

Entrepreneurial decision-making logics during time-critical pivoting: empirical evidence from high-tech ventures

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Abstract: Entrepreneurs typically adopt decision-making logics such as effectuation, causation or a hybrid during venture creation and development. One part of such development involves the search for viable business models. Ventures might need to deviate from their initial plan and radically change (i.e., pivot). While entrepreneurial decision-making logics at venture creation have received substantial research attention, we know little about their dynamics during pivoting. Specifically, pivoting is often accompanied by time and resource constraints for entrepreneurs and such constraints can influence entrepreneurial decision-making. This inductive and multiple case study is based on 14 ventures in Europe's DACH region. It explores the question of how and why time constraints and perceived time pressures affect entrepreneurs' decision-making logics during pivoting processes. Findings suggest that entrepreneurs tend to employ more effectual logics when time constraints and perceived time pressures are pronounced and vice versa for causal logics. The emerging findings contribute to entrepreneurship and effectuation theory in that they indicate that time plays a crucial role for pivoting entrepreneurs' decision-making logics.

Keywords: effectuation; entrepreneurship; pivoting; startups; decision-making; transformation; time constraints.

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1 Introduction

Following the by now widely employed and practice-based lean startup methodology (Ries, 2011), entrepreneurs commonly employ an iterative process when attempting to establish successful new ventures (Minniti and Bygrave, 2001; Boddington and Kavadias, 2018). Iterations are deemed necessary as business failure “is a constant today” (Dias and Teixeira, 2017, p.2). This is because many startups act in high-risk environments where ex-ante calculations of success are hardly possible (Cantamessa et al., 2018). By detecting that certain elements of their nascent ventures have not been as successful as hypothesised, entrepreneurs are perceived as being able to change some of these elements (Eisenmann et al., 2012). These changes lead to an iteration of the newly altered elements in order for entrepreneurs to test their performance once again (Andries et al., 2013; Gruber et al., 2008). Practitioners and scholars alike refer to ‘pivots’ when describing such changes (Bajwa et al., 2017; Bohn and Kundisch, 2018; Grimes, 2018). Pivoting demonstrates an important topic for research as it can be a means for entrepreneurs to seek a more promising path to success (Wood et al., 2018). Unfortunately, prior research on the actual execution of pivots is limited (Bajwa et al., 2017) and a deep understanding of the workings of pivots is still lacking (Wood et al., 2018; Unterkalmsteiner et al., 2016; van der Ven and Bosch, 2013; Hampel et al., 2019). This is to be expected, however, as pivoting is seen as a rather new phenomenon (Terho et al., 2015) and as different from traditional organisational change as it involves new ventures (Hampel et al., 2019). Even though Ries (2011) lists several types of pivots, for example related to products or business models, their conceptualisation still requires scientific validation (Bohn and Kundisch, 2018). While pivoting may open a path to success for ventures, it is commonly associated with time constraints and pressure (Lévesque and Stephan, 2020; Klotins et al., 2018; Wood et al., 2018). Entrepreneurs decide to pivot when their initial plan did not produce desired results and such situations are often characterised by financial or market-related hardships (Hampel et al., 2019). As such, these problems need to be addressed rather quickly (Wood et al., 2018; Bajwa et al., 2017). Since time constraints and pressure have been found to influence human decision-making (Benson and Beach, 1996; Ordóñez and Benson, 1997), the question arises how and why such time-critical pivoting processes affect entrepreneurial decision-making logics. Effectuation and causation are such decision-making logics that entrepreneurs typically revert to during venture creation (Sarasvathy, 2001). Entrepreneurs following a causal logic tend to formulate goals at venture creation, research both market and competitors and devise a business plan based on their research and goals (Chandler et al., 2011; Gupta et al., 2016; Reyman et al., 2015). An effectuation-based logic typically starts with the means available to ventures and addresses the question of what can be achieved in terms of business model and success with these means (Sarasvathy, 2001). Experimentation with business models or products and some entrepreneurial flexibility when faced with unexpected situations tend to accompany this logic (Brettel et al., 2012). As entrepreneurs face the question of whether to maintain their initial direction (causation) when faced with uncertainty or to experiment with new paths (effectuation), time and its accompanying limitations for ventures play crucial parts in pivoting situations (Lévesque and Stephan, 2020). To date, it remains unclear how time-constrained entrepreneurs make use of decision-making logics during such time-sensitive pivoting processes (Lévesque and Stephan, 2020).

Consequently, we pose the research question of how and why time constraints and perceived time pressures affect entrepreneurs' decision-making logics during pivoting processes. To address this question, semi-structured interviews were conducted in combination with the study of secondary material based on 14 German, Austrian and Swiss high-tech startups. In doing so, this paper advances entrepreneurship research in that it expands effectuation theory to the realm of time-critical pivoting. Based on these findings, propositions for future research are developed.

2 Literature review

Pivots have been defined as “structured course corrections designed to test a new fundamental hypothesis about the product, business model, and engine of growth” (Ries, 2011, p.178). While recent literature contributions have started to shed some light on complete pivots involving a change in a venture's full offering (Wood et al., 2018), most studies perceive pivots as relating to parts of a venture. For instance, Boddington and Kavadias (2018) describe them as “the partial change of a venture's strategic configuration” (p.1). Similarly, Bajwa et al. (2017) perceive a pivot “as a strategic decision which leads to the significant change to one or more, but not all, elements of a startup: product, entrepreneurial team, business model or engine of growth” (p.2378). This view is shared by Pillai et al. (2020) who assign pivots to the category of strategic decisions within ventures. Strategic pivots involve the testing of hypotheses with regard to “technological, organisational, or market aspects” (p.378). Pivoting, then, is viewed as being accompanied by creative and strategic changes for ventures (Grimes, 2018). Thus, we adopt the definition given by Bajwa et al. (2017) as it incorporates the two components of strategic change and individual venture elements. These elements and their characteristics serve as guidelines for this study's data collection and analysis.

Pant and Yu (2018) stress the role of pivots as leading to reconfigurations of organisations with outcomes ranging from better performance to value destruction. While first empirical evidence has emerged regarding such reconfigurations leading to changes in venture infrastructure (Bajwa et al., 2017; Klotins et al., 2018, McDonald and Gao, 2019), little is known about the interplay of pivoting processes and decision-making logics (Brenk et al., 2019). This is unsatisfactory as decision-making logics are context-dependent (Alvarez and Barney, 2005; Reymen et al., 2015) and pivots have the potential to fundamentally alter ventures' contexts (Wood et al., 2018). This view corresponds to the understanding that new venture creation goes along with high levels of experimentation and hardly follows a straightforward process (Vohara et al., 2004; Boddington and Kavadias, 2018). Similarly, Siggelkow (2002, p.158) refers to ventures' “organisational evolution toward fit” which embodies developmental processes of organisational core elements, such as structures or activities. As we have seen, such evolution and development are to a large extent due to environmental change and market uncertainty. And it is precisely this market uncertainty that poses the challenge to entrepreneurs of how to set up their ventures at the outset (Alvarez and Barney, 2005; Reymen et al., 2015). This discussion led Boddington and Kavadias (2018) to perceive pivots as an evolutionary search process with the discovery of viable business models or ultimate firm failures as potential outcomes.

Such search processes as well as entrepreneurship in general are heavily influenced by individuals, namely founders or key stakeholders (Johnson, 2007; Klotz et al., 2014).

After all, entrepreneurial behaviour is based on “social action” (Johnson, 2007, p.103). As such, human decision-making logics, thought processes or social behaviour play a key role in entrepreneurship (Schmidt and Heidenreich, 2018). And it is in this regard that time constraints and time pressure accompanying many pivoting processes matter for entrepreneurs. While time pressure refers to a subjective assessment of stress, time constraints are actual limitations as to the time available to perform a task (Benson and Beach, 1996; Wood et al., 2018). Both are viewed as one construct in this paper and both can have various influences on decision-making, such as reducing creativity (Elsbach and Hargadon, 2006) or overcoming procrastination (Ariely and Zakay, 2001). Transferred to the realm of entrepreneurial decision-making logics, it remains unclear how time constraints and pressure influence entrepreneurs’ utilisation of causation, effectuation or a hybrid form during pivoting processes. As pivoting presents a decision-making issue (Boddington and Kavadias, 2018) and effectuation theory is suited well for these types of problems (Sarasvathy, 2001), we focus our empirical research on this entrepreneurial question.

In fact, the decision-making logics of effectuation and causation are “integral parts of human reasoning” (Sarasvathy, 2001, p.245). As “human life abounds in contingencies” (Sarasvathy, 2001, p.250) entrepreneurial search processes might lead to frequent changes in business models or products, i.e., pivots. While effectuation logic supports the exploitation of contingencies, causation processes can help making use of knowledge (Sarasvathy, 2001). Both effects prove potentially valuable in the case of pivoting as entrepreneurs need to “balance an open, flexible, opportunistic approach with the need to be persistent, tenacious and committed” (Crilly, 2017, p.61). Still, to date we know little about the actual effects of pivoting on such decision-making logics.

