

Identifying and Understanding Entrepreneurial Decision-Making Logics in Entrepreneurship

Education

Abstract

Purpose – It is unclear how nascent entrepreneurs make decisions during the venture creation process. This study investigates decision-making logics and their transformation over time among student entrepreneurs who aim to create new business ventures in the higher education setting.

Design/methodology/approach – The study employs the mixed methods approach through the use of survey and observation data. The longitudinal survey data comprise three surveys collected via an internet-aided tool. The constructs of causation and effectuation are measured using previously tested scales (Chandler *et al.*, 2011). Non-participant observation data were collected during the course, focusing on the venture creation processes of four different start-ups, and were analysed thematically.

Findings – The findings show three transformation patterns—doubts in how to proceed, unwillingness to proceed, and unsatisfactory team dynamics—that led individuals towards a coping decision-making logic in which no causation or effectuation is emphasized. The findings illustrate that, despite this stage of decision-making logic, the learning process continues: Even if no new business venture is launched, entrepreneurship education can still generate learning outcomes that improve students' understanding of entrepreneurship as well as understanding of themselves as entrepreneurs.

Originality/value – This study brings the theories of causation and effectuation into the teaching of entrepreneurship. Of particular value to scholars is the fact that the study generates new understanding of the decision-making logics during new venture creation. Accordingly, this study sheds new light on the transformation and complementarity of the decision-making logic of an individual as new ventures emerge in an educational context reflecting the real-life start-up context.

Keywords: Decision-making logic, Causation, Effectuation, Entrepreneurship education

Introduction

Over recent years, research interest in nascent entrepreneurs—that is, individuals or teams of individuals— has grown. The actions of these entrepreneurs transform ideas into new business ventures (Bird and Schjoedt, 2009; Dimov, 2010; Fisher, 2012). An essential aspect of bringing new ideas to life is quickly and appropriately finding viable solutions to the challenges encountered in business formation (Fayolle and Gailly, 2008).

Studies on entrepreneurs' decision making have for years focused on activities characterised by individuals' economic and plan-oriented thinking (Fisher, 2012). This causal approach has been challenged by emerging perspectives that suggest optional strategies and mechanisms employed by entrepreneurs forming new ventures

(Venkataraman *et al.*, 2012), such as bricolage (Baker and Nelson, 2005; Davidsson *et al.*, 2017), effectuation (Read *et al.*, 2009; Sarasvathy, 2001), and pattern recognition (Baron, 2006). Effectuation, on the other hand, suggests that, in highly uncertain environments, instead of forming pre-defined goals, entrepreneurs rely on available sets of means (Sarasvathy, 2001). This conflict between causation and effectuation as differing approaches to entrepreneurial opportunities is suitable for investigating how nascent entrepreneurs make decisions during the venture creation process.

The decision-making logics employed during the new venture creation process are extremely hard to identify. Previous research has called for 'field-based observation of the phenomenon' and 'a richer understanding of process steps, necessary sequences and decision-making rationales' (Arend *et al.*, 2015: 646) to more comprehensively understand the new venture creation process (Langley, 1999). As suggested by Reuber *et al.* (2016), this study focuses on the new venture creation processes of students in higher education during an educational intervention. The aim of this study is to identify students' decision-making logics during the new venture creation process and to investigate and understand how and why these decision-making logics are transformed during the process. In the studied context, bachelor-level students are required to ideate, test, and exploit a business idea through setting up a new venture and a company in real markets. This kind of setting both requires students to take concrete actions and allows for investigation of their behaviour up close as it happens (see Hytti and O'Gorman, 2004). It is acknowledged that students' behaviour in a course setting does not fully resemble the real-life start-up process in terms of financial investments and related risk taking, even if they launch real businesses during the course. Nonetheless, this setting, which follows student entrepreneurs' venture creation processes, is suitable for providing new insights on decision-making logics. Additionally, although new venture creation is often a team effort (Reynolds and Curtin, 2008), this study focused on the behaviour of individuals, as it enabled us to better understand the formation and transformation of decision-making logics than team-level assessment would.

The contribution to the related literature is twofold. First, given the scarce empirical work done on entrepreneurs' new creation processes in real time (Langley, 1999; McMullen and Dimov, 2013; Read *et al.*, 2016; Reuber *et al.*, 2016), the study generates a new understanding of the decision-making logics used during new venture creation. Importantly, this study examines the decision-making logics among individuals who are still in the process of launching a new business with unknown end results—a new venue suggested by Welter and the others (2016). So far, the concept of effectuation has been based on studies of the decision making of expert entrepreneurs who have been successful in their entrepreneurial efforts (Sarasvathy, 2001, 2008; Dew *et al.*, 2009). In addition, the study provides deeper insights on the transformation of decision-making logics which has not been addressed much in recent research (Chetty *et al.*,

2014; Dutta and Thornhill, 2014). The study contributes to the theories of causation and effectuation by introducing the patterns that lead to a coping decision-making logic, in which no causation or effectuation is emphasised. The findings shed new light on stagnation in the nascent entrepreneurial process, which may remain in the start-up phase for a long period (Reynolds and Curtin, 2008).

Second, as suggested by Fayolle (2013), the study brings the theories of causation and effectuation into the teaching of entrepreneurship in an effort to understand how students make decisions during the venture creation process. Moreover, the study sheds novel light on the transformation and complementarity of the decision-making logics at an individual level as new ventures emerge in an educational context that reflects the real-life start-up context. Pittaway and Cope (2007) as well as Harms (2015) have studied how a learning situation that has uncertainty and scarce resources can boost entrepreneurial learning and outcomes among students. Therefore, entrepreneurship as a method may help advance new venture creation and result in new firms (Fayolle and Gailly, 2008; Kozlinska, 2016) as well as other important learning outcomes beyond new venture creation (Yamakawa *et al.*, 2016). Based on this study, it can be argued that, even if no new venture is launched, entrepreneurship education (EE) can still generate learning outcomes that improve students' understanding of entrepreneurship and of themselves as entrepreneurial individuals as well as other important learning outcomes such as language and social skills not necessarily related to entrepreneurship.

