertainty reduction by both RBSO strategies and buyer's assessment of RBSO quality to influence the likelihood of the trade sale event happening.

RBSO strategies None of the RBSOs had a history of consistent profitability. *Charlie* was the most mature firm in terms of steady growth in revenues, but it had only recently become profitable before the trade sale. As shown earlier, RBSOs can be categorized into distinct phases of development (Vohora et al., 2004). The later the stage of development, the lesser the uncertainty, and therefore the greater likelihood of a trade sale event. As shared by a buyer representative from *Golf*: “We would have considered buying it, but obviously at a significantly lower price because the risk element being a start-up technology unproven in the market would have been much higher.” The stage of development is a much more significant factor than firm age (see Table 1). For instance, while *Delta* was 8 years old at the time of the trade sale, it was still in the R&D stage. Considering the long development time and associated uncertainty in the development and commercialization of their technologies, any advancement in the RBSOs' stage of development is viewed as a way of reducing uncertainty. Obtaining market acceptance through early customer sales seemed to reduce uncertainty, as expressed by a buyer representative in *Alpha*: “The product is already in great shape. If the product was still in development, they could still be interested in buying the business. But then it would be at a lower price of course.”

When the knowledge resources in the RBSOs remained largely tacit, the trade sale potential was limited because buyers face uncertainty about how to transfer and integrate the knowledge into their organizations. Consequently, the buyers insisted that key technical

personnel committed to staying with the firm after the trade sale. This was consistent across all cases with high dependence of key individuals, and buyers generally stated that the transactions would fail otherwise. A buyer representative of *Alpha* explained: “Although they had products, they were completely dependent on the people behind it. We would have had great trouble keeping these products alive without the people of *Alpha*.”

Turning the tacit knowledge into explicit knowledge assets, such as patents or software code, is a commonly used strategy to reduce uncertainty. Consider the example of *Golf*, which commercialized an engineering invention and achieved initial success through pilot projects and early sales with certain key customers. The commercial contracts created routines in manufacturing, distribution, and adaptation of the generic invention to customer-specific applications. The CEO of *Golf* commented: “The product concept was already clear, tested and verified.” Due to this progress, the buyer of *Golf* was less concerned with retaining key technical people compared to other cases. One key employee at *Golf* said: “As the product was quite mature, continued employment [of the inventor] was not strictly necessary. In a very early stage, however, [...] that would have been the most important in a potential trade sale.” This illustrates two key strategies (turning tacit into explicit knowledge; building firm-level routines) used by RBSOs to reduce uncertainty during a trade sale.

Trust in RBSO quality We found trust to be an important enabler of trade sales. More specifically, the buyers trust in the quality of the RBSO increased the likelihood of the trade sale event. Buyers paid close attention to the reputation of the entrepreneur(s) and recognition from objective third-parties. For instance, the CEO of *Hotel* commented: “The starting point was that we were introduced by [Professor N], and the buyer representatives knew him from his work in the field, which was popular at conferences and things like that. Since he was the one who set up the meeting, a certain level of quality was assured?” Buyers also actively attempted to verify the RBSOs' quality by assessing the ability of the entrepreneur, team and technology in different ways. A buyer representative of *India* similarly stated: “We contacted the few pilot customers [the company] had at that time. We asked how they perceived the technology [...]. In addition, we did a survey to potential customers, and I did phone interviews with all of them [...].”

Prior relationships also influenced the trust levels between the buyer and seller. In the case of *Bravo*, the relationship between the buyer and one of the founders went back many years, as commented by a buyer representative: “Bravo’s founder was an early architect of our principal [product] development and had worked with us [buyer] early on. It was another reason for the architecture of their software to be like ours. Though Bravo never had any business relationship with us, we knew his capability.” In other cases, the buyer and seller created relationships while cooperating on marketing activities. Similarly, the chairman of *Echo* explains: “Most of the revenue came through [the buyer]. The relationship worked.” Interestingly, in three cases, a relationship was institutionalized formally with the subsequent buyer through a minority equity position in the RBSO. This leads to the following proposition:

Proposition 5: RBSO exits through trade sales are more likely to be completed when the uncertainty for the buyer is reduced by (a) RBSO strategies demonstrating progression to later stages of development and higher formalization of firm competencies and routines, and (b) buyer’s increased trust in the quality of the RBSO.