Effectuation has been conceptualised based on four dimensions first depicted by Sarasvathy (2001). These consist of *experimentation* with products or business models, *flexibility* when faced with unexpected circumstances for which no plans have been devised, *affordable loss* and the pre-defined limitation of resources or budgets to put at stake while searching for viable business models, and *pre-commitments* or an openness towards *cooperation* with other market participants in order to co-create offerings and reduce uncertainty. Causal logics, meanwhile, have been linked to the dimensions of *goal-orientation*, i.e., creating business plans or goals for various key performance indicators at venture creation and basing consequent decisions on these plans, *avoidance of unexpected* situations or developments and instead following the business plan or focusing on internal operations when faced with unexpected market occurrences, extensive *competitive and market research* at venture formation and the formulation of *expected returns* based on this research and business planning. However, even though causal and effectual logics are often portrayed as dichotomous, overlaps and the usage of elements of both logics over time and even simultaneously have been observed (Reymen et al., 2015; Sarasvathy, 2008).

Among the first to apply effectuation theory to empirical research, Reymen et al. (2015), Brettel et al. (2012) and Chandler et al. (2011) have used these dimensions in their qualitative, quantitative or hybrid empirical studies and have specified empirical indicators for measurement and operationalisation purposes. Even though a number of subsequent empirical advances have been made regarding effectuation theory, many of which descriptive in nature or not addressing uncertainty in entrepreneurial action (McKelvie et al., 2020), its dynamics in time-critical pivoting processes remain unresearched. This is surprising as Gupta et al. (2016) advocate the studying of

effectuation and causation against the background of time while McMullen and Dimov (2013) call on entrepreneurship scholars to research “the entrepreneurial process as a series of events” (p.27) and consider the relevance of time. Uncertainty plays a critical role in such processes as ventures move from ideation to piloting and scaling phases and in many cases must pivot elements of their business models along the way. This is accompanied by the difficulty of making decisions regarding ventures’ subsequent organisation or products (Alvarez and Barney, 2005). At the same time it is a risky endeavour as pivoting consumes substantial amounts of time while not guaranteeing success (Bajwa et al., 2017; Boddington and Kavadias, 2018; Klotins et al., 2018). High-tech ventures, in particular, are affected by high levels of uncertainty and resource constraints (Guo, 2018) and we therefore focus our attention on them. While there is no commonly agreed upon definition of what constitutes a high-tech venture, we follow Mohrman and Von Glinow (1990) in that we perceive fast-changing market environments as key determinants for such firms. Coupled with our focus on startups, we define high-tech ventures as those firms that are ten years or younger at the time of research, feature innovative business models and operate in fast-changing market environments by their own accounts.

3 Methods

Given the nascent area of pivoting and its unexplored interrelatedness with effectuation theory a research design was sought that allows for an in-depth look at this phenomenon. The state of prior pivoting research makes it difficult to approach this phenomenon with a-priori hypotheses and calls for further collection of primary data (Bajwa et al., 2017). These circumstances render an exploratory and inductive approach to research rather useful (Gioia et al., 2013; Mathias et al., 2015; Nguyen-Duc et al., 2018). Thus, hypotheses or research propositions are viewed as possible outcomes of this study as opposed to inputs (Bortz and Döring, 2006). Informants are perceived as acting in dynamic and ambiguous contexts and as creating their own social reality (Maxwell, 2005). This view corresponds to the perception of entrepreneurship as social action (Johnson, 2007). Therefore, this study aims to unearth informants’ subjective interpretations of their organisational settings and follows the interpretive research paradigm (Burrell and Morgan, 1979). Such interpretations are difficult to uncover with quantitative research methods (Denzin and Lincoln, 2005). Thus, a qualitative method was employed. Specifically, a qualitative case study approach was selected in order to unearth informants’ tacit understandings, their insights and knowledge as to their specific decision making and pivoting details and to gain an in-depth look into this process. Yin (1984, p.23) defines a case study as an empirical study “that: investigates a contemporary phenomenon within its real phenomenon and context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”. This definition fits this study as the contemporary status of pivoting and its interplay (and therefore unclear boundaries) with effectuation and causation have become apparent from the literature review. Furthermore, it was aimed to incorporate multiple startups into this research and to conduct interviews as well as make use of material such as newspaper papers backing up the primary data (Flick, 2009). Therefore, multiple sources of evidence are used in this study. Also, pivots in startups demonstrate dynamic processes and case studies have been suggested as fruitful in such circumstances

(Eisenhardt, 1989). A multiple case study was used as its findings are more robust and convincing compared to single cases (Yin, 1984; Miles et al., 2014). This study's research question of how and why time constraints and pressure during pivoting processes affect entrepreneurial decision-making logics also fits the picture as case studies are specifically suitable for 'how' and 'why' questions (Blumberg et al., 2008). Finally, interviews were deemed appropriate tools for this research as they are suitable for studying infrequent and episodic phenomena (such as pivots) and creating rich empirical data for the purpose of exploration (Eisenhardt and Graebner, 2007).

We share the notion of inductive research never starting from zero, i.e., without any prior mental structure or knowledge by researchers (Kennedy and Thornberg, 2018). Some initial structuring of interview questions is viewed as suitable and even helpful in this kind of research (Denton, 2019). Thus, based on the literature review above a semi-structured interview guide was created. Incorporating the advice given by Galletta (2013), the guide was structured to have an opening segment consisting of open questions, a middle segment with more specific questions and a concluding segment to revisit some issues still open and to wrap up.

3.1 Sampling

For the qualitative sampling suitable startups were purposively chosen by aiming for theoretical as opposed to representative reasons, in line with Miles et al. (2014). As noted above, only high-tech ventures younger than 10 years were selected for this study. To this end, company websites and press papers were read to establish whether the ventures were associated with innovative business models and fast-changing market environments as well as to check their foundation dates. They were also asked later whether they deem their market environments as fast-changing ones. Furthermore, startups have been chosen based on the following criteria: first, they had to originate in Germany, Austria or Switzerland in order to establish a geographic area with similar cultural norms, business practices and legal frameworks. Second, these startups' pivots must have occurred within the last four years from the interview dates. This time frame was selected in order to reduce errors of recall in the interviews (Golden, 1997). Third, entrepreneurs such as co-founders must have been willing to participate in either personal, phone or online video interviews that would be recorded for subsequent transcription. As there are no public databases consisting of startups that underwent pivoting, German, Austrian and Swiss startup media such as *DerBrutkasten.com*, *Gruenderszene.de* or *StartupTicket.ch* were studied to identify suitable ventures. Moreover, based on a yellow pages list of startups in various cities at *Deutsche-Startups.de* and *SeedTable.com*, a list of 82 suitable startups was created and their LinkedIn and websites studied regarding news, press papers or comments as to potential pivoting efforts. Based on further filtering in accordance with these criteria and following the availability of contact information, a total of 49 venture founders were contacted by email and, ultimately, 14 entrepreneurs agreed to take part in semi-structured interviews. It became apparent that pivoting represents a sensitive topic for many founders as some did not want to talk about their failures and others had already moved on. Table 1 summaries the case composition and key characteristics of these ventures (all startups have been pseudonymised as oral non-disclosures have been agreed upon).

Table 1 Characteristics of startups sampled

| <i>Feature/Startup</i> | <i>ACTION</i> | <i>BIKE</i> | <i>BALL</i> | <i>COOL</i> | <i>TUNE</i> | <i>EAT</i> | <i>SPRAY</i> |
|--------------------------|--|---|--|---|--|---|---|
| Foundation | 2014 | 2012 | 2012 | 2013 | 2012 | 2013 | late-2017 |
| Pivot begin | 2017 | 2015 | 2015 | 2018 | 2014/2015 | 2015 | late-2018 |
| Type(s) of pivot | Business model | Product, business model | Product, business model | Business model | Customer focus, product range | Product assortment | Business model |
| Staff no. category | 10–20 | 10–20 | 10–20 | 50–100 | 5–10 | 10–20 | 5–10 |
| Status as of 08/2020 | Bankrupt, acquired | In business, rebranded | Bankrupt, acquired | In business | In business, acquired | In business | In business |
| Interviewee | Co-founder | Co-founder | Co-founder | Executive | Founder | Founder | Co-founder |
| Founding context | Founding for kickstarter campaign, passion for product | Founding by co-founders based on hardware and software vision | Founding to bring prototype to light (based on Diploma thesis) | Founding by sole founder after successful design of prototype | Founding by co-founders while at university, passion for product | Founding by main founder, desire to become entrepreneurs in unspecified field | Co-founders former consultants, desire to become entrepreneurs in unspecified field |
| Transcript pages | 10 | 12 | 8 | 8 | 15 | 12 | 14 |
| Pages of supporting data | 21 | 20 | 18 | 23 | 16 | 39 | 22 |

Table 1 Characteristics of startups sampled (continued)

| <i>Feature/Startup</i> | <i>BODY</i> | <i>SPACE</i> | <i>WARES</i> | <i>MATE</i> | <i>CAR</i> | <i>LINE</i> | <i>MUSEUM</i> |
|--------------------------|---|---|---|--|--|--|--|
| Foundation | late-2017 | 2013 | 2009 | 2011 | 2014 | 2019 | 2018 |
| Pivot begin | mid-2018 | 2017 | 2015 | Gradually | 2015 | 2020 | 2020 |
| Type(s) of pivot | Business model | Business model | Business model | Customer focus | Customer focus | Customer focus | Product, customer focus |
| Staff no. category | 5–10 | 10–20 | 10–20 | 5–10 | 5–10 | 1–5 | 5–15 |
| Status as of 08/2020 | In business | Bankrupt | In business | In business, part of bigger group now | Bankrupt | In business | In business |
| Interviewee | Co-founder | Co-founder | Founder | Co-founder | Co-founder | Co-founder | Co-founder |
| Founding context | One co-founder studied the field at university, other two are functional experts (IT) | Co-founders had no experience in industry but applied known technology to it. | Founding by co-founders after initial idea was derived while at university. | Co-founders had no experience in industry, but applied known technology to it. | Co-founders had no experience in industry, but saw opportunity in real life. | Founding by co-founders, supported by local university professor | Co-founders had no experience in industry, but saw opportunity in real life. |
| Transcript pages | 12 | 10 | 11 | 13 | 11 | 9 | 14 |
| Pages of supporting data | 12 | 12 | 18 | 13 | 16 | 19 | 13 |

All startup names have been pseudonymised.