The study proceeds as follows: First, the theories of causation and effectuation are discussed in the EE context. Next, the methodology of this study is presented. Then, taking a mixed methods approach, comprising of survey data from a sample of students in higher education and observation data, this study identifies students' decision-making logics during the new venture creation process and investigates how and why these decision-making logics are transformed during the process. This is followed by a discussion and conclusions.

Causation and effectuation in practice-based learning in entrepreneurship education

EE aims to facilitate students' personal growth and transformation by providing them with entrepreneurial knowledge, skills, and attitudes (Gedeon, 2014). For instance, EE has been proven to have an effect on a number of entrepreneurship-related human capital assets, such as knowledge and skills on entrepreneurship, positive perceptions and entrepreneurial intentions, and entrepreneurship outcomes such as start-ups and entrepreneurial performance (Martin *et al.*, 2013). More specifically, EE aims to foster three types of learning: 1) learning to become an enterprising individual (through entrepreneurship), 2) learning to become an entrepreneur (for entrepreneurship), and 3) learning to become an academic or teacher in the field of entrepreneurship (about entrepreneurship) (e.g. Fayolle and Gailly, 2008; Hytti and O'Gorman, 2004). In enhancing learning, two types of pedagogical approaches have been utilised. The first

type, theory-based pedagogical approach, fosters students' understanding about entrepreneurship, whereas the second type, practice-based approach, focuses on developing students' competencies in regard to being an entrepreneur (Neck *et al.*, 2014). In general, most of the attention in EE has traditionally been paid to 'for' entrepreneurship approaches aimed at new venture creation and at exposing students to becoming entrepreneurs. These practice-based approaches are intended for those students who seek support and training for their entrepreneurial projects or for those wishing to gain more practical knowledge and learn different techniques for starting a venture (Fayolle and Gailly, 2008; Yamakawa *et al.*, 2016).

Practice-based EE has increasingly become focused on entrepreneurial method (Fayolle and Gailly, 2008; Sarasvathy, 2008; Yamakawa *et al.*, 2016), which refers to the use of two modes of logic—causation and effectuation—in responding to the diverse challenges that accompany entrepreneurial behaviour (Yamakawa *et al.*, 2016). Fayolle and Gailly (2008) labelled causation and effectuation as learning models to be utilised in EE. The concepts of causation and effectuation have been introduced to differentiate managerial from entrepreneurial decision-making logics or actions that entrepreneurs use to solve the problems they encounter (Fayolle and Gailly, 2008). In EE, effectuation can help students to initiate an iterative process of trying to create value for stakeholders outside the classroom (Lackéus *et al.*, 2016). Effectuation as a learning model can be particularly useful in helping students learn how ideas can be examined, modified, and delivered to the market (Mäkimurto-Koivumaa and Puhakka, 2013). In designing EE, it is thus important to acknowledge that the model of effectuation focuses on facilitating entrepreneurship-specific learning regarding situations of bounded rationality, where individuals have limited information, cognitive limitations, and limited time to make decisions (Fayolle and Gailly, 2008). The causal, predictive model entrepreneurship, in which entrepreneurship is portrayed in terms of economic and plan-oriented decisions, is the prevailing approach in business schools (Sarasvathy, 2001). Its embodiment, business planning, holds a significant position in EE (Chandler *et al.*, 2011), as it provides valuable information on critical business operations (Honig, 2004). When students are encouraged through the model of causation, they identify and assess long-run opportunities in developing their ventures, and they engage in creating project plans for developing their products and/or services and for conducting market and competitive analyses (Chandler *et al.*, 2011; Fisher, 2012; Sarasvathy, 2001).

In regard to effectuation, Sarasvathy (2001) defined it as an approach in which, instead of engaging in economic thinking, entrepreneurs focus more on the resources they already possess and ignore market needs in search of opportunities. This approach can be considered meaningful in highly uncertain and dynamic markets where target customers cannot be predefined. The effectuation approach acknowledges the changing goals of entrepreneurs, and, instead of focusing on goals, entrepreneurs focus on control over the available sets of means they possess. Effectuation

is expressed by developing varying versions of a product and/or service for markets, experiencing different ways of selling the actual product and/or service, and changing one's offerings quickly if needed or when something more interesting comes one's way. Entrepreneurs are willing to accept affordable loss, which means that they commit only limited amounts of resources to their ventures. Entrepreneurs also control uncertainty by entering into agreements with customers, suppliers, and stakeholder groups (Chandler *et al.*, 2011; Fisher, 2012; Sarasvathy, 2001). This type of effectual resource logic is seen to prevail among student entrepreneurs (Politis *et al.*, 2012).

It has been suggested that the traditional model of causation and writing business plans should be combined with emerging models that better explain how entrepreneurs behave during the venture creation process and that apply real-life concepts (Fisher, 2012; Fletcher and Harris, 2002; Rauch and Hulsink, 2015). Fayolle and Gailly (2008) proposed that procedural rationality, which allows an entrepreneur to identify and analyse all potential solutions and select the most appropriate one, can simply be impossible due to the time and resource constraints that nascent entrepreneurs face. Mäkimurto-Koivumaa and Puhakka (2013) suggest that causation and effectuation can both be applied simultaneously or sequentially. Similarly, Yamakawa *et al.* (2016) argued that causation's planned strategy and effectuation's co-creation are both needed in pursuing a new opportunity, and both should therefore be addressed in new venture courses.

Recent discussion on effectuation has taken the theory development approach by assessing effectuation as a theory and providing tools and ideas for its construction and reconstruction (Reuber *et al.*, 2016). Its position as an entrepreneurship theory and its theory building process, particularly in the field of organizational research, have raised several important concerns and questions (see e.g. Arend *et al.*, 2015; 2016; Baron, 2009; Chiles *et al.*, 2007; Gupta *et al.*, 2016; Reuber *et al.*, 2016; Welter *et al.*, 2016). Although effectuation is considered to be a process theory, there seems to be a lack of process orientation research on this subject (Gupta *et al.*, 2016). Effectuation research may develop more effectively if more attention is paid to examining processes with rich, qualitative data (Gupta *et al.*, 2016; Langley, 1999). In addition, as effectuation was originally proposed to explain how entrepreneurs act and make decisions, there is a lack of knowledge about effectuation in action in different contexts, such as in an effectual educational intervention (Reuber *et al.*, 2016). In this study, the above research gaps are addressed through the following research questions:

RQ1. How do students make decisions during their venture creation processes during an educational intervention?

