PLANNING THE UNKNOWN: THE SIMULTANEITY OF PREDICTIVE AND NON-PREDICTIVE ENTREPRENEURIAL STRATEGIES

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ABSTRACT

Two distinct approaches have emerged to categorize entrepreneurial strategies. While some argue that planning is beneficial for entrepreneurs, a growing body of literature argues that non-predictive strategies can also lead to successful outcomes. The effectuation framework gained attention and it is perhaps the most sophisticated theoretical framework to understand non-predictive strategies. In this paper, we investigate two of the effectuation principles and their relationship to firm performance. Based on an analysis of the business plans of 102 small firms, we find that both principles are comprised of two independent, orthogonal dimensions and that these dimensions affect firm performance differently. The implications are that future theorizing and research on entrepreneurship needs to go beyond the causation-effectuation dichotomy and that it is more fruitful to scrutinize the space of possible entrepreneurial strategies comprised by the various independent dimensions that make up the effectuation construct.

INTRODUCTION

Since its first publication in 2001 (Sarasvathy, 2001), the notion of effectuation has gained popularity within the field of entrepreneurship. There is an increasing amount of conceptual work done and also empirical studies have found their way into the journals (e.g., Chandler et al., 2009; Dew et al., 2009a; Goel & Karri, 2006; Read et al., 2009; Sarasvathy & Dew, 2005; Wiltbank et al., 2009). An important share of these studies focuses on the principles that comprise the effectuation construct. Principles such as the 'Pilot-in-the-plane principle' and the 'Bird-in-hand principle' are inductively grounded and rhetorically attractive. In some studies these principles are presented as dichotomies, thereby conceptualizing effectuation as the inverse of causation (Sarasvathy, 2001, 2008). Yet, at other places it is argued that the principles reflect multiple independent dimensions. Wiltbank et al. (2006; 2009), for example, argue and empirically demonstrate that prediction and control in the 'Pilot-in-the-plane' principle are independent orthogonal dimensions rather than two ends of a continuum. Consequently, they suggest four rather than two possible strategies for entrepreneurs to deal with environmental uncertainty.

Based on Wiltbank et al.'s observations it can be asked whether the same applies to the other effectuation principles. This brings up questions such as Can affordable loss and expected return go together? Can competitive analysis and collaboration be combined? Can entrepreneurs avoid and leverage contingencies? And can entrepreneurs be means-oriented and ends-oriented? This paper focuses on the last of these questions. Rather than taking means-orientation and ends-orientation as logical opposites, we consider them two independent dimensions. Along the same line as Wiltbank et al. (2006), we use this independence to sketch four possible entrepreneurial strategies to deal with means and ends.

THE DIMENSIONALITY OF EFFECTUATION AND CAUSATION PRINCIPLES

Effectuation is best characterized along five principles, labeled the 'Affordable loss principle', the 'Crazy quilt principle', the 'Lemonade principle', the 'Pilot-in-the-plane principle', and the 'Bird-in-hand principle' (Sarasvathy, 2008). This study focuses on the latter two. This focus is partially due to a methodological reason: our data are not suitable to study the other three dimensions. Yet, there are also more substantial reasons to study these two principles, for without them the essential distinction between causation and effectuation would disappear.

The Pilot-in-the-Plane principle expresses the extent to which entrepreneurs believe they can actively create the future rather than passively predicting it. The importance of this principle can be seen in Sarasvathy's definition of effectuation. At various places, she uses solely this principle to define effectuation as 'to the extent we can control the future, we do not need to predict it' and causation as 'to the extent we can predict the future, we can control it' (Sarasvathy, 2001, 2008). Also pivotal is the Bird-in-hand principle. It expresses whether entrepreneurs take means or ends as starting point for their actions. The primacy of either one over the other is a fundamental issue in understanding the nature of meaningful actions. It has kept sociologists, economists, and philosophers busy for decades. As the starting point for the effectual process, this principle is also indispensable to understand the distinction between causation and effectuation.