5 Discussion and implications

Our study provides novel insights into exit through trade sale by RBSOs. As illustrated in Fig. 2, we identified three main dimensions that influenced the potential for and likelihood of RBSO trade sale. First, the synergy potential is a key enabler of trade sales. When synergies are expected to materialize in the combination of the two firms, either by the RBSO having scalable assets or the buyer having complementary resources, the potential for trade sale is higher. Second, the presence of credible alternatives, for both the RBSO and the potential buyers, will enable the trade sale. The trade sale is more likely to happen when buyers are highly motivated to complete the transaction because of few alternative options. Third, our analysis illustrates that to facilitate a trade sale RBSOs must reduce the uncertainty of their knowledge resources and transform them into firm level competencies and routines. More specifically, in the context of exit through trade sales, the idiosyncratic dyad of the firm and its buyer plays a critical role to enable the trade

sales. In other words, there are important and dynamic mechanisms related to both the seller and the buyer that also takes into consideration the unique characteristics of the RBSO.

Our study makes contributions to two key literatures within entrepreneurship. First, our findings inform the entrepreneurial exit literature by explicating how various dimensions—synergy potential, credible alternatives, and uncertainty reduction—influence the potential for and likelihood of a particular type of exit—exit through trade sale. While prior research has extensively studied some components of entrepreneurial exit, with an emphasis on the financial performance antecedents of exit and modes of exit (Headd, 2003; Wennberg et al., 2010), understanding the dynamics through which the buyer and seller interact and the conditions involved in at trade sale has been scant. We empirically derive propositions outlining how synergy potential and credible alternative influence the potential for an exit event, while uncertainty reduction makes the trade sale event more likely to happen. As a consequence, we begin to derive theoretical insights about the enablers that allow exit through trade sale to take place. To this end, we are able to examine more detailed aspects of an event that have been difficult to explore empirically, since the type of exit we study is considered private and access to data limited. This is one advantage of our qualitative approach. Our findings indicate that there are dimensions that influence the potential of the trade sale event and others that influence its likelihood of occurring. This further separation of dimensions that—when combined and potentially in sequence—lead to an eventual exit event advances our understanding of how exit through trade sale can be more deeply studied in the future. We detail this further in the future research section below.

Second, we contribute to the science commercialization and academic entrepreneurship literatures with a rare study of trade sales of early stage RBSOs. To our knowledge, the only studies on RBSO trade sales look at RBSOs that have already gone public (Bonardo et al., 2010; Cattaneo et al., 2015; Meoli et al., 2013). This is surprising as RBSOs typically exit at much earlier stages in their lifecycle (Wright et al., 2006). Furthermore, we broaden the current conceptualization of the organizational development of RBSOs by demonstrating how exit through trade sales can act as a distinct mechanism to help their development. We find that RBSOs can influence exit in significant ways to achieve a positive outcome for their firm. Particularly, we find that RBSOs

can not only increase the potential of an exit possibility (using structured processes with advisors, attracting multiple buyers, keeping alternate financing options at hand), but also increase the likelihood of the exit event (reducing dependence on founders, gaining early customers and respected certifications) by their actions. Our separation of enablers of exit into possibility and likelihood provides important insights for RBSO founders, investors, as well as policymakers. RBSOs commercialize new technologies that make their development and performance long and uncertain. Exit through trade sales is an important exit mode for the realization of the technology's impact. Considering the growing recognition of non-economic motives behind RBSO founding (Lam, 2011), our findings may explain some of the performance heterogeneity exhibited by RBSOs (Mathisen & Rasmussen, 2019). These insights increase our understanding of RBSO development paths, especially during their early stages, and lead to several implications.