RQ2. How and why are decision-making logics transformed during the new venture creation process?

Methodology

Study context

In investigating the decision-making logics in EE, this study focuses on a non-compulsory, practice-based bachelor-level course that was organised jointly among three Finnish higher education institutions: a university and two polytechnics. During the course, the students were required to craft business ideas, test suitable business models, and set up operating businesses exploiting the business idea in real markets. The students were not required to have preliminary business ideas or experience in entrepreneurship, nor were they required to have completed entrepreneurship studies before attending the course. In the course, the students worked in multidisciplinary teams of two to five members, where they managed projects and benefited from group learning that enhances entrepreneurial learning (Harms, 2015).

The 18-week-long learning experience was launched with a seven-hour boot camp session at which the students met each other for the first time. They participated in exercises aimed at helping team formation and idea generation testing processes. Thereafter, the course consisted of bi-monthly meetings and independent work in teams (outside of the classroom). In each meeting, students were given assignments that were planned to indirectly guide the new venture formation process. The assignments comprised different kinds of activities supporting the new venture creation process, such as idea generation and testing, business model generation and validation, and pitching and marketing the idea. The solutions and their outcomes were, however, dictated by the students, and the related learning experiences were discussed in the meetings.

Students were encouraged to find suitable answers themselves to the challenges they faced during the new venture creation process. The course was mainly 'for' entrepreneurship, as it was aimed at supporting students in progressing through their new ventures towards business start-ups and becoming entrepreneurs. The course was also aimed at supporting learning 'through' entrepreneurship, that is, supporting learning to become an enterprising individual. The course did not involve any traditional teaching methods, although the students were briefly provided with some basics 'about' entrepreneurship and the start-up process, such as calculating relevant business numbers or deciding on suitable business models for their ventures. Instead of lecturing, the teachers acted as facilitators, posing questions to help students find solutions by themselves and proceed in their new venture formation. In all, students were encouraged to experiment, test, and make the necessary decisions related to the venture creation process by themselves, just as genuine start-up entrepreneurs would. Therefore, the course setting can be considered to allow an examination of students' decision-making logics in real time and almost in real life.

During the course, students' learning was assessed based on five criteria which combine team and individual efforts. First, the team's activity during the meetings was evaluated by the facilitators. Second, the team's business idea, business model, and the team's development were evaluated by the facilitators and based on a pitching competition, which was judged by an external group of judges. Third, the team's execution of the given assignments was evaluated

by the facilitators. These assignments reflected the common steps that a nascent venture takes, such as making a marketing plan, prototyping, conducting competitor analysis, and estimating the costs and revenues (see e.g. Reynolds *et al.*, 2014). Finally, individual participation in a trade fair, the team's business report, and students' self-evaluation reports were part of the final grading. We acknowledge that the course assessment placed emphasis on assessing progress in the new venture creation, and this may have influenced students' entrepreneurial behaviour during the course. However, the assessment identified all the learning goals 'for', 'through', and 'about' entrepreneurship.

Data

Mixed methods approach

To identify and understand students' decision-making logics during their new venture creation process, data were collected from participating students. Therefore, students' decision making was the unit of analysis. To achieve the aim of the study, the mixed methods approach was used to identify different types of decision-making logics during the venture creation processes. First, survey data was collected from the students during the course. Second, in order to gain a deeper understanding of the types of decision-making logics identified and how they changed during the course, non-participant observation data were collected by one of the authors during the course. As an ethical procedure, all participating students were informed of the research during the first meeting of the course. Each student included in the study gave permission for the collected observation and survey data to be used anonymously for research purposes.

The mixed methods approach enabled the integration of quantitative and qualitative data for analysis and allowed us to address the aim more comprehensively (Hurmerinta-Peltomäki and Nummela, 2006) than we would have been able to if employing only survey or observation data. The quantitative and qualitative data were collected simultaneously and therefore used a QUAL + QUAN design, where qualitative and quantitative parts had equal status in terms of priority (Molina-Azorín *et al.*, 2012). The mixed methods approach examined the types of decision-making logics and also complemented the quantitative part of the study by illustrating and expanding the findings. It also extended the breadth and range of inquiry by using observation data for different inquiry components, that is, patterns leading to transformations in decision-making logics (see Greene *et al.*, 1989) during the venture creation process. Even though the mixed methods approach is commonly applied in social sciences, its importance has been acknowledged in general discussion in the field of entrepreneurship in the twenty-first century (Davidsson, 2003).

Survey data

The survey data comprised three surveys collected via an internet-aided survey tool at different points in time. The first survey data, collected at the beginning of the course (time point 0=T0), covered students' demographic and background information and their opinions of entrepreneurship-related aspects, such as entrepreneurial passion (Cardon *et al.*, 2013) and entrepreneurial identity (Farmer *et al.*, 2011). These data, together with the data from the two follow-up surveys (first time point=T1 at the ninth week and second time point=T2 at the eighteenth week of the course), were used for analysing the decision-making logics identified. The follow-up surveys (T1 and T2) were conducted during the course meetings and after meeting reminders were sent to those who were absent.

The data were combined in a data set comprising 49 responses from 57 students who completed the course¹. All 49 respondents were identical, and self-selection bias did not influence the results. This gave us a response rate of 86 per cent. In the data, the average age of the respondents was 26 (SD 4.8), with the ages ranging from 20 to 48 years. Sixty-seven per cent of the respondents were male, 75 per cent had completed at least half of their studies, and most of the students had studied business (42 per cent) or technical sciences (27 per cent). A minority of the students, 14 per cent, were international students from different countries, such as Germany, Peru, and Bangladesh. Only 7 out of the 49 students had earlier experience in entrepreneurship. There were 16 student teams, of which 14 completed the course. Their business ideas ranged from a design studio and webstore to embedded electronics.