The Crazy quilt principle reflects building a network of self-selected stakeholders rather than engaging in competitive analysis. The relevance of this principle is that it moves the analysis from an isolated to a socially embedded entrepreneur (Granovetter, 1985), which co-develops his or her business together with others. As can be seen in the dynamic process model of effectuation (Sarasvathy & Dew, 2005), creating stakeholder commitments is the key mechanism through which the effectuation process operates. Through these commitments, new means and ends are created, thereby affecting the predictability and controllability of the venture's future. This means that any study of the *dynamics* of effectuation would require the inclusion of this principle. However, as our study is a static one based on initial business plans, we had to omit this principle.

The two remaining principles are less prominent in our view. The Affordable loss principle refers to investing based on what one can afford to lose rather than on an expected return. Hence, it is an investment strategy focused on control rather than on prediction. This makes it a specific case of the Pilot-in-the-plane principle. The same applies to the Lemonade principle. Its focus on embracing and leveraging surprises rather than avoiding them implies making use of available means rather than following predefined goals. This means this principle can be seen as a specific case of the Bird-in-hand principle. Hence, our conclusion is that both principles can be safely omitted without losing the essential character of the effectuation-causation distinction.

Opposing causation and effectuation along these five principles suggests the two approaches are dichotomous ends of a continuum. Sarasvathy (2008) points this out clearly when she argues "Effectuation is the inverse of causation". She admits that *empirically* the two approaches can go together, but that, *conceptually*, they should be considered as inverses. Further theorizing and research, though, has shown that the distinction between effectuation and causation is more complicated. At the measurement level, for example, Chandler et al. (2009) find that causation is a coherent uni-dimensional construct while effectuation is a formative multi-dimensional construct – and thus that effectuation is not 'simply' the inverse of causation. Furthermore, as mentioned above, Wiltbank et al. (2006) persuasively argue that, conceptually, prediction and control are orthogonal dimensions rather than two ends of a continuum. Based on these complications of the effectuation framework, we further analyze the Pilot-in-the-plane principle and the Bird-in-hand principle and develop our propositions below.

The Pilot-in-the-Plane Principle: Combining Prediction and Control

The Pilot-in-the-plane principle concerns how people take control of their future. While causal entrepreneurs rely on predictions, effectual entrepreneurs rely on non-predictive forms of control by focusing their attention on things they can directly influence. This principle represents how experienced entrepreneurs respond to Knightean uncertainty – fundamental uncertainty of which even the probability distributions are unknown and unknowable. Such uncertainty results from disruptive events, from the complexity of social systems, and from the unpredictability of how other actors will behave and respond.

Conceptualizing prediction and control as two ends of a continuum (Sarasvathy, 2001) suggests that entrepreneurs choose to either emphasize prediction or emphasize control. More recently though, prediction and control have been conceptualized as two independent orthogonal dimensions (Wiltbank, et al., 2006) and subsequent research suggests that the two are indeed independent (Read, et al., 2009; Wiltbank, et al., 2009). By separating the two dimensions, these authors propose that entrepreneurs use different combinations of prediction and control. Along that line they distinguish four entrepreneurial strategies.

Entrepreneurs following a *planning* strategy have a strong emphasis on prediction and a low emphasis on control. This strategy emphasizes systematic analysis and integrative planning and it has been historically the most dominant thinking. Entrepreneurs following an *adaptive* strategy have both a low emphasis on prediction and a low emphasis on control. This implies one must constantly learn and adapt to the changing environment. The basic principle of an adaptive strategy is the incrementalism of the 'Learning school' with Mintzberg as its main exponent. As opposed to the planning strategy, this strategy suggests organizations learn what to do by limiting the use of prediction, and instead use trial-and-error experimenting to capture new opportunities.

These first two strategies involve a low emphasis on control and focus on how the firm can position itself in response to the forces in the environment (Wiltbank, et al., 2006). The remaining two strategies assume a more proactive role of the entrepreneur in constructing the environment. Entrepreneurs following a *visionary* strategy combine a high emphasis on prediction with a high emphasis on control. This strategy emphasizes constructing an organization and its environment by imagining future possibilities and proactively making them a reality. The last strategy that Wiltbank et al. (2006) distinguish is *transforming.* This strategy is a creative, design-oriented strategy rooted in Simon's 'Sciences of the artificial' and March's 'technology of foolishness'. Entrepreneurs following this strategy have a low emphasis on prediction and a high emphasis on control. According to Wiltbank et al. (2006), this strategy is the same as effectuation.