After having analysed the 14th interview it was concluded that temporary data saturation had been reached, as will be explained in the Section 3.3. This is also in line with Guest et al. (2006) who postulate that a sample of a minimum of twelve participants in relatively homogenous groups is likely to be enough for data saturation to occur. Data saturation, as a more operationalisable concept compared to theoretical saturation (Glaser and Strauss, 1967), refers to “the point in data collection and analysis when new information produces little or no change to the codebook” (Guest, Bunce and Johnson, 2006, p.65). However, as is prevalent in qualitative research, proving whether saturation has indeed occurred is hardly possible (Charmaz, 2014; Nelson, 2016).

In total, 421 codes were identified in the analysis of all 14 interviews. Out of those codes, 38 categories were developed. That development took place through the grouping of thematically similar codes. In order to achieve a more abstract level of analysis and interpretation, these categories were eventually grouped into themes which act as our main result of data analysis and which group categories into overlying ideas with shared points of reference (Guest et al., 2006; Glaser and Strauss, 1967; Miles et al., 2014).

3.2 Research design

We are aware that our understanding of effectuation theory poses a decisive influence on this study. Given the difficulties in measuring effectuation and causation (Arend et al., 2015; McKelvie et al., 2020), some indication was needed of what to look out for in terms of decision-making logics in the data. And to this end, a formulation of some embodiments of these logics became necessary before interviews were conducted. Reymen et al. (2015) and Chandler et al. (2011) have specified various empirical indicators for the measurement of both effectuation and causation and these indicators fall into the four dimensions of each logic mentioned above. The coding structure employed in the present paper is based on these indicators and can be seen in Table 3. This led to the semi-structured nature of the interviews. For instance, the interview question “To what extent were you considering new feedback from inside or outside the company before and during the pivoting process?” was asked based on one indicator within the effectuation dimension of flexibility. Regarding the level of pre-structuring, the interview guide was developed so that it reflects these dimensions. Questions addressed observable behaviour (Chandler et al., 2011; McKelvie et al., 2020). This approach has been described as not being able to “capture and fully model all infinite nuances in logics of causation and effectuation” (McKelvie et al., 2020, p.706). However, given its advantages in reducing errors of recall when talking about action instead of beliefs or other intangible matters (Golden, 1997) and the original nature of effectuation research within the context of pivoting, it is deemed a reasonable approach. Following calls to specify the unit of analysis in effectuation research (McKelvie et al., 2020), we view the venture itself as the level of analysis and the series of individual decisions as well as actions by entrepreneurs and key stakeholders as the units of analysis.

Moreover, in order to establish the contexts regarding time constraints interviewees were asked about any resource constraints and market-related hardships surrounding their pivoting efforts. Moreover, they were asked whether they perceived any time pressure concerning their decisions to pivot. These statements helped to perform magnitude coding in order to rate the level of time constraints and pressure inherent in their ventures’ pivoting processes, as can be seen in Table 4.

The recorded parts of interviews lasted a net period of between 30 and 45 minutes with an average of 35 minutes (introductions, expressions of gratitude and other non-research elements have been excluded from these time specifications) and are therefore in line with what is expected in qualitative interviews (DiCicco-Bloom and Crabtree, 2006). Similarly to the effectuation studies by Chandler et al. (2011) and Crick and Crick (2014), interviews have been conducted using one interviewee per venture, in thirteen cases either founders or co-founders and in the remaining case a high-level executive who joined the venture well before its pivot. These informants have been chosen because of their in-depth knowledge and decision-making discretion in their ventures' development. Stemming from funding and scheduling difficulties, all interviews were held via phone, Skype or Zoom, audio-recorded with the consent of all participants and transcribed verbatim. All interviews except for one were held in German and the quotes selected in this paper have been translated and, where necessary due to language differences, paraphrased. In three cases, follow-up emails were exchanged to clarify some information. A total of 159 single-spaced transcript pages emerged as well as 37 pages of research notes. As has been noted above, only cases with pivots dating back no more than four years were involved, thereby addressing and reducing errors or recall (Golden, 1997). In summary, retrospective, quasi-longitudinal research was carried out (de Vaus, 2011). Retrospective, quasi-longitudinal research refers to the reconstruction of data from certain periods of time by collecting data at one point in time (de Vaus, 2011). A total of 262 pages of supporting material (company websites, founder interviews, media reports and blog postings) were analysed as supporting data in order to validate interview responses, reduce errors of recall and achieve some level of triangulation (Flick, 2009). Table 1 lists the number of transcript and supporting pages per startup.

3.3 Data analysis

Data analysis was conducted by following the three main steps outlined by Miles et al. (2014). First, data reduction took place after the creation of each transcript. This entailed that after reading a transcript once, it was read again in order to identify bits of text that were deemed appropriate for getting assigned a code (using MaxQDA). Such codes are "labels that assign symbolic meaning" (Miles et al., 2014, p.78) to data gathered during a study. To begin with, first-level codes were created which are those that stay very close to interviewees' statements, but their identification already contributes to data reduction (Creswell, 2013). Codes were assigned whenever it was discovered that text pieces fit to decision-making logics, their interplay with time-critical pivoting and the actual pivoting process.

For instance, the statement "*We felt there was no time to conduct any market research*" might have been identified within a transcript and, following this study's interpretive approach, would have been coded as "*time pressure*". This procedure started with the first interview transcript and based on these codes questions were added or revised in the interview guide for subsequent interviews. In total, the interview guide was revised three times, i.e., after the first, second, and third interview. The 14th interview resulted in no further unique codes and thus the 14 interviews proved sufficient for data saturation, in line with Guest et al. (2006). Afterwards, the codes were interpreted by resorting to prior research (Gioia et al., 2013) on decision-making logics and pivoting. Based on these interpretations higher-level categories were developed, which consist of the grouping of multiple codes in order to aggregate them into a common theme

(Creswell, 2013). Eventually, magnitude coding (Miles et al., 2014) has been employed in order to reach a scale of pivoting time pressures observed and their relationship to decision-making logics. Therefore, in this study an iterative, inductive research process was followed (Maxwell, 2005).

Table 2 Empirical research process employed in this study

| <i>Phase^a</i> | <i>Activities^a</i> |
|-------------------------------|---|
| 1. Research design | First review of relevant literature (pivoting, effectuation theory) Definition of research question Researching, contacting and selecting cases based on non-probability sampling in the DACH region |
| 2. Data collection | Researching and studying of supporting data (262 pages, e.g. press papers and founder interviews) on the fourteen ventures to be studied Definition of semi-structured interview guide based on initial review of relevant literature Refinement of interview guide after first three interviews Conducting, recording and transcribing of interviews (159 pages) Creation of field notes next to interviews (37 pages) |
| 3. Data analysis | Overlapping data collection and analysis due to semi-structured and iterative nature of research Start of coding of text passages Creation of tables in order to structure and analyse data Within- and cross-case analysis of cases to identify patterns, magnitude coding of time spans and effectuation and causation (Table 6) Theoretical saturation deemed reached after fourteenth case |
| 4. Data visualisation | Creation of tables to visualise characteristics of startups sampled as well as findings |
| 5. Comparison with literature | Comparison of emergent data with literature on pivoting and effectuation theory Writing of detailed, rich findings |

^aBased on Crick and Crick (2014) and Styles and Hersch (2005).

Following from this last step of data reduction, the second part of the data analysis procedure addresses the displaying of data (Miles et al., 2014). Various tables have been created in order to demonstrate the characteristics of the startups sampled (Table 1), the research process employed in this study (Table 2), the coding structure (Table 3), findings

regarding entrepreneurs' time constraints and pressures (Table 4), the identification of effectuation and causation indicators within the data (Table 5), results displayed using magnitude codes and a subsequent ranking of time pressure and the existence of effectuation and causation indicators within the data (Table 6).