Non-participant observation data

To understand students' decision-making logics and transformation in these logics, non-participant observation data were collected. During the data collection process, students were observed without active participation in their actions. Non-participant observation is often used in tandem with other methods to enable a more nuanced comprehension of complex situations (Liu and Maitlis, 2010). From the beginning of the course, the venture creation processes of 23 students from six different teams were followed up. Based on the results of the survey of the decision-making logics of the students (T1 and T2), the analysis was focused on four different venture creation processes and the students involved in them. The students were selected because they represented different teams and ideas and also because, more importantly, they indicated at T1 that they followed different types of decision-making logics, of which our aim was to gain a deeper understanding. Furthermore, all the selected students ended up with coping approach at T2, implying that their venture had stagnated prior to the end of the course. Focusing the analysis on the stagnated ventures is justified, as existing research has mainly analysed successful ventures, and understanding of failures or unsuccessful ventures

¹ Due to some non-responses, the final data set contained some missing values (ranging from 0 to 35 per cent of missing values), which were imputed by using multiple imputations (MI) with linear regression modeling. All analyses were conducted separately with non-imputed and imputed data, and both analyses produced similar results.

remains insufficient (Davidsson, 2003; Yusuf, 2012). In addition, the team provides a context for understanding individual student behaviour, and we therefore do not even attempt to separate the selected individuals from their teams.

The observation data collection took place during the bi-monthly meetings where students shared their learning and the actions they had taken. These actions were focused on as they were considered to be proxies for decision-making logics. As guided by the teachers of the course, the students shared with the entire class how they had reached their decisions regarding the necessary actions to take. Triggering events and critical incidents were also recorded when discussed or identified by the students. Non-participant observations were recorded in the form of a research diary in a notebook or on a laptop by one of the authors.

Non-participant observation is subject to several hazards that may result in biased outcomes (Liu and Maitlis, 2010). For instance, observer effect on participants, objectivity issues, and the problem of selectivity can lead the researcher in the wrong direction when interpreting the results (Liu and Maitlis, 2010). To overcome the observer effect, the students were informed about the ethical issues and procedures related to the collection of the research material. When the data collection commenced, during the first meeting, the students seemed perplexed about being observed, but they appeared to forget the researcher's non-participatory observation as the meeting progressed (Liu and Maitlis, 2010). The challenges of objectivity and selectivity were addressed by recognising the different roles of the authors in respect to the course—one of facilitator, one of non-participant observer, and one of remote researcher not participating in the course meetings—and taking these roles into consideration when analysing the data.

Analysing survey data

Survey data analyses were threefold. First, the decision-making logics were analysed using explorative and confirmatory factor analyses to validate their dimensions. The decision-making logics were measured with Chandler *et al.*'s (2011) scale, which covers causation, experimentation, affordable loss, flexibility, and pre-commitments. In this study, focus was placed on two constructs: causation and experimentation. The respondents had to evaluate their team's decision making in relation to various statements, such as 'We developed a strategy to best take advantage of resources and capabilities', using a scale ranging from 1 to 5 in which 1=totally disagree and 5=totally agree. The items used in the analyses are listed in Appendix Table 1. Experimentation was defined as a suitable construct for recognising effectuation in the course context. To validate the measurement approach, an explorative factor analysis was conducted ($KMO=0.68$, $p<0.001$). The results support two constructs of causation and effectuation with no considerable cross-loadings (*cut-off value*=0.500).

This was further validated with confirmatory factor analysis, which supported the two-factor solution ($\chi^2(26)=29.97$, $\chi^2/df=44.90$, $p=0.269$; $CFI=0.957$; $RMSEA=0.056$). These analyses were conducted using Mplus software Version 6. The convergent validity and discriminant validity assessment indicates that the reliability of the constructs varies. Construct validity was assessed based on the composite reliability (CR) and average variance estimates (AVE). The CR estimate of causation construct, 0.81, was above the cut-off value of 0.70 (Hair *et al.*, 2010). For effectuation, the CR estimate was 0.56, which implies a low level of internal consistency of this scale. The standardised factor loading estimates for each item were above the necessary threshold of .50 (Hair *et al.*, 2010), and item loadings were significant at the $p<0.05$ level. The AVE value for causation was 0.48 and for effectuation was 0.31, both of which were below the cut-off value of 0.50 (Hair *et al.*, 2010). These results imply that the assumed items for the causation and effectuation scales do not correlate well with each other within their parent factor. This can be improved by dropping items from the scales or by using sub-samples. The former would result in lower content and face validity, and the latter is impossible with 49 observations. However, AVE values below 0.50 can provide nuanced results for first-time studies (Ping, 2009), and, due to the explorative nature of the study and the emphasis on mixed methods, we are willing to accept lower AVE values. However, the assessment of discriminant validity (squared AVE vs. construct correlations) shows that both constructs explain more of the variance among their own items than they share common variance (*Pearson's* $r=0.11$). Accordingly, these results serve as a suggestion for future research to improve the scale for effectuation.

Second, both of the latent variables were employed in cluster analysis to identify students' profiles of decision-making logics. Cluster analysis is a group of multivariate techniques whose main purpose is to group objects, for instance, respondents, on the basis of certain identified characteristics. Objects in the same cluster are more similar to one another than they are to objects in other clusters (Hair *et al.*, 2010). In this study, cluster analysis was used for grouping students based on their decision-making logics, using sum variables for causation and effectuation that were composed based on the result of EFA during the course (at T1 and T2). In this study, a combination of hierarchical and non-hierarchical methods was utilised (Hair *et al.*, 2010). First, hierarchical clustering (Ward's method and squared Euclidean distance) was conducted to determine the number of clusters. Because cluster analysis procedures do not employ a specified test to select the number of clusters (Hair *et al.*, 2010), an agglomeration schedule was used to determine the numbers of clusters at T1 and T2. During this analysis, the centroids of these cluster solutions were saved. Second, K-means clustering for two-, three- and four-cluster solutions at T1 and T2 were conducted.