While some evidence has been published that suggests prediction and control are indeed independent dimensions (Wiltbank, et al., 2009), we are not aware of any previous study that has explicitly analyzed these four strategies in practice. We therefore offer the following proposition:

> ***Proposition 1:*** *Prediction and control are independent dimensions of entrepreneurial strategies.*

The Bird-in-Hand Principle: Combining Means and Ends

The Bird-in-hand principle refers to the distinction between means-driven and ends-driven behavior. The causation approach starts with goals as a given. The basic decision for that approach is the decision on what means *should* be accumulated to achieve these goals. Effectuation, on the other hand, starts with means and focuses on the decision on what effect *can* be created given these means. Based on this focus on means, the effectuation approach starts by asking the questions of who I am, what I know and whom I know, rather than by a particular goal or opportunity (Sarasvathy & Dew, 2005). These questions refer to the entrepreneur's identity, their knowledge base, and their social networks as starting points for the entrepreneurial process (Sarasvathy, 2008). Extant research has primarily focused on the latter two. Examples are research

on the importance of prior knowledge (Shane, 2000) and social networks (Burt, 2000). Yet effectuation puts more emphasis on the role of the entrepreneur's identity. As Sarasvathy argues, using identity-based decision criteria allows entrepreneurs to take decisive action without having to order their preferences, even under conditions of Knightian uncertainty.

The extant effectuation literature sees a trade-off between means-based and end-based entrepreneurship and an iterative development of both over time. This, though, is a too restrictive view and we argue that the two are independent. As was the case for the relationship between control and prediction, a high emphasis on means need not be associated with a low emphasis on ends. In other words, entrepreneurs can be low means-oriented and at the same time low ends-oriented and they can be high means-oriented while simultaneously being high ends-oriented. Along the same line as above, the assumption of independent dimensions allows us to define four types of entrepreneurial strategies.

The first strategy is the *persistent* strategy. Entrepreneurs following this strategy are driven by future goals irrespective of the means they currently have. This is a goal-oriented approach to entrepreneurship in which entrepreneurs first make plans, after which they gather the necessary resources and as such build their business. This strategy is captured in Stevenson & Jarillo's definition of entrepreneurship: "The process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control" (Stevenson & Jarillo, 1990: 23).

A second strategy that entrepreneurs can follow is an *opportunistic* strategy. This strategy is neither tethered by strong goals nor by current resources. Rather, entrepreneurs following this strategy take advantage of opportunities they encounter. Obviously, this strategy relies on the notion of opportunities, which are "situations in which new goods, services, raw materials, markets, and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships" (Eckhardt & Shane, 2003: 336). This definition is revealing, because it expresses that opportunities are neither constrained by means nor by ends. The opportunistic strategy is prominently visible in the entrepreneurship literature that considers entrepreneurship to center on the recognition, evaluation, and exploitation of opportunities (Shane & Venkataraman, 2000).

In contrast with the opportunistic strategy is a *leveraging* strategy of entrepreneurship. Entrepreneurs following this strategy have a strong emphasis on means and ends. They have a clear idea of where to go with their firm while at the same time trying to leverage their current resources. This strategy links closely to Hamel & Prahalad's notions of 'strategy as stretch and leveraging' (Hamel & Prahalad, 1993), by which firms try to purposefully arrange and exploit their existing resources such that they benefit most from them.

The final strategy is a *bricolage* strategy. It involves a high emphasis on means and a low emphasis on ends. The notion of bricolage is a relatively recent contribution to the entrepreneurship literature made by Baker and colleagues (Baker, 2007; Baker et al., 2003; Baker & Nelson, 2005). Based on Lévi-Strauss's study of savage behavior, Baker and Nelson define it as "making do by applying combinations of the resources at hand to new problems and opportunities." (2005: 333). As this definition expresses, the emphasis is primarily on the resources at hand and less so on the ends. Of course this does not mean that entrepreneurs following a bricolage strategy are completely without goals. Yet, it does mean that the entrepreneurs are resourceful and adjust their goals to the available resources.