The drawing of conclusions and the verification of data demonstrates the last step of data analysis. In this study's case, this interpretation of data was done in an iterative manner, as explained above (Maxwell, 2005). Still, at the end of this process the major themes concerning pivoting and effectuation theory were interpreted by referring to prior research and compared across all 14 cases. The relevant statements by interviewees were verified by reading the secondary material that was collected and no discrepancies were found (e.g., a statement about turnover not being supported by company press releases).

4 Findings

Six out of the 14 ventures studied reported very high degrees of time constraints and pressure during pivoting and for an additional five ventures they were rated as moderate. The main reasons for such time constraints and pressure originate either from time limits being imposed on them by their investors or from limited amounts of funds and other resources left in the business. This is to be expected as recent data indicate startups' financial constraints surrounding pivots (Kirtley and O'Mahony, 2020). Moreover, pivoting is not just about finding a path forward, but also about cleaning up what has been done in the past. The data suggest that many entrepreneurs had to engage in organisational restructuring (e.g., moving the firm from hardware operations such as logistics to software-based ones such as firmware development) or in discussions with both investors and employees as to what parts of the business should be maintained. Again, all these tasks can be anticipated given the strategic changes surrounding pivots (Grimes, 2018) as well as their usual consequence of having to reconfigure organisations (Pant and Yu, 2018).

4.1 Effectuation logic

Eight (ACTION, BALL, SPRAY, BIKE, LINE, TUNE and to a somewhat lesser extent MUSEUM and CAR) out of the 14 ventures reported pivoting behaviour that is in strong support with those indicators associated with effectuation logic. All six reported high or relatively high degrees of pivoting time constraints and pressure. Interestingly, among those with relatively pronounced effectuation indicators, BALL, SPRAY, CAR and MUSEUM were found to feature some minor causation-related indicators. This supports earlier reasonings and findings as to hybrid logics being used by entrepreneurs (Reymen et al., 2015; Sarasvathy, 2001; Anagnou et al., 2019) and it extends these findings to the realm of pivoting. Founders in seven out of the eight high-effectuation ventures stated to have faced intense time constraints and pressure and in many cases time was not available for in-depth research of markets or competitors. This was even though some of these industries were new to the entrepreneurs or the competitive landscape was unknown to them.

Table 3 Coding structure for decision-making logics

| <i>Dimensions</i> | <i>Flexibility</i> | <i>Effectuation</i> | | |
|-----------------------------------|---|--|---|---|
| | | <i>Affordable loss</i> | <i>Cooperation</i> | <i>Experimentation</i> |
| Empirical indicators ^a | • Adapting existing resources to new market environment | • Defining limits of budgets or funds for further investments | • Reaching out to external stakeholders to receive feedback | • Testing different products |
| | • Determining general direction, not detailed paths and goals | • Trying to reduce investment risks in order to safeguard firm | • Initiating partnerships with external stakeholders | • Testing or drafting different business models |
| | • Allowing firm evolution based on emerging opportunities | • Managing and limiting ambitions | • Presenting ideas or pilot products to external stakeholders | • Incorporating new feedback into products or models |
| | • Incorporation new or unexpected feedback into decisions | • Identifying and using unused resources | • Working towards co-creation with external stakeholders | • Selling different product than initially envisioned |
| | • Changing/ adapting plans, guidelines, structures, staff systems | | | |

Table 3 Coding structure for decision-making logics (continued)

| <i>Dimensions</i> | <i>Causation</i> | | | |
|-----------------------------------|---|---|---|---|
| | <i>Goal orientation</i> | <i>Competitive analysis</i> | <i>Expected returns</i> | <i>Avoidance of unexpected</i> |
| Empirical indicators ^a | • Defining goals for firm success | • Detailed research of market and competitors | • Calculating potential and expected outcomes | • Following business plan |
| | • Creating detailed business plan | • Identifying market niche for own firm | • Basing action on calculated outcomes | • Looking inward to adjust operations during crises |
| | • Following key performance indicators ^c | • Conducting contract-based market transactions | • Long-term planning to reach returns | • Abandoning activities due to new realities |
| | • Controlling firm progress | | | • Focusing on internal action to work towards plan |

^aBased on Chandler et al. (2011) and Reymen et al. (2015).

Table 4 Time constraints and pressure and main tasks while pivoting

| <i>Feature/Startup</i> | <i>ACTON</i> | <i>BIKE</i> | <i>BALL</i> | <i>COOL</i> | <i>TUNE</i> |
|---|--|--|--|--|--|
| Time constraint to pivot ^a | +++ | +++ | +++ | + | + |
| Time pressure to pivot ^b | +++ | +++ | +++ | + | + |
| Influential issues during pivoting | Lack of funds, financial pressure to sell inventory, shareholders and business angels leaving board, psychological pressure to succeed | Technical product problems, internal restructuring, increasing pressure by competition | Shareholders issued ultimatum for new business model, lack of funds, technical product problems | Far-reaching organizational restructuring, layoffs, increasing competition, sufficient funds and investor support to complete pivot | Plenty of R&D not yielding any results, initial product line keeping firm financially afloat, issues with new IT-based resource planning system |
| Main time-sensitive tasks during pivoting | Organisational restructuring | Organisational restructuring, fund-raising | Organisational restructuring | Organisational restructuring | Organisational restructuring |
| Exemplary quotes | <p>“We had a whole backpack of problems to solve first, ranging from cancelling shareholder agreements to leaving [original] business or severance agreements. We were on the edge, time-wise.”</p> <p>“It was really, really tight. (...) At that time we had a huge backlog in our book-keeping. But we couldn't work any more hours, totally occupied by our [new] operations.”</p> | <p>“Things moved slowly, we had to sort of change a lot of things, get new people to replace old people. Which all cost time, and the software had to change hands quite a few times.”</p> | <p>“There weren't enough sales and time left. And our price increases didn't bring much in.”</p> <p>“Our story of hope did not come quickly enough.”</p> | <p>“In hardware business even when you decide to pivot you need to consider investment lead times of about 12 to 15 months with regards to supply chain, distribution channels etc.. It takes time to wind it all down.”</p> | <p>“Our marketing [for new direction] hasn't worked very well and we lost some time there.”</p> <p>“Lots of R&D activities did not yield anything, even though we invested a lot of time in it.”</p> |

Table 4 Time constraints and pressure and main tasks while pivoting (continued)

| <i>Feature/Startup</i> | <i>EAT</i> | <i>SPRAY</i> | <i>BODY</i> | <i>SPACE</i> | <i>WARES</i> |
|---|---|---|---|---|--|
| Time constraint to pivot ^a | + | +++ | ++ | ++ | ++ |
| Time pressure to pivot ^b | + | +++ | ++ | ++ | ++ |
| Influential issues during pivoting | Supportive business angels, financial funds to change business model, post-pivoting operations based on initial IT landscape | Founders frustrated by poor customer feedback, one last attempt to find new business model, supported by investors | Poor understanding of customer needs due to far-reaching focus on IT and technology, time needed to research market | Heavy prior investments in technology and digital assets and psychological links to these assets | Psychological links to previous business model and initial customers |
| Main time-sensitive tasks during pivoting | Market research, new customer acquisition | Business model ideation, coordination with investors | Market research, business model planning | Market research, business model planning | New customer acquisition |
| Exemplary quotes | “We already had the infrastructure in place for [post-pivot operations] and a lot of it was already automated, which saved us time while we pivoted.” | “We became more and more frustrated and the money available became less and less. Because of this pressure we just looked at what is still possible.” | “We spent two or three months to study some lean startup methods in order to avoid those issues that came with our IT-driven initial business model.” | “We spent a lot of time doing market research for [potential new business model], but we didn't know if that would be it. It was very risky.” | “It was gradual at first and the [pre-pivot business model] paid for our pivoting endeavours.” |
| | | “We really worked ourselves into [new industry] and invested a lot of time to understand it.” | | “We did some research in a totally unrelated industry, but in the end decided on something that was closer to our assets. Otherwise it would have consumed even more time.” | |

Table 4 Time constraints and pressure and main tasks while pivoting (continued)

| <i>Feature/Startup</i> | <i>MATE</i> | <i>CAR</i> | <i>LINE</i> | <i>MUSEUM</i> |
|---|--|--|---|--|
| Time constraint to pivot ^a | ++ | ++ | +++ | +++ |
| Time pressure to pivot ^b | ++ | ++ | +++ | +++ |
| Influential issues during pivoting | Increasing pace within industry due to innovative competition | Lack of funds to aggressively target new customer segments, VC-backed competition | Regulation changes led to many customers closing down, LINE's know-how almost exclusively in initial industry | Initial product became outdated for initially targeted customers, time-critical reconfiguration needed |
| Main time-sensitive tasks during pivoting | New customer acquisition | New customer acquisition | New customer acquisition, market research | New customer acquisition, market research |
| Exemplary quotes | "The market got faster and we just went with it. Our competitors added features and branched out and so did we, but we did it along the way of our existing operations. It was gradual." | "When we did the pivot, we tried to be clever and save as much time as possible, e.g. by using API instead of having to manually bring onboard [customers]." | "Within a few days we lost all of our customers." "We just followed up on an idea [to approach new customers in new industry]. There was hardly any time to do some proper market research. We are doing it only now." | "We were in full survival mode. We tried to let go of everything that wasn't helpful as quickly as possible." "Within one week and some all-nighters we devised a new business model and did what we could to study the potential new industry. (...) Only later did we find flaws in our pivoting idea." |

^a Based on interviewees' indications as to market performance and looming financial deadlines, we rate time constraints from "+," indicating low levels of time constraints to "+++" symbolising relatively high levels.
^b Based on interviewees' statements we rate the availability of time for pivoting from "+" indicating relatively low levels of time pressure (and longer time spans) to "+++" symbolising relatively high levels of time pressure (and shorter time spans).