At T1, a comparison of the different solutions, focusing especially on cluster centres and on the number of cases, indicated that two- and three-cluster groups seemed not to reveal students' decision-making logics comprehensively. Instead, the four-cluster solution covered clusters with relatively similar numbers of cases in each cluster. Thus, a four-

cluster solution at the first measurement point was selected. At T2, K-means clustering for two-, three- and four-cluster solutions were also conducted. Three-cluster solutions included three notably unequal groups, where one group clearly dominated. In addition, all cluster groups were not easy to interpret as they were in a two-cluster solution. Thus, a two-cluster solution was selected at the last measurement point. Based on these analyses, different groups of decision-making logics were identified: four at T1 and two at T2 for 49 students followed over 18 weeks.

Third, the differences between each cluster were measured using univariate analysis of variance (ANOVA) and t-tests. ANOVA is a procedure that assesses group differences on a single metric dependent variable. T-test measures the statistical significance between two sample means for a single dependent variable (Hair *et al.*, 2010). In addition to the decision-making logics, the cluster group comparisons were conducted using established scales of perceived entrepreneurial identity (Farmer *et al.*, 2011), a passion for founding and inventing (those relevant to early-stage teams) (Cardon *et al.*, 2013; Stenholm and Renko, 2016), and feasibility and desirability of entrepreneurship (Krueger *et al.*, 2000) to gain a deeper understanding of the clusters. Data for these scales was collected at T0. All analyses, barring confirmatory factor analyses, for which the Mplus software Version 6 was used, were conducted with SPSS statistics software Version 23.

Analysing non-participant observation data

The non-participant observation data focused on students' decision-making logics and on how they rationalised and orally described their actions in the nascent processes and related decisions to other students and teams. Most importantly, our focus was on how students' decision-making logics changed during the new venture creation process in order to gain a more nuanced understanding of the logics and patterns leading to these transformations. The transcribed observation data comprised 21 pages of text, which were carefully analysed. The focus of the analysis was on the selected student teams' discussions of new venture creation processes and ideas. Sections describing the ways in which the observed students within the team acted when further developing their ideas and implementations were identified. Based on these, a rough storyline of each case was built. Each storyline covered the responsibilities of the studied students and the critical incidents and phases of the venture creation process (Appendix Figure 1). The first analysis was theory-driven and deductive in order to identify causal and effectual decision-making logics based on Fisher (2012) in the critical phases of the process. Then, a second, more inductive approach was used to reveal new insights on the identified logics and their transformations during the venture creation process. The observation data was analysed by the observer and other authors, taking into consideration their different roles in respect to the course, first independently

and then through joint discussions, to improve the objectivity and selectivity of the study and thus to reduce the risk of false interpretations.

All quotations that explain the findings are extracted from the research diary of one of the authors, and they are informative of her observations and interpretations of the students' behaviour. The focus is on individual student behaviour and the particular decision-making logics taking place in the team. When deepening understanding of the types of decision-making logics by integrating the survey and observation data findings, some unexpected and interesting insights, such as seemingly conflicting decision-making logics, were discovered. To make sense of these, the learning diaries of the students were further studied to verify the interpretations.

Results

Identifying and understanding types of decision-making logics

Each group of decision-making logics was evaluated by comparing the values of both composite variables in each cluster against the sample average. For instance, if the value of effectuation of a student was higher than the sample average, he or she was part of the effectual approach (or hybrid) group. If he or she perceived both causation and effectuation at a rate lower than the sample average, he or she belonged to the coping cluster. Based on the cluster means from the K-means clustering and the cluster sizes, the clustered entrepreneurial behaviour at T1 was labelled as follows:

Effectual approach, representing 27 per cent (n=13) of students. These students exhibited experiential behaviour by reporting their willingness to revise the business idea and try different business models. Their perceived feasibility and desirability to start a business were about the average, compared to other clusters. Even if the differences were not significant, the members of the effectual cluster showed the lowest levels of passion for inventing, and their passion for founding was lower than in the causal approach cluster. Moreover, their perceived entrepreneurial identity was the lowest among all four clusters.

Causal approach, representing 27 per cent (n=13) of students. Most of the students in this cluster were females. They exhibited high levels of the causal approach, such as determinedly staying in the first vision of a business idea, analysing long-term opportunities, or researching target markets and competitors comprehensively. There were no significant differences between these students and the others in terms of the perceived desirability of entrepreneurship. With regard to feasibility of entrepreneurship, passion for founding and inventing, as well as perceived entrepreneurial identity, members of the causal cluster ranked the highest, although the differences were not statistically significant.

Hybrid approach, representing 18 per cent (n=9) of students. This cluster exhibited relatively high levels of both the effectual and causal approach. This was manifested by their willingness to revise their business ideas and to try alternative business models while also conducting long-term analyses and research on target markets and competitors. Their entrepreneurial perceptions did not differ from those of the others, but they were slightly, although not significantly, older than the members in the causal and coping clusters. In addition, their passion for founding and inventing was higher than that in the effectuation cluster, and their perception of themselves as entrepreneurial was less than the average.

Coping approach, representing 29 per cent (n=14) of students. These students' decision-making logics were illustrated by low levels of both the effectual and causal approaches. Accordingly, they were not willing to revise their business ideas, try alternative business models, or conduct meaningful analysis. Similarly, their willingness to revise their strategies was low, and they stayed determinedly in the first vision of the business idea. Their entrepreneurial perceptions did not differ from those of the other students, but their passion for founding was the lowest among all the clusters. However, their passion for inventing and their perceived entrepreneurial identity were slightly higher than in the effectuation clusters.

The non-participant observation data of the selected students shows an increase in the understanding of each type of decision-making logic identified. Table 1 provides an overview of the student entrepreneurs whose decision-making and idea development were observed and followed up.