Along the same line as with the Pilot-in-the-plane principle, we are not aware of any previous study that has explicitly analyzed these four strategies empirically. Hence, our study intends to find out whether means-orientation and ends-orientation are indeed independent dimensions and thus whether these four strategies can be usefully distinguished. Therefore, we will test the following proposition:

Proposition 2: *Means-orientation and ends-orientation are independent dimensions in entrepreneurial strategies.*

ENTREPRENEURIAL STRATEGIES AND FIRM PERFORMANCE

While perhaps useful as typologies of entrepreneurial strategies, the relevance of the preceding analysis increases when it enables us to make more accurate predictions about other firm characteristics, such as firm performance. To demonstrate this relevance, we test whether these typologies can be used to predict one particular indicator of performance: firm growth. Theoretically, there is no simple explanation of whether an effectuation approach would lead to more growth than a causation approach or vice versa. Hence, Sarasvathy's claims about the effect of effectuation on the performance and growth of firm's and entrepreneurs have been modest and nuanced (see Chapter 6 of Sarasvathy, 2008). Yet the extant literature provides numerous studies in which predictions of firm performance and growth are made in relation to the four dimensions. From this literature we draw two further predictions below.

The Pilot-in-the-Plane Principle and Firm Growth

It has oftentimes been suggested that market information enhances performance (Kohli & Jaworski, 1990; Narver & Slater, 1990; Slater & Narver, 2000). Some empirical studies confirm this. Hart & Tzokas (1999), for example, found that market research has a positive effect on export sales. Similarly, Song et al. (2010) found that, regardless of market conditions, collecting market information has a positive effect on firm performance and Key et al. (2007) found it has a positive effect on sales growth. On the other hand, Diamantopoulos & Hart (1993; Hart & Diamantopoulos, 1993) found no relationship between using market information and firm performance and growth. Similarly, both Goll & Rasheed (1997) and Priem et al. (1995) found no direct significant relationship between rational decision-making and firm performance and growth. Hence, we must conclude that no indisputable effect of a predictive strategy on firm performance and growth has been established.

Studies within the effectuation discourse have found that control-based strategies lead to more, but smaller failures of new ventures but not to less 'big hits' (Dew et al., 2009b; Wiltbank, et al., 2009). The proclaimed reason for this is that entrepreneurs following a control-based strategy tend to under-invest initially but less so later on. Similar findings appear in Coff's (1999) study of firm acquisitions in uncertain industries. Yet, none of these studies provides evidence whether a control-based strategy leads to higher or lower performance or growth. Some indications that a control-based strategy leads to a better performance and growth can be found in Lane & Maxfields' (1996) case study of ROLM. Along that same line Kim & Mauborgne (2005) suggest that a 'blue ocean', control-based strategy can significantly enhance the performance and growth of firms.

The Bird-in-hand Principle and Firm Growth

The effect of a means-orientation and an ends-orientation on firm performance have oftentimes been investigated. Entrepreneurship literature has paid considerable attention to entrepreneurial intent (Bird, 1988) and its antecedents (Hmieleski & Corbett, 2006; Krueger et al., 2000), particularly with respect to the decision to start a new firm. It has been shown that entrepreneurs have very different reasons to start (Kolvereid & Isaksen, 2006) and that entrepreneurs differ in their growth intentions (Cassar, 2006; Dutta & Thornhill, 2008; Hmieleski & Corbett, 2006). Furthermore, it has been found that different reasons for starting a firm have no effect on growth (Birley & Westhead, 1994) and that a goal accomplishment emphasis has no effect on firm performance (Hansen & Wernerfelt, 1989). Yet, it has also been found that high-growth firm are more likely to maintain their initial product focus (Feeser & Willard, 1990; Siegel

et al., 1993) and that growth aspiration levels have a positive influence on firm growth (Greve, 2008). Also, Bourgeois (1985) found that goal diversity - not consensus - is positively and significantly related to firm growth. These various contradictory findings imply that there is no clear relationship between an ends-orientation and firm growth.

While the findings on prediction, control, and ends-orientation have been inconclusive, there is strong evidence though, that a means-based strategy does have a positive effect on firm growth. Some studies only find a small positive (Unger et al., 2009) or insignificant negative effect (Haber & Reichel, 2007). However, the majority of studies establish a clear positive effect. Colombo & Grilli (2005, 2010), for example, found that founders' industry related knowledge and skills are a fundamental ingredient of the growth of new technology-based ventures. Similarly, Siegel et al. (1993) and Feeser & Willard (1990) found that firms based on previous experience grow larger than firms not based on existing experience. Furthermore, Florin et al. (2003) found that social capital leverages the productivity of a venture's resource base and Bradley et al. (2010) showed that resource slack enhances firm growth. Finally, within the realm of effectuation research, both Wiltbank et al. (2009) and Read et al. (2009) found a significant positive relationship between a means-orientation and firm growth.