6 Managerial and policy implications

Our findings provide several insights for practice. First, our study suggests that entrepreneurs can significantly influence exit through trade sale by taking specific actions such as: reducing the dependency on founders/key employees, having strong client/partner relationships, increasing early customer traction, and gaining technical certifications. For investors in early-stage new ventures seeking to exit their investments (Botelho et al., 2020), these results point to the importance of strategically developing the venture to be an attractive acquisition target by established firms. Establishing partnerships with industrial firms at an early stage can be beneficial to RBSOs, but this can also restrict the opportunity of exit through trade sale by excluding potential options with other partners.

Second, for buyers interested in accessing the technologies and competencies of early stage new ventures, our results indicate that buyers can access such unique technology and know-how by engaging and networking with research environments. This will enable buyers to assess the quality of early stage privately held new ventures, which generally remains complex and elusive. The acquisition of RBSOs clearly depends on the dyadic interaction between buyer and seller, to first develop the

potential for trade sale and then reduce the uncertainty to make it likely for the transaction to be completed.

Finally, since there is increasing pressure on universities and public research institutes to commercialize knowledge (Fini et al., 2017), we also see value of our findings to policymakers and university administrators for better understanding how exit through trade sale, and the specific enablers of such transactions, can be used as a mechanism for achieving impact of research (Fini et al., 2018). We are cautious as to not over-reach our implications for practice given our research methodology and focus on the enablers of the completion of an exit, rather than a focus on long-term shareholder value creation and societal impact.

7 Limitations and implications for future research

Our study has several limitations offering opportunities for future research. First, while our focus has been on the successful completion of a trade sale, we did not examine any other attempts for a trade sale that were not completed. In other words, we do not compare and contrast “successful” and “failed” attempts. To that end, adopting a comparative approach comparing successful and unsuccessful trade sales may add further insights into understanding entrepreneurial exit.

Second, our theoretical sampling was done in the context of a national population of RBSOs. Norway has a limited public market for small technology-based firms. RBSOs in other economies (e.g., Germany and the USA) may find IPOs—or other exit routes—a more realistic opportunity. How the structure of small-cap capital markets affects trade sales is a promising area for further research, especially in the context of RBSOs. Since IPOs and other modes of exit cannot achieve the same strategic synergies as a trade sale, research is needed to understand if there are different mechanisms leading to different types of exits, and whether the valuations and outcomes differ.

Third, most of the trade sales in our sample occurred when the target firms were in a relatively early stage of development. This is particularly important in the context of RBSOs that often grow comparatively slowly. However, it is unclear if our propositions will hold in trade sales comprising larger or more established technology-based firms. Although financial

considerations clearly play a more central role in these circumstances, trade sales are rare and complex decisions where strategic factors are likely to play important roles (Zollo, 2009). As such, extending beyond our specific context may capture additional factors at play. For instance, further research should provide more nuanced perspectives on how strategic, social, and financial mechanisms interact in leveraging trade sale events. It may also be important to explore how the motivations of entrepreneurs and owners influence exit decisions during trade sale (Botelho et al., 2020).

Fourth, although we identify trade sale as a successful exit event simply by being completed, we did not investigate what happens after the transaction is completed. Additional research is needed to understand how a trade sale affects the acquiring firm and its business activities, especially how factors determining exit affect post trade sale performance and integration. It may be interesting to explore if the factors that enable the completion of a trade sale have similar or different effects on long-term performance.

8 Conclusion

The study of entrepreneurial exits is an area where scholars have made several important advances and where there is growing interest. Our study adopts a case study approach to better understand the enablers of one type of exit—trade sale—and in the context of RBSOs. RBSOs are an important source of innovation and have distinct developmental patterns that make trade sales particularly relevant. By focusing on three main enablers of the trade sale event, we provide new empirical and theoretical knowledge on how potential synergies, credible alternatives, and uncertainty reduction enable completing a trade sale. As a result, our rich data concerning a usually confidential processes allows us to advance our scholarly understanding of exits among RBSOs and provides insights for theory, practice, and policy.

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