'Insert Table 1 here'

Mary's *effectual approach* was demonstrated by her openness to new ideas and endless suggestions to go forward. Mary was eager to change herself and her thinking and was absolutely unwilling to give up for whatever reason, even though the team faced a serious drawback: The generator of the idea left the team with her friend, and the rest of the multi-cultural team, two Peruvian students, was left without an idea and without natives familiar with the local business environment.

'This particular case illustrates how she was not willing to give up, although they had lost a team member.'

After this setback, Mary remained enthusiastic about the business idea, and their team even rapidly built a prototype for testing the idea in practice. Experimenting, learning, and curiosity about new people and ideas were clearly visible in her decision making, and she did not need to determinedly stay in the first version of their business idea. Even if

Mary was very flexible, although she was determined to develop their start-up, she seemed to identify herself not as an entrepreneur but more as an inventor crafting new ideas.

Wayne and his team had already come up with their idea when attending the course and they immediately started to plan implementation of the idea in the markets. He was positive that they had a winning idea, although it seemed they were merely discussing the solution—that is, the product or service—rather than the existing problem of their potential customers. Wayne's *causal approach* was demonstrated particularly by his goal-driven decision making when designing and planning business strategies.

'It seems that he and his group members are very determined, even dangerously determined, to achieve this goal.

Other students tried to ask whether there were enough customers in the market, but Wayne responded by listing all the places they could sell the equipment, ignoring the importance of actually asking potential customers whether they would buy the equipment It seems that the students are moving forward like a steam train'.

Wayne did not really struggle with what they should do next—he was constantly doing something to move towards the goal. Thus, he was highly passionate about founding a business during the course. To the observer, his decision making at some points seemed careless and sightless. Wayne and his team contacted various potential producers, all the way over in Germany, to find suitable suppliers for their business. He also presented some market analyses for the service, but it remained unclear whether markets for their idea really existed. Wayne attempted to understand how their product functioned in the markets but did not seriously find out whether there was enough demand among potential customers. He quite strongly identified himself as an entrepreneur capable of entrepreneurial actions. Accordingly, he continuously asserted that the venture creation process was relatively easy because they had such strong plans for achieving their goal.

Kate was very committed to the idea of her team and was passionate about developing it further. Due to her high levels of passion for inventing, it was devastating for her to learn that there already was a similar product in the markets abroad and on eBay. She really thought they had invented something unique. The team then decided to start importing the product. She was ready to change the original idea although the team had already made a preliminary three-dimensional (3D) model of the product. It seems that a good working spirit and good dynamics in Kate's team carried them forward in a challenging situation.

'The team members just got together in the kick-off meeting. Given that they did not know each other earlier, their group dynamics and team spirit are excellent'.

Kate's intensive work and her openness to new ideas, to changes in the venture idea, and to new team members demonstrated her flexibility and effectual approach. On the other hand, her straightforward actions to go ahead with the venture, albeit in a new format, demonstrated her causal approach, as she simply wanted to proceed towards the goal. It seemed that Kate's *hybrid approach* reflected her flexibility and openness to everything new as well as her desire to keep doing something to reach the set goal. Nonetheless, she seemed to identify herself more as an inventor than as an entrepreneur.

From the very beginning, William and his team seemed not too interested in the new venture creation process. William did not take the idea seriously at all, but he kept coming to the sessions. William spoke a lot but did not do anything.

'I wonder whether they are going to do anything or they are here just to collect easy credit points.'

There also seemed to be some problems related to personal chemistry among the team members. This was no surprise, as not everyone in the group wanted to cut classes as William wished to. William's *coping approach* was demonstrated by his doing nothing or doing very little in a committed manner as part of the new venture creation process. Despite his fairly low passion for founding the venture, he occasionally introduced new ideas to others, but they did not generate any feedback or actions. Therefore, neither the causal nor the effectual approach was identified. It was unclear how the team members were contributing, if at all, and the team dynamics did not encourage any engagement in the process.

The above analyses illustrate in a real-life context the different decision-making logics identified from the survey data during the first half of the course. Further analyses provided new insights on how students' decision-making logics changed during the latter half of the course.

Identifying and understanding transformations in decision-making logics

Students' decision-making logics were measured at the end of the course (T2) to find out whether any changes had taken place. Following the analyses conducted at T1, hierarchical clustering (Ward's method and squared Euclidean distance) was conducted to determine the number of clusters at T2. After fitting various cluster solutions, a two-cluster solution was selected, which was explored by comparing the values of causation and effectuation in both clusters against the sample average. In addition, perceived passion for inventing and founding as well as perceived entrepreneurial identity were measured at T2. The differences were analysed with t-tests. Based on the above, the clustered decision-making logics at T2 were labelled as follows:

Hybrid approach, representing 51 per cent (n=25) of students. As described at T1, this cluster emphasised both the effectual and the causal approach more than the others on average. Their perceived entrepreneurial identity was lower than in the coping approach cluster. With regard to passion for inventing and founding, the hybrid approach students also fell behind those emphasising the coping approach.

Coping approach, representing 49 per cent (n=24) of students. In this cluster, the decision-making logics had no remarkable emphasis on causation or effectuation. Still, at T2, these students perceived their entrepreneurial identity to be higher than that of students with the hybrid approach, and they considered entrepreneurship to be more feasible and desirable than did the students in the hybrid approach cluster.

An intriguing finding is that 'pure' causal and effectual approaches vanished during the course and that, at the end, all of the students followed either the hybrid or coping approach. The decision-making logics of some students clearly widened, as they did not apply only the causal or the effectual approach but rather indicated high levels of both approaches at the same time, that is, the hybrid approach. On the other hand, about half of the students reported using the coping approach without any emphasis on causation or effectuation. Interestingly, the survey data suggest that the students in the coping approach cluster possessed more favourable perceptions towards entrepreneurship than did the students in the hybrid approach cluster.

The non-participant observation data of the selected students revealed transformations from the four different identified approaches at T1 to the coping approach at T2. The observation data of the four selected students reveal patterns through which their decision-making logics transformed into the coping approach.