Propositions

While adding contingency variables such as market uncertainty and experience (cf. Sarasvathy, 2008) may certainly help, doing so lies outside the scope of this paper. As our intention is to demonstrate the relevance of the typologies of strategies, we do limit ourselves here to studying the direct relationships. Considering that most of the findings above are either positive or insignificant, the only warranted inference we can draw at this point is that entrepreneurs who combine prediction and control and entrepreneurs who combine a means-orientation with an ends-orientation, will grow larger than entrepreneurs who do neither. Accordingly, our two final propositions read:

Proposition 3: *Firms with a high emphasis on prediction and control in entrepreneurial strategy will grow larger than firms with a lower emphasis on either prediction and control*

Proposition 4: *Firms with a high emphasis on means and ends in entrepreneurial strategy will grow larger than firms with a low emphasis on either means and ends*

RESEARCH METHODS

Our research context is one of the oldest incubation programs in Europe. Managed by the University of Twente, the Netherlands, the TOP program (Temporary Entrepreneurial Positions) started in 1984 and supported so far more than 400 entrepreneurs spanning more than 25 years. The program is a light incubation program. It consists of an interest-free loan as well as provision of business support services such as coaching and access to a network of professional contacts. Furthermore, entrepreneurs are linked to a research group of the University where their idea is assessed and where they receive support in bringing it to the market. The TOP program has already been studied in the context of academic entrepreneurship in Europe. One of the requirements of the TOP program is the presentation of a written BP. This means that these BPs do not necessarily rely solely on planning but rather provide with a snapshot of the entrepreneurial strategy. Until 2009, the TOP program had supported more than 400 entrepreneurs and helped creating more than 300 companies. Our entire database counts more than 15,000 pages of data such as written BPs and further evidence of incubation activities (intermediate reports, CV, etc.). For this research, we analyzed 102 BPs of companies established between 1990-2005.

Measures

Firm Performance. Measuring performance of emerging firms has always been problematic in entrepreneurship research. A common source of concern is that small firms might have different objectives than large corporations and therefore indicators such as financial ratios might not measure performance. Also, it has been argued that performance indicators might not be the same across industries or firm development stage. For example, profitability might not be the main goal of an emerging venture struggling to survive and trade in a new competitive market. In this study, we chose to measure performance using firm size measured in full time employees. Far from ideal, this measure is widely used in entrepreneurship studies. We selected companies established before 2005 and, as a result, firm size reflects at least four years of growth. The companies in our sample are young (average age = 8.94 years; standard deviation = 5.212), which alleviates possible bias emerging from using employment as proxy for performance.

Effectuation and Causation Principles. We built on previous empirical work on effectuation (Chandler, et al., 2009; Dew, et al., 2009a; Wiltbank, et al., 2009) to derive our measures. The distinction between prediction and control must embody the extent to which entrepreneurs rely on predicting the future to position their venture or, alternatively, sets out to control and create a market in which is possible to trade. In this light, we use the presence of market research in the written BP as a measure of *prediction* in the entrepreneurs' strategy (dichotomous variable). If entrepreneurs perform market research in their business plans this is a clear sign that they rely somehow on prediction to start trading; conversely, if no market research is present, this translates to an intentional lack of interest to research any markets in which to trade. Along that line, we use the extent to which the business idea is to be traded in a new market as a measure of *control*. If an entrepreneur is setting out to create a new market with his/her products, this means that a certain degree of control is present (Dew, et al., 2009a). On the other hand, entering existing markets denotes less desire of controlling the market but rather conquering a certain share of an existing market. We used a four-point scale to capture the extent to which the market is entirely new or consists of a niche of an existing market.

The distinction between means and ends approximates the extent to which entrepreneurs base their strategy on a defined goal or, alternatively, rely on the existing means to build their venture. As such, we use the extent to which the business idea is based on the entrepreneur's experience as a measure of *means-based* strategy using a five-point scale. This concurs with Dew et al. (2009a) who analyzed the number of times an entrepreneur drew on personal experience as a measure of a means based strategy. Growth intention was utilized to measure an *ends-based* strategy using a four-point scale. Since our context is a business incubator established to support young entrepreneurs to start their business, growth intention measures, in this case, the extent to which entrepreneurs focus on a given end to their venture.