Table 5 Effectuation and causation indicators

| <i>Feature/Startup</i> | <i>ACTION</i> | <i>BIKE</i> | <i>BALL</i> | <i>COOL</i> | <i>TUNE</i> |
|---|---|---|--|--|---|
| Focus of entrepreneurial action during pivoting | <ul style="list-style-type: none"> - Changing initial organisational setup (controlling much of the value chain) and organisational restructuring - On the market side, ACTION tried to cooperate as much as possible with retailers and manufacturers in order to cope with its limited funds - Definition of "last ditch attempt" budget to limit exposure | <ul style="list-style-type: none"> - Focus on re-writing software code to adapt to new market environment and approach potential partners; training and onboarding of entirely new staff in short amount of time as some existing developers left the firm - Organisational restructuring led to some neglect of market developments and opened door for competitors to spot and enter market | <ul style="list-style-type: none"> - Lot of time spent by founders to raise new capital - Founders tried to present a "story of new hope" to investors by basing it on new customer segments; however, "time was moving too fast for that story to become reality" - Founders devised rudimentary potential new business models but mostly approach various leads from various industries | <ul style="list-style-type: none"> - Pivot demanded substantial management attention, e.g. due to internal discussions staff whose services were no longer needed - Winding down of old business model (e.g. shutting down logistics, hardware operations) lasted several months and was managed by entrepreneurs by following their vision as guideline | <ul style="list-style-type: none"> - Due to lack of funds and time new products were created with similar designs, even though new customer segments required something else - Founders concentrated on achieving marketing cooperations as smallness of team meant that resources were lacking for new marketing |

Table 5 Effectuation and causation indicators (continued)

| <i>Feature/Startup</i> | <i>ACTION</i> | <i>BIKE</i> | <i>BALL</i> | <i>COOL</i> | <i>TUNE</i> |
|--------------------------------------|---|---|---|--|---|
| Causation indicators ^a | | | Design of rudimentary business model options | Initial business strategy was guideline for pivot, clear and initial vision was being followed | |
| Effectuation indicators ^a | Cooperation, adapted operations and business model to resources, entirely different operations post-pivot, committing defined amount of budget to pivot | Cooperation, adapted operations and business model to resources | Cooperation, adapted operations and business model to resources, flexibility towards business model post-pivot, flexibility towards opportunities and customer segments | | Cooperation, adapted operations and business model to resources |

Table 5 Effectuation and causation indicators (continued)

| <i>Feature/Startup</i> | <i>EAT</i> | <i>SPRAY</i> | <i>BODY</i> | <i>SPACE</i> | <i>WARES</i> |
|---|---|---|--|---|---|
| Focus of entrepreneurial action during pivoting | <ul style="list-style-type: none"> - Entrepreneurs used existing business infrastructure (processes, systems, staff) for pivot in order to save time and funds - "Core thinking" (automation, efficiency) still in place and guiding all pivoting-related decisions | <ul style="list-style-type: none"> - Creation of five mind maps with potential business cases, based on customer and investor feedback - Plenty of discussions with investors about new direction before decision was made to pursue it - Testing main new idea with first batch of pilot customers in order to refine idea and approach | <ul style="list-style-type: none"> - Many discussions among founding team as to pivot direction and goals - Investors helped to guide the team towards hypothesis-backed pivoting - Time and funds available to start thinking in terms of customer needs instead of "with curtain of having to sell own product" | <ul style="list-style-type: none"> - Main question for founders and investors was what to do with previously developed assets (e.g. app) as new development would be too time- and money-consuming - Substantial time investments in new market research to find customer segments that could use existing assets | <ul style="list-style-type: none"> - "Brutal, but quick" decision to pivot, with some staff leaving and a re-naming of the business; based on calculation of potential risks and rewards (software vs hardware business) |
| Causation indicators ^a | Initial business strategy was guideline for pivot, clear and initial vision was being adhered to | Design of rudimentary business model options (mind maps) | Analytical approach to target new customer segment, market research | Analytical approach to target new customer segment within clear-cut industries, market research | Analytical approach to target new customer segment, market research |
| Effectuation indicators ^a | Adapted operations and business model to resources available | Flexibility towards new business model, experimentation to discover new opportunities, cooperation, cooperation | | | |

Table 5 Effectuation and causation indicators (continued)

| <i>Feature/Startup</i> | <i>MATE</i> | <i>CAR</i> | <i>LINE</i> | <i>MUSEUM</i> |
|---|--|---|---|--|
| Focus of entrepreneurial action during pivoting | <ul style="list-style-type: none"> - Calculated that current industry is most promising, rather, they had to technically stay up to date and in accordance with social media giants and regulation - Discontinuation of product features as part of focus on constant engineering overhauls - Due to fast-moving world of online communities time pressure was related to engineering | <ul style="list-style-type: none"> - Making use of existing technology to target new customer segments made pivot "very easy" and quick - Nimble tech platform was adjusted with simple means in order to "look more professionally" - Attempted to cooperate as much as possible with industry players so save time and funds | <ul style="list-style-type: none"> - Collecting feedback from mentors and media to discuss ideas for new business model - Full attention being diverted to testing product with new customer segment, which originated out of an "idea" - Only after initial customer testing did founders study the market in full and research competitors | <ul style="list-style-type: none"> - Facing near immediate shut-down, founders used one full week to come up with basics of new approach and reach out to potential customers to inquire about opportunities - Focus shifted to by-product of initial business model that became main product after pivoting - Product's usage potential was tested quickly with customers; customer segments were changed two to three times |
| Causation indicators ^a | Long-term opportunities within same industry were sought, based on market research and customer data | Analytical approach to target new customer segment | | Design of basic business model options, avoiding unexpected |
| Effectuation indicators ^a | | Cooperation, adapted operations and business model to resources | Flexibility towards new business model, experimentation to discover new opportunities, cooperation | Flexibility towards new business model, experimentation to discover new opportunities, cooperation, adapted operations and business model to resources cooperation |

^aBased on Chandler et al. (2011) and Reymen et al. (2015)

Table 6 Ranked comparison of time constraints and pressure and decision-making logics

| <i>Feature/Startup</i> | <i>ACTION</i> | <i>BALL</i> | <i>SPRAY</i> | <i>LINE</i> | <i>MUSEUM</i> | <i>BIKE</i> | <i>COOL</i> | <i>BODY</i> | <i>SPACE</i> | <i>WARES</i> | <i>MATE</i> | <i>CAR</i> | <i>TUNE</i> | <i>EAT</i> |
|--|---------------|-------------|--------------|-------------|---------------|-------------|-------------|-------------|--------------|--------------|-------------|------------|-------------|------------|
| Time constraints/pressure ^a | +++ | +++ | +++ | +++ | +++ | +++ | + | ++ | ++ | ++ | ++ | ++ | + | + |
| Causation indicators ^b | | + | + | | ++ | | ++ | ++ | ++ | ++ | ++ | + | | ++ |
| Effectuation indicators ^b | +++ | +++ | +++ | +++ | +++ | ++ | | | | | | ++ | ++ | + |

^aBased on interviewees' statements we rate the availability of time for pivoting from "+" indicating relatively low levels of time constraints and pressure (and longer time spans) to "+++" symbolising relatively high levels of time constraints and pressure (and shorter time spans).

^bBased on Chandler et al. (2011) and Reymen et al. (2015); ranging from none, to "+" indicating some indicators found to "+++" symbolising the substantial finding of indicators within the data (based on Table 4).

The venture pseudonymised as LINE presents a suitable example for showing high on effectuation indicators and facing intense time constraints and pressure. The startup was founded in mid-2019 by three co-founders and backed by a local government subsidy that provided the founders some financial relief in the early stages of their business. LINE worked towards developing a software-based product for a specific industry and one of LINE's co-founders had some in-depth experience in this industry stemming from her family's business ties there. The company spent approximately six months developing the software and simultaneously pitching it to potential pilot customers with some early results, namely the successful winning over of two main customers. However, both customers together with their whole industry struggled heavily in the beginning of 2020 and LINE was forced to discuss alternative paths forward. As the state grants were about to expire and its initial industry not appearing to come back anytime soon, the three founders saw no more gains within this initial industry. They spent one full week reaching out to mentors, family members and friends in the hope of receiving ideas what to do with themselves and the business as well as how to potentially salvage their software development efforts. Based on some early feedback and newspaper articles, they quickly reached the decision to pivot into a fundamentally different industry with different sets of processes, sales approaches, types of customers and regulation. The decision to pivot in this new industry was not substantiated by any business model planning or competitive market analysis. Instead, the founders attempted to use their existing assets, namely the venture's software assets, and see whether they can work in another industry. The entrepreneurs felt pressure to do something, i.e., proving that despite the loss of its initial customers in its initial industry the business was not about to go under but would manage to show signs of life in a different industry. Hence, the founders' full focus was on finding pilot customers in the new industry in order to experiment on how to adapt the software to these new types of customers. LINE's co-founder stated they were flexible towards how exactly the software would be used and that the pivot towards the new industry consisted about learning how to adapt. Only at some later point in time did LINE study the new market in more detail in order to plan its competitive position and find unique selling points for its sales approach.