During the course, the selected students encountered several new situations and challenges that they needed to resolve. Among the observed students, Mary faced the most dramatic changes, but she was flexible enough to continue with the team's idea even though the idea generator had left the team. However, she was not able to solve the problem of having no native or local member with whom to work, and she therefore claimed to lack the necessary knowledge about the business environment. Although the team continued to have a good spirit, she had doubts about how to carry out the idea. She did not seriously try to solve the question about costs and incomes, for example, and claimed that she had no idea about the cost level of the country.

'As if they had given up, as they felt that it was so challenging to work without any natives'

Nonetheless, Mary continued the course by being present, actively doing her homework assignments, and maintaining contact with the other team member. Her focus shifted from new venture formation towards general learning. This shift in her learning was further verified from her learning diary, in which, towards the end of the course,

she emphasised general learning goals in terms of language and getting to know new people, rather than the new venture creation process.

Wayne's venture creation process progressed efficiently as the team pushed hard to get the business running. The team continued with the selected idea from the very beginning up to the end and did not bother tackling the questions of potential customers and their problems, for example. The plan was there just to be executed. At the end of the course, it was quite surprising that Wayne had more or less given up the venture creation process and that he was unwilling to proceed, even though he was still passionate about inventing new things and he considered entrepreneurship to be relatively feasible for him.

'I was told that team members were busy with their other projects and therefore had no time to finalise this one. As a consequence, the enthusiasm and activities died down'.

Kate had difficulties accommodating the new idea, and the team got stuck due to the lack of enthusiasm. It seemed that the original idea had changed too much and that Kate was not committed to eagerly going forward with the revised idea. Kate was still interested in making something happen and in finding new ways of moving the team's business idea forward. For instance, she organised a Facebook competition during the course but did not really progress with the new venture creation.

'She seems to want to secure the credit points of the course, and I also believe she is eager to learn all sorts of things, such as entrepreneurial behaviour for her future activities'.

William's activity in the new venture creation process was modest from the very beginning. He accomplished the tasks assigned during the course, but they were not done for the venture but rather for the course and the credit points. William still indicated passion for inventing and founding, and he identified himself strongly as an entrepreneur. His 'just passing the course' mentality may have reflected the unpleasant atmosphere of the team and its dynamics, as the team was not committed to working together towards anything.

'I can clearly see that there are some problems between the team members'.

Indeed, William's learning diary notes reveal his disappointment with the group, as he stated that he did not find anyone with whom he could have started up a venture and he therefore did not achieve his goals for the course.

In all, the observation data on the coping approach demonstrate that this decision-making logic hinders decision making and seems to generate stagnation in the entire new venture creation process. However, this does not necessarily

mean that no activities take place at all. Students may continue to be committed to the course and even to the team and may perform the related course assignments efficiently. Students may also still learn a lot about entrepreneurship and about themselves as entrepreneurs even though the venture creation process is put aside. These findings are based on the students' individual learning diaries. Challenges in team dynamics also appear to play a role in how students arrive at coping decision-making logics.

The 'paths' through which students' decision-making logics were transformed into the coping approach varied. In general, all of the studied students encountered challenges that they found difficult to solve. Mary, in particular, and perhaps even Wayne had doubts about how to move forward with the venture creation process. Mary's doubts stemmed from a lack of local knowledge, whereas Wayne's overconfidence at the beginning led to inflexibility and even ignorance. Kate was clearly unwilling to move on with the revised idea, as she was so in love with the first solution, but she wanted to maintain the good spirit of the team and continued with the joint activities. From the very beginning, William had decided to focus just on accomplishing the course, as he did not find the team relevant for his start-up purposes. The team also lacked an idea that could be developed further. In each case, the team-related issues need to be taken into consideration as well: Other members and the team dynamics clearly play a role in individual decision-making logics. In all, the analyses revealed three different routes to the coping approach: 1) *doubts in how to proceed*, 2) *unwillingness to proceed*, and 3) *unsatisfactory team dynamics* (Figure 1).

'Insert Figure 1 here'

Figure 1 summarises the findings on decision-making logics and their transformation during the new venture creation process in the studied EE setting. The patterns found in the analyses bridge the change from the four identified decision-making logics to the coping approach.

Discussion

The study explored *how students make decisions during their venture creation processes during an educational intervention* and *how and why the decision-making logics are transformed during the new venture creation process*. In response to RQ1, the findings showed that the students followed one of four types of decision-making logic—effectual, causal, hybrid, and coping—at the beginning of their venture creation process, each of which has specific characteristics that add to existing knowledge. Interestingly, this indicates that different forms of decision-making logic can be recognized before the actual outcomes of entrepreneurial effort are evident, and it sheds new light on the current

discussion on causation and effectuation, which leans on studies of expert entrepreneurs with existing entrepreneurial experiences (Sarasvathy, 2001; Dew *et al.*, 2009; Welter *et al.*, 2016). The findings also show the transformation of the decision-making logics during the new venture creation course. By the end of the course, the 'pure' causal and effectual approaches had vanished, and about half of the students did not emphasise the causal or effectual approach but instead indicated high levels of both approaches at the same time, making theirs a hybrid approach. The rest of the students reported the coping approach, without any emphasis on causation or effectuation, and, intriguingly, their new venture creation processes were stagnated. The study adds to existing knowledge by going beyond the traditional dichotomy of causation versus effectuation as well as of theory versus practice by demonstrating how different decision-making logics complement one another and change during the venturing process. The findings on the transformations in decision-making logics complement previous research suggesting that different contextual and temporal settings may be more suitable for either of the decision-making logics (e.g. Fisher, 2012; Mäkimurto-Koivumaa and Puhakka, 2013). For instance, effectuation may be more applicable when a business idea is still indeterminate or needs reformulation, but after the business idea is developed and more precisely defined, causation is incorporated to supplement effectuation (Berends *et al.*, 2014). Similarly, Mäkimurto-Koivumaa and Puhakka (2013) identified different behaviours and actions for causation and effectuation and suggested integrating them to support an effective entrepreneurial process. This resonates with the hybrid approach identified in this study.