Control variables. We included several control variables relevant in the context of entrepreneurship and effectuation research. We measured the *total amount of pages of the written BPs* to assess whether the common assumption that business plan length is an indicator of the extent of planning was correct. Also, we compared the *start-up experience* of the entrepreneurs, as effectuation is an approach often ascribed to experienced entrepreneurs (Sarasvathy, 2001, 2008). Finally, we measured *current age of venture* as age, since it has been suggested that the role of effectuation and causation in a firm changes over time (Dew, et al., 2009b; Sarasvathy, 2008). Descriptive statistics of all variables are presented in Table 1.

Insert Table 1 about here

Coding

We developed a coding scheme to measure the independent and the control variables in the BP contents. The scheme was tested initially in a pilot set of 15 BPs and improved according to the differences found between coders. Subsequently, each BP was analyzed independently by two coders. Inter-rater reliability was assessed by the weighted kappa coefficient, a correlation that corrects for the degree of convergence between raters that would be expected by chance. We obtained kappa values ranging from 0.682 to 0.957 for the applicable items, suggesting concordance between coders to be good to excellent (Fleiss, 1981).

RESULTS

The Pilot-in-the-Plane Principle: Prediction and Control

We started our analysis by plotting all companies in a two-by-two matrix according to our variables. As the levels high and low are arbitrary and literature has not been clear about this, we separated our companies using the average value of each variable computed for the whole sample. Companies with high levels of control are those whose products or services are to be traded in newer markets; similarly, companies with high levels of prediction are those showing market analysis in their BPs (dichotomous variable) (Figure 1).

Insert Figure 1 about here

The results show that indeed four categories in which different combinations of level of prediction and control are used can be distinguished. This confirms Proposition 1 – that prediction and control are independent dimensions. Although a majority of the companies in our sample is starting their ventures using an adaptive approach (43%), significant portions of companies describe different approaches in their BPs. Further, non-parametric independence tests show that companies falling in those categories also have statistically significant differences in other dimensions of effectuation constructs as well as in performance (Table 2).

Insert Table 2 about here

When we turn our attention to the results in terms of effectuation and causation dimensions we observe that:

- Adaptive companies are defined by low levels of control and prediction. These 44 companies are also shown to have the lowest growth intention in our sample (2.59). Yet a significant share of these entrepreneurs had experienced in starting businesses at the time of inception (20%). The length of their BPs is moderate (18.20 pages).
- Visionary companies are defined by high levels of both control and prediction. These 15 entrepreneurs were the most experienced in starting up businesses (33%). Their growth intention is also the highest found (3.47) as well as the length of BPs (25.47 pages).
- Planning companies are defined by low levels of control together with high levels of prediction. Interestingly, these 17 entrepreneurs are *not* the ones with the longest BPs (17.41 pages). Also, those are not the most experienced in starting businesses at the time of inception (6%) and their growth intention is moderate (3.00).
- Transformative companies are defined by low levels of prediction combined with high levels of control, the main tenet of the Pilot-in-the-plane effectuation principle. Surprisingly, these are the less experienced entrepreneurs; only about 8% had experienced in starting businesses at the time of inception. Further, their growth intention is moderate (3.08) and their BPs are the shortest of all (14.31 pages).

In terms of performance, these results suggest that planning companies are the ones growing most (to 10.35 employees on average). This rejects Proposition 3 and suggests that emphasizing prediction rather than control leads to superior firm performance. Also, the results also show that the adaptive strategy (low control, low prediction) does not lead to the smallest firms. Strikingly, we find that transformative companies are the smallest in our sample (5.00 employees on average). Both visionary and adaptive companies show intermediate numbers of employees, 8.73 and 8.48 on average, respectively.

The Bird-in-hand Principle: Means and Ends

Similarly to the Pilot-in-the-Plane principle analysis, we started by plotting a two-by-two matrix to visualize the high and low levels of means and ends-orientation. Companies with a high means orientation are those basing their ideas in past experience above average while those showing high levels of ends orientation are those with above average growth intention (Figure 4).