“Two of our main initial customers [in pre-pivot industry] closed and overall, the industry was hurting, so we had to decide what to do. (...) We got the idea [of potentially new industry] and we had some phone calls with people we knew [in potential new industry], but none of us had any connection [to industry LINE pivoted to] and we did not know how the processes were running. We tried to tap friends and family in order to get insights and learn. (...) Later, we recognised that not all [potential customers in new industry] had the problem we were trying to solve for them. (...). We did not have time to do a thorough market analysis of [new industry] and that was different to our initial market, for which we of course did a detailed analysis. It was totally not feasible [at time of pivoting]. Our focus was on finding pilot customers and we found one with whom we could do some tests. (...) We made up for [competitive analysis] at some later time. (...) As it turned out we might need to develop software interfaces to integrate our solution with existing software of [potential customers in new industry].”

[LINE, co-founder; translated]

Similarly, BALL was a manufacturer of high-tech equipment for a range of purposes and began pivoting in 2015 as big corporations entered its original market and lured away BALL's initially targeted customer segments. BALL was well funded in its early years,

mainly thanks to a variety of business angel investments and due to having raised money through crowdfunding campaigns. Its three co-founders meticulously planned BALL's initial business plan and based it on a diploma thesis that featured some substantial market research and guidance for finding a niche in the overall market. For instance, BALL discussed with industry experts what the pricing of its product should look like. However, the founders were wrong-footed when big corporations entered the market. At this point, BALL was in the middle of shipping its first batch of products to its early tech-savvy backers and was hoping on sufficient mouth to mouth propaganda (via social media) as well as favourable press coverage to drive up sales across a more general audience. Given the new competitors this did not materialise and BALL was forced to raise prices for its products in order to fund its subsequent manufacturing. When it became apparent that BALL would not be able to financially survive amidst lacking sales and new competition, discussions were held with business angels to receive further funding and to discuss possible new directions. The venture was specialised in producing high-tech hardware products which was associated with a hardware-focused organisation. As the co-founders realised that changing the organisation to be more software-oriented was not doable and as its main investors were not willing to provide substantial new funds, it decided against re-designing its products and opted for a cooperative approach. The co-founders felt this was a promising way of dealing with the time constraints brought upon them by its funds starting to run out. It contacted those customers that were more B2B in nature, which were outside the core customer segments the venture targeted initially but which were thought to be interested in close and trustful relations as opposed to just buying at low-prices from big competitors. BALL's approach was one of recommending joint hardware development to take into account specific needs of these potential B2B customers and of providing these potential customers with a one-stop-shop for their equipment needs. In doing so, BALL appeared to listen to its potential B2B customers and their hardware needs and was willing to flexibly develop functionalities to address these needs. Hence, BALL's organisational focus shifted in large parts to the co-creation with these B2B firms by deploying its remaining resources such as engineers to these projects. This is in stark contrast to BALL's beginnings which were dominated by the diploma thesis-lead detailed business planning. Additionally, BALL developed some new functionalities which were not included in its prior thinking.

"It became apparent that we needed to shift towards B2B, otherwise it wouldn't have worked out anymore. There just was not much money left. (...) We had some individual B2B contacts in the past, we worked with them, even though they weren't our focus in the beginning. After it became clear that we could not keep our prices and the [B2C] market got dominated by the big firms, we thought we could pitch our products' features to B2B companies. (...) Time was short so we did not want to spend resources for re-designing our products and we thought they [the products] were viable for B2B purposes. (...) We did some in-depth development projects with [two big, stock-listed corporations] that we knew from before. (...) Together with them we developed some very specific functionalities for our hardware. And we had even further ideas which we could not follow up on in the end as time ran out. (...) We didn't generate sales quickly enough."

[BALL, co-founder; translated]

LINE, SPRAY and MUSEUM also had to let go of their initial plans and all reached out to potential new customers in order to find out some new opportunities or receive pre-

commitments. There was no clear goal or direction but all three ventures engaged in co-creation activities that consisted of testing first drafts of their products with pilot customers, followed by analysing the feedback gathered and refining their products so they would match their customers' needs.

"We spent [one full] week in order to come up with a conceptualisation of our idea and starting on Monday we talked to potential customers in order to present our concept to them and ask them for feedback. That was an extremely compressed process. (...) We researched potential customers and tried to talk to their directors. (...) In between we realised that we needed to shift to a different customer segment altogether as the tests showed that our products might work better [there]. We only realised these findings when practically testing products and new customer segments. (...) We had a totally new product and a totally new customer segment in the end."

[MUSEUM, co-founder; translated]

"We just followed up on an idea [to approach new customers in new industry]. There was hardly any time to do some proper market research."

[LINE, co-founder; translated]

SPRAY used the limited time it had left to follow a different approach, namely one that was more open-minded towards customer feedback instead of drafting another detailed business plan. This led the co-founders to flexibly working towards a new product based on real customer needs.

"In hindsight we followed some daydreams [in the beginning of the venture]. (...) Gradually, there was less and less money [in the business], fewer and fewer investors were interested in investing and there were only few customer leads. (...) We realised that, initially, we did not solve any core problem for customers. It does not matter what we are developing as we are not providing any core value to today's customers. So, we had to get away from the daydream. That was the main result of one last workshop with our investors [before initiating the pivot]. We then went and talked to customers, held interviews with the basic goal of understanding their issues. We then formulated hypotheses based on the statements we received and A/B tested these statements with various websites. (...) The way we are working has changed significantly. Instead of working with pre-structured ideas and listening only selectively because we had these pre-structured ideas in our minds, we now listen more carefully and open-minded to customers."

[SPRAY, co-founder; translated]

4.2 *Causation logic*

It was found that five ventures (COOL, BODY, SPACE, WARES, MATE) showed some noteworthy levels of causation logics in their pivoting activities. Also, EAT featured moderate causation levels. Incidentally, all six reported either moderate or even low levels of pivoting time constraints and pressure. All interviewees at these six startups reported on substantial internal restructuring efforts and intense discussions with staff and among the leadership team while pivoting. Many also reported on following a clear vision, drafting detailed business plans and calculating the odds of future success by extensively researching potential markets and niches.

MATE serves as a good example here. It operates in a sector that is affected by constant technological advances, such as regarding user experience on a variety of devices or concerning handling of customer data. Its goal is to always catch up to its bigger rivals and stay relevant, i.e., technologically up to date. MATE's co-founder described the venture's pivoting as gradual and as mainly related to the product's technical features combined with the startup's engineering organisation. The co-founders' approach was one of calculating returns and sticking to their initial vision within a clearly defined industry.

"We had always in the back of our minds that we need to fulfil investors' demands, that we need to fulfil our KPI [key performance indicators]. (...) [Thinking about entering new industries or creating new products] was not really something we deemed realistic. We are very close to [initial industry] and changing to [exemplary different industry] was never an option, at least until [initial industry] still works. I can't say what the future will bring, but the overall trends definitely seem to favour us."

[MATE, co-founder; translated]

MATE decided to change its name at some point during its pivoting process and for MATE's co-founders it was a calculation to reach better results with search engines. This fits to the *expected returns* dimension of causation, involving calculating potential and expected outcomes. Also, this decision to change the venture's name involved elements of longer-term planning.

"[At venture creation], we chose a name that would stand out of the crowd. Some users had difficulties finding our website on the search engines. (...) [The new domain] was a relatively expensive domain but we estimated to have good chances with this name. (...) When pivoting [with the new name], we were quite sure that in the long-run it would help us."

[MATE, co-founder; translated]

SPACE, BODY, WARES and COOL all pivoted by resorting to analytical approaches. At COOL (shedding its hardware business and becoming a player in software and firmware development) and WARES (leaving its hardware business and becoming a software provider) precise goals and plans were in place how to move from their current positions to post-pivoting ones. Both ventures estimated to have lower risks in their new markets. At WARES, its initial hardware business yielded some positive financial returns, so it had some time and money reserves for their pivoting efforts. COOL, meanwhile, received support by its investors and supervisory board chairman during its pivot and could therefore engage in some lengthy restructuring.

"There was this vision of 'why not acting as [provider for specific software] ourselves, instead of just letting others be in this market'. (...) In parallel we had our first customers [in software] next to our hardware operations and this got us thinking further. (...) The risk involved in hardware is way bigger than in software, e.g., we need to handle hardware returns and product failures. So, we deemed to have lower risks when just selling licenses for software. Then we tried to analyse to see what it would mean to continue with our hardware business and what would it mean to go the software route. And during our summer holidays we decided that the software route is the right one because we saw the potential to scale there. (...) The stable hardware business supported us during that thinking process and we were not under any big stress to rush."