In relation to RQ2, the study revealed three patterns through which students' individual decision-making logics were transformed to the coping approach, leading to the stagnation of the venturing process; *doubts about how to proceed*, *unwillingness to proceed*, and *unsatisfactory team dynamics*. Doubts about how to proceed were particularly visible in Mary's case, as her team would likely have benefitted from native team members clearly indicating what to do next, that is, adding a causal approach to complement Mary's effectual curiosity. Similar complementary decision making would have been useful in Wayne's case as well when the team became stuck with their winning idea and were not capable of finding new innovative ways of moving forward; that is, an effectual approach with fresh insights might have supported their venturing process. Unwillingness to proceed was demonstrated in Kate's case, as her mental attachment to her original idea prevented her from moving forward in full with the revised idea and venture despite her strong commitment to the team. Unsatisfactory team dynamics was clearly demonstrated in William's case, where unsatisfactory communication among team members and the presence of unsuitable team members for venturing purposes both prevailed. In all, the findings shed light on the reasons for transformation of the decision-making logics and suggest that nascent entrepreneurs are vulnerable to giving up in situations where they need to drastically change their business ideas or teams. This might take place especially when they think they have invented something really

innovative. By using qualitative research material to examine the processes that students go through (Gupta *et al.*, 2016; Langley, 1999), these findings shed light on why new venture creation processes are prolonged or disengaged. It is important to investigate this as most entrepreneurship research focuses on successful venturing processes, ignoring the ideas or ventures that have failed or faded away before launching (Davidsson, 2003; Yusuf, 2012).

Investigating decision-making logics in action in the context of an educational intervention (Reuber *et al.*, 2016), the study revealed interesting findings in terms of EE. Even if the venture processes came to a halt, this does not necessarily mean that the students did not progress at all: students with the coping approach remained committed to the course and some even to the business idea or to the team, and they performed their related assignments, making further learning possible. Although the students were not successful in new business creation, they reported other meaningful learning outcomes, such as language and social skills as well as taking the initiative as an entrepreneurial individual, indicating personal growth and increase in their human capital (see also Gedeon, 2014; Martin *et al.*, 2013).

Conclusion

Overall, the findings bring the entrepreneurship theories of causation and effectuation into the teaching of entrepreneurship, as suggested by Fayolle (2013). The study demonstrates the existence and nature of different decision-making logics during the new venture creation process and highlights how these decision-making logics transform during the entrepreneurial learning process. The study also shows the continuation of the learning process beyond new venture creation. As part of this transformation, decision-making logics change over time into different patterns that direct individuals towards coping decision-making logics, in which no causation or effectuation is emphasised. The study has several theoretical implications. The study demonstrated that different decision-making logics can be utilised based on different contextual and temporal settings and also that the approaches of both causation and effectuation can be used at the same time or can remain without emphasis. Contributing to literature on venture performance, the study also implies that the coping approach as a consequence of the three different patterns leads to venture stagnation. Interestingly, the findings suggest that even if students fail to produce the practical outcome of a new viable business, a start-up course with a particular start-up goal may produce other equally important learning outcomes. For example, the course produced enterprising individuals with better knowledge of entrepreneurship as a phenomenon. In addition, more general learning outcomes related to personal growth and human capital, rather than to entrepreneurship, were identified. This kind of complementarity in terms of pedagogy and learning are often present in EE (Thrane *et al.*, 2016).

Implications for policy and practice

In all, the patterns of transformation of the decision-making logics can be used in designing and implementing EE courses as well as in supporting nascent entrepreneurs. The study contributes by providing a wider view of the learning and transformation taking place at the individual student level. The findings emphasise that educators need to be sensitive to the different types of decision-making logics among students and to how a team can fully exploit individuals' causal and effectual approaches to better support new venture creation. Furthermore, different types of student assignments and methods used during the course may support the development of different decision-making logics and their combinations. For example, idea generation supports creativity and the effectual approach, whereas competitor analysis may encourage calculative thinking and the causal approach. Similarly, policy makers designing interventions supporting new venture creation need to be aware of the identified transformation patterns that lead to venture stagnation in order to better support nascent entrepreneurs by enhancing complementary decision-making logics to secure successful new venture creation processes.

Study limitations and further research

Despite its merits, the study has a number of limitations. One crucial limitation is related to the role of the team and team dynamics. Although previous research has pointed out that new venture creation takes place in teams (Reynolds and Curtin, 2008), this study focused on individual decision-making logics. The study of decision-making logics at the team level is a promising direction for future research. The findings indicate that the complementarity of team members and their different types of decision-making logics seem to be at the core of the venturing process. Similarly, Reuber *et al.* (2016) suggest extending the individual perspective to other levels of analysis when studying effectuation. Furthermore, team members may have conflicting perceptions of decision-making logics, providing another interesting direction for further research.

Moreover, applying the findings drawn from student start-ups (during a course) to real-life new venture creation should be done with caution. The stakes are clearly different: Students do not invest their savings in their ventures nor do they take out considerable loans to fund their processes. Accordingly, the commitment to the new venture and to the team may differ considerably from that in real-life cases. However, the venture processes of the students were not hypothetical class-room exercises: they took place in real markets and were therefore capable of producing relevant data and insights to the study.

Students participating in EE programmes also differ in their motivations and learning goals (Hytti *et al.*, 2010). Some may emphasise general learning and social networks, whereas others may really wish to find a good idea and

team for a genuine venture to be launched in the markets. These tend to affect the effort and decision-making logics of individuals during the programme as well as their learning and team performance in venturing, and it is consequently important to acknowledge the individual learning paths of the students (see Thrane *et al.*, 2016) and to take this into account when designing new EE programmes and interpreting the research findings. Investigating the role and influence of facilitators on EE outcomes is therefore another promising future research direction (Kozlinska, 2016).

Finally, an empirical assessment of this study revealed that the scale of effectuation (Chandler *et al.*, 2011: experimentation) did not fit well with the data. The construct validity assessment suggested that the internal consistency of the effectuation scale was low, which implies that all used items do not correlate enough with the latent variable. Even if the results indicated acceptable discriminant validity, these findings serve as a suggestion for future research to improve the scale of effectuation.

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