[WARES, founder; translated]

“The time window to establish ourselves [in specific hardware market] was extremely short, even though at first we received a substantial number of orders. But as a newcomer it was very difficult and then [big corporation] copied our product quickly. (...) So, we analysed the market and in September [of specific year] we started to look into several [B2B software] verticals and I started to have several meetings with [potential customers]. (...) Our stakeholders were supportive and looking towards ROI [return on investments] and were pragmatic [regarding pivoting from hardware to software]. (...) Business-wise the software verticals made sense.”

[COOL, early executive; translated]

Similarly, SPACE spent substantial energy to determine which potential markets or niche the venture should pivot into with the goal of retaining as many of its previously developed assets as possible. The company was developing a web- and search-based software product and the engineering of its initial core features was accompanied with high costs and time investments. However, as the market got crowded with bigger competitors, the co-founders together with their main investors looked for alternative industries to move to. This search process followed specific guidelines, namely to make use of its existing software assets as much as possible and to target customer segments that could use these assets. SPACE was supported by a major investor during this time and was therefore able to spend substantial time to research future business models.

“It was the big question what would happen to our [software] assets. We took a lot of time to create possible [business] models (...) and our first pivoting idea would have seen many of our assets become obsolete. (...) Later on in the process we invested even more time into researching potential markets and finding out what might be worthwhile and what not. (...) During this time we received substantial support by one of our main investors.”

[SPACE, co-founder; translated]

4.3 *Hybrid logics*

As Table 7 shows, it was found that five startups showed some hybrid decision-making logics. The data indicate that while these ventures put a heavy emphasis on working flexibly towards post-pivoting business models by using defined sets of resources (effectuation-related logic), they also did at least some rudimentary business planning coupled with the basics of market research (causation-related logic). However, at two of these five these logics were more evenly distributed (CAR and EAT) compared to the three others. CAR, for instance, was working in a market dominated by big corporate or Venture Capital-backed startups and after it realised that its stand-alone software product would not receive enough traction to be sustainable, it reached out to a number of market participants in the hope of cooperating with them. Simultaneously, CAR was very open towards new ideas or proposals from these market participants and, given limited resources and its difficult outlook in this industry, tried to limit its investment risks by tweaking its technology instead of raising new funds or overhauling its product completely. The ease of changing its software without substantial time and financial requirements translated into a somewhat calm atmosphere. Yet, CAR’s founders knew

that for their investors' sake they needed to come up with a final decision as to which market to pursue soon. Therefore, they researched potential new markets in detail and, eventually, calculated that its chances of winning were highest in its initial market.

"Capital requirements to move into [another industry] would have been very high and [at time of pivoting] it was not realistic to raise so much funds. We did look at it intensely but we decided, collectively, to stay in our initial market, which we knew in detail and where we knew all the players. (...) I always had the word 'coopetition' in my mind and we sat down with [specific industry participants] to discuss ways of working together. (...) We tried to cooperate instead of having to build our own massive sales organisation. We always thought that there just has to be a way to develop [software] features with let's say just one day's of work, and that these features than satisfy our customers. (...) At one point

we even sat down with our biggest rival to discuss options."

[CAR, co-founder; translated]

EAT, however, was very flexible towards potential new industries where its technology could be put to use. After its initial market had not worked out, the founders decided to keep doing business using its initial technology as it was their main asset. They also talked to various friends, family members and experts across industries in order to reach out and look for inspirations. Eventually, they generated an idea of a potential market and tested its product with pilot customers there. As the co-founders had invested their own funds into the company and some of this money was still available, they had some time to study pivoting options.

"One day we walked through [specific shop] and realised that this could be it [future industry for EAT] so we asked ourselves about pricing opportunities here. Then we talked to some companies in this industry and inquired about [operations]. (...) We didn't define any guidelines or product or industry limitations [for pivot], we just looked where we could provide value."

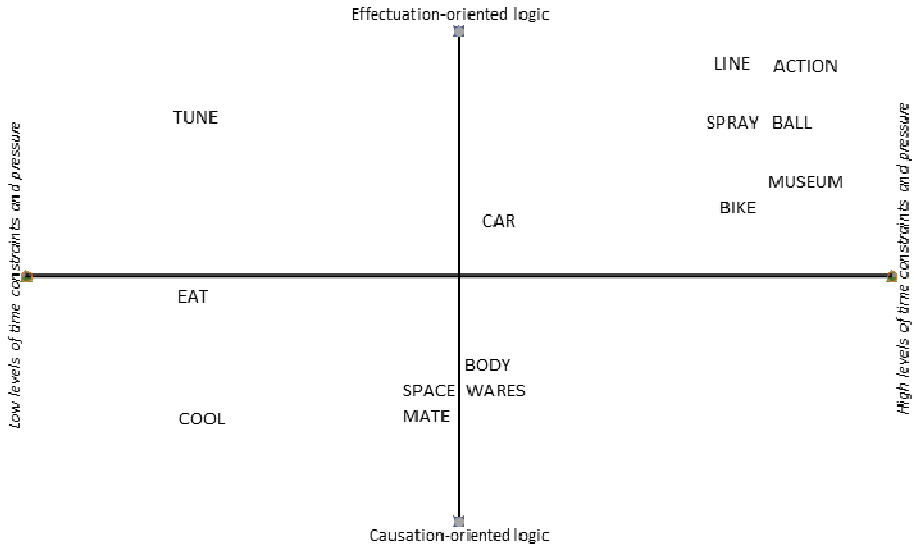
[EAT, co-founder; translated]

MUSEUM, featuring relatively high levels of effectuation-based but also some hybrid decision-making logics during pivoting, was facing dramatic financial hardships at one point. Its co-founders decided to spend several days, including one full weekend, researching potential future markets for its technology without creating a specific path yet. All staff members were participating in these discussions, thereby abandoning existing activities.

"Initially, we came up with a first draft of a concept for the pivot. We wanted to use this concept to talk to potential customers and business partners in various industries and get their feedback the following week. (...) The software developer and I did the market analysis. Normally that would not be part of his tasks at all. But we had so much pressure and we desperately wanted to know if it could work. And, therefore, we threw everything we had left in the company, every capacity, into doing this concept and research."

[MUSEUM, co-founder; translated]

Table 7 Grouping of logics identified per venture given differing levels of time constraints and pressure



5 Discussion and research propositions

Researching ways of becoming sustainable takes both time and businesses’ readiness to change (Shevchenko et al., 2016). For entrepreneurs in high-tech ventures, once they decide to change course and pivot, time constraints and pressure appears to be of relevance for their decision-making logics. Six out of the seven ventures scoring high or relatively high on the effectuation logic scale were facing intense time constraints and pressure during their pivot. Effectuation is associated with a temporal focus, i.e., an “allocation of attention to the past, present, and future” (Shipp et al., 2009, p.2), that is more directed towards the present (Lévesque and Stephan, 2020). Given high levels of time constraints and pressure as well as uncertainty, entrepreneurs may decide to focus their efforts on the immediate situation at hand instead of longer-term planning. Our data supports this notion. Faced with existential and time-critical necessities to come up with different customer segments, new products and technologies or even entirely new industries to pivot to, efforts to plan ahead were kept to a minimum or comprehensively neglected. Instead, pilot projects with potential customers or forms of cooperation with market partners were sought (*cooperation*) in order to quickly test and experiment with viable business options (*experimentation*). All six entrepreneurs reported on thorough business planning when creating their venture which supports earlier findings regarding shifting dominant logics and context dependence (Alvarez and Barney, 2005; Reymen et al., 2015). Similarly, the enormous uncertainties involved in pivots, ranging from financial to organisational and competitive matters, appear to lead to non-predictive situations requiring adaptive behaviour (Wiltbank et al., 2006). This, in turn, would explain the high levels of effectuation-based decision-making logics observed. Additionally, time-pressured pivoting entrepreneurs reached out to potential partners, be they pilot customers or competitors, in order to initiate cooperation. Five out of the six

highly time-pressured entrepreneurs talked about efforts to acquire business partners. In some cases their proposals were still vague and all of them reported to be flexible towards their potential partners' ideas and needs (*flexibility*), which is in line with effectuation (Wiltbank et al., 2006). We therefore propose the following research proposition for further empirical validation:

Proposition 1: *Pivoting entrepreneurs facing high levels of time constraints and pressure are more likely to make use of effectuation-based decision-making logics.*

On the other hand, entrepreneurs reporting lower levels of time constraints and pressure appeared to make more use of causal logics than their time-pressured peers. While not as clear cut as the effectuation-related evidence, the data suggest that detailed market analyses (*competitive analysis*), longer-term business planning (*goal orientation*) and the calculation of outcomes and returns (*expected returns*) play important roles for pivoting entrepreneurs with time on their hands. Sarasvathy (2008) names the classic marketing textbook approach of market definition, segmentation, targeting and positioning as one good example of a causation-based decision-making logic. In our data, we find support for the notion that entrepreneurs with higher levels of time available tend to perform markets studies, engage in detailed customer research, and plan their segmentation strategies when pivoting. It must be noted that these research and planning activities were independent of the actual pivoting type, so did not only happen in what Bajwa et al. (2017) call zoom-in pivots which are characterised by studying and targeting narrowed-down customer segments. Furthermore, the data on pivoting ventures COOL, SPACE, EAT and MATE indicate that formulating visions and tracking their progress along the way might be accompanied by higher levels of investors' financial support and, consequently, availability of time. Based on this study's data it is unclear, however, if such support is an antecedent to time availability or happens subsequently. Grimes (2018) illustrates how persisting with one's idea when faced with challenges demonstrates the opposite of pivoting. However, as our data show, these might be two sides of the same coin: when (new) visions or strategies have been devised for ventures' post-pivoting appearances, their existence might allow these businesses to work through those challenging times by showing a path forward, thereby calming nerves. This appears to be in line with findings concerning audience expectations. Pivoting entrepreneurs might need to set out new visions to "justify continued support for the venture" (McDonald and Gao, 2019, p.22) by partners or investors. As our findings show, such vision formulation might depend on the time constraints and pressure during pivoting processes. Meanwhile, Gruber et al. (2008) argue that allocating time for the identification and specification of market opportunities comes at an opportunity cost for entrepreneurs, namely that entrepreneurs might not have much time left to "exploit the first identified opportunity" (Gruber et al., 2008, p.1663). Similarly, Wood et al. (2018) use the analogy of runways and conclude that when ventures' runway is short (low levels of available cash left, for instance), full-on pivoting is more likely to occur as opposed to when the runway is long. However, these findings do not tell us how exactly decision-making logics play out in these circumstances. Given our data, we find that pivoting entrepreneurs facing lower levels of time constraints and pressure are more likely to take their time to engage in competitive analysis and goal orientation. One explanation for this lies in different sets of resources (such as number of staff) among the ventures studied. However, as Table 1 displays, most ventures employed between 5 and 20 staff. Additionally, in the four cases

mentioned above investors appreciated the availability of visions and were supportive and pragmatic, yielding positive effects on the time available for pivoting. This way, a clear future time perspective (Gielnik et al., 2018; Lévesque and Stephan, 2020) opened up for these pivoting ventures. Wood et al. (2019) note that research on entrepreneurial cognition could benefit from including time and temporality into its agenda. As time availability appears to contribute to the drafting of visions (and vice versa) in pivoting ventures and visions being a tool for entrepreneurial narration, we view our findings as suitable starting points for further research into this area. Following from this discussion, we propose:

Proposition 2: *Pivoting entrepreneurs facing lower levels of time constraints and pressure are more likely to make use of causation-based decision-making logics.*

We also observe the noticeable existence of hybrid or “overlapping” (Sarasvathy, 2001, p.245) logics in the data. Five ventures showed noticeable indicators of both effectuation and causation. Time constraints and pressure inherent in these startups’ pivoting activities were quite different, ranging from high to low levels. The aforementioned opportunity cost of allocating time to extensive market research (Gruber et al., 2008) has been avoided by MUSEUM, for instance, whose co-founders only had a few days to devise the basics of a new product to be tested in various industries (*flexibility, experimentation*). Yet, they also rudimentarily researched potential markets and abandoned existing activities for the time being (*competitive analysis, avoidance of unexpected*). As such, it appears as if fine nuances exist when it comes to hybrid decision-making logics during pivoting. Clearly, market research and competitive analysis fall into the spectrum of a causal logic but given the rudimentary execution over the course of a week one might argue that it does not contribute to the formation of a dominant logic across decisions (McKelvie et al., 2020). In fact, MUSEUM showed slightly higher on the effectuation scale. BALL, SPRAY, CAR and EAT also featured indicators of both logics but tended towards a particular one. Consequently, hybrid logics were found to exist in ventures with fundamentally different levels of time constraints and pressure. Reymen et al. (2015) view the capacity to move between logics depending on different contexts as an entrepreneurial capability and pivoting appears to be a relevant context for such moves. As the use of effectuation and causation “depends on the presence of uncertainty about the value of opportunities and residual rights” (Reymen et al., 2015, p.376), uncertainties surrounding pivots may influence the extent and balance of hybrid logics. The same appears true for new insights coming out of business experimentation. Such insights lead entrepreneurs to adapt their action and decisions to the new situations at hand (McDonald and Gao, 2019). Depending on the extent of such uncertainties and insights, entrepreneurs appear to make more use of one form decision-making logic over the other. This was found to be the case independent of the existence of time constraints and pressure and leads to the third proposition:

Proposition 3: *Pivoting entrepreneurs employing hybrid decision-making logics tend towards one logic that is more dominant compared to the other, independent of time constraints and pressure.*

6 Implications and limitations

6.1 Contributions and implications for research

How and why do time constraints and pressure during pivoting affect entrepreneurs' decision-making logics? This study's findings indicate that higher levels of time constraints and pressure skew entrepreneurs towards effectuation while lower levels appear to be more related with causation. As to the former, new viable business options need to be found in a short amount of time, potentially requiring experimentation and flexibility instead of detailed planning and the calculation of returns. These empirical findings are in line with the reasoning that pivots shift the temporal focus towards the present, thereby favouring effectuation-based logics (Lévesque and Stephan, 2020). Moreover, the findings appear to be related to pivoting entrepreneurs' invalidated prior assumptions about business success, thereby creating situations of high uncertainty and requiring adaptive behaviour (Alvarez and Parker, 2009).

Causation-related logics appear to be more in line with less time-pressured pivoting endeavours as the creation of visions and business plans seem more doable in these circumstances. Intuitively, "the act of planning would take away time and effort from other tasks" (Liao and Gartner, 2006, p.28) and our inductive study points towards causation as a more dominant logic when time is more readily available to pivoting entrepreneurs. As causation has been linked to positive results in terms of new venture persistence (Liao and Gartner, 2006), more research is needed into the longer-term venture implications of causal and effectual logics during pivots.

In addition, the findings show that hybrid logics are being used by pivoting entrepreneurs, which is in line with previous findings and reasonings (Reymen et al., 2015; Sarasvathy, 2001). Andries et al. (2013) found evidence that some investors appear to be "supportive of this combination of planning and action" (p.307) and our study extends these findings to the realm of pivoting. This is not surprising as some recent evidence suggests the benefits of using a combination of effectual and causal logics for venture performance (Smolka et al., 2016). Crucially, the data indicate that while hybrid logics are being utilised, entrepreneurs still lean towards one dominant logic. Additionally, our findings suggest hybrid logics are used independent of any time constraints and pressure.

In summary and following calls for further studies on time in entrepreneurship research (Lévesque and Stephan, 2020), this paper contributes to effectuation-theory as follows: it investigated how and why time constraints and pressure affect entrepreneurial decision-making during pivoting processes. By inductively finding that depending on the level of time constraints and pressure entrepreneurial decision-making tends towards either effectuation or causation, it expands the nascent literature on pivoting. Furthermore, to the best of the author's knowledge it is the first to extend effectuation theory to the area of pivoting.

The present study centres on decision-making logics during pivoting based on entrepreneurial action in order to navigate some profound methodological challenges. It

appears worthwhile to direct further empirical studies towards the uncovering of entrepreneurial thinking in order to approach the measurement of decision-making logics during pivoting from a different angle. Moreover and given the delicate issue of pivoting, the establishing of close ties with startup founders might prove invaluable for researchers in order to receive privileged access to these firms and well before the initiation of their pivots (An et al., 2020; Smolka et al., 2016). In doing so, truly longitudinal research into the specific workings of pivoting processes would become possible. Additionally, researching on decision-making logics during different types of pivots, such as early- or later-stage ones (Hampel et al., 2019), is deemed a promising avenue for further research.

6.2 Limitations

By researching the nascent area of pivoting and its under-researched connection to effectuation and causation, various limitations in this study's methodology had to be accepted. First, we cannot generalise empirically as the sample of 14 ventures is too small and our propositions require empirical testing. Second, as our study deals with semi-structured interviews uncovering historical action, errors of recall by informants cannot be ruled out (Golden, 1997). Although secondary material such as newspaper articles was used in order to triangulate, biases in interview responses might still have occurred. Third, only the time period between founding and pivoting was addressed. Therefore, it is impossible to draw any conclusions as to startups' future and long-term competitiveness. Relatedly, we only looked at the one major pivoting process that a particular startup communicated with the outside world. It is conceivable that there might have been other and potentially smaller ones and such situations might distort results. Fourth, given the nascent state of empirical effectuation research (McKelvie et al., 2020), especially within the context of startup pivoting, there is a certain level of abstraction inherent in the operationalisation of effectuation and causation. Finally, this study is based on empirical evidence of German, Austrian and Swiss startups. This gives rise to the possibility of having a geographical bias. As startup landscapes (e.g., institutional support, funding possibilities) differ from country to country, this geographical limitation influences the extent of theoretical generalisability of this study.

Competing interests

The author(s) declare that there are no conflicts of interest.

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