Insert Figure 4 about here

Our results confirm Proposition 2, showing that means-orientation and ends-orientation are independent dimensions and thus that the four strategies based on combinations of high and low levels of means and ends approaches can indeed be distinguished. Despite the majority of firms using a leveraging strategy (44%), significant shares of companies use other alternative strategies. As seen above for the Pilot-in-the-Plane principle, non-parametric independence tests show differences between companies, also statistically in terms of their performance (Table 3).

Insert Table 3 about here

In terms of effectuation and causation dimensions, we see that persistent companies are the ones more likely to do market research (56%). Conversely, bricolage companies are the ones less likely to execute market research (15%). About a quarter of leveraging companies perform any kind of market analysis (27%) while only a fifth of opportunistic companies does so (20%).

In terms of performance, our results indicate that leveraging companies are the ones which grow more (9.00 employees on average). This confirms our Proposition 4 while providing evidence that opposing means and end based approaches is incorrect. In our sample, entrepreneurs using both means and ends based approaches show superior performance in terms of size of companies. Conversely, opportunistic companies are the ones growing less (1.80 employees on average. Bricolage companies grow a bit more than persistent companies (8.40 and 8.11 employees), yet both take intermediate positions between the leveraging and opportunistic strategies. This finding is as expected, thereby providing a further confirmation of Proposition 3.

DISCUSSION AND CONCLUSION

The main result of our study is a confirmation of the orthogonality of effectual and causational entrepreneurial strategies. We empirically confirm Wiltbank et al.'s (2006) theoretical insight about the existence of four strategies based on different combinations of control and prediction usage levels. Furthermore, we advance literature suggesting the same applies to another effectual principle – the Bird-in-hand principle – which typically opposes means and ends based approaches. We provide empirical evidence confirming the existence and relevance of those four strategies. Taken together, these results provide further evidence that causational and effectual dimensions are independent (cf. Wiltbank, et al., 2009).

We furthermore show that the orthogonality of effectual and causational dimensions is relevant with respect to firm performance. Our data suggests a link between the combination of

means and ends, and prediction and control, to performance. We found that *planning* and *leveraging* companies are the ones growing more. This implies that using high levels of prediction, means and ends combined with low levels of control is the strategy that most likely will lead to superior performance. It also suggests that neither causation nor effectuation driven strategies are the most effective.

This study is not without limitations. We analyzed data based on the contents of BPs written prior to entry in an incubation program. As these were written years before we conducted our study, our measures were not ideal. Yet they largely corresponded to measures earlier used in effectuation research (Chandler, et al., 2009; Dew, et al., 2009a; Dew, et al., 2009b; Wiltbank, et al., 2009). Furthermore, the advantage of BPs is that these are written prior to starting the firm and thereby leave no ambiguity with respect to the causal direction between the principles and firm performance. The measurement of our independent variable was limited to a single indicator, firm size in full-time equivalent employees. As such, we cannot claim an effect of effectuation principles on firm performance in general. Yet, as our intention was showing the two typologies matter with respect to performance rather than to fully predict performance, this limitation should not have influenced our primary conclusions. Finally, our sample was comprised of small and medium sized firms only and contained only firms that participated in the TOP program. Hence, we cannot make any generalizations to a wider population of firms with respect to the number of firms that follow a particular strategy. However, since we find significant variety within this rather homogenous sample, our expectation is that our conclusions will even be stronger once firms of different sizes and origin will be studied. Hence, we conclude that, despite their influence, these limitations should not have affected the main outcomes of this study.

Finally, our study has some implications for practice. The two typologies of entrepreneurial strategies may help practitioners to decide on their current and future strategies. These typologies can enable practitioners to understand the strategy they are following and evaluate whether it is the most appropriate strategy. Furthermore, by linking these strategies to firm growth, our study may help practitioners to signal whether their strategy is likely to be successful or not. For example, our observation that the transformative and opportunistic strategies turned out to lead to the smallest firms, may lead practitioners following such strategies to reconsider these.

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REFERENCES

Baker, T. (2007). Resources in play: Bricolage in the Toy Store(y). *Journal of Business Venturing, 22*(5), 694-711.

Baker, T., Miner, A. S., & Eesley, D. T. (2003). Improvising firms: bricolage, account giving and improvisational competencies in the founding process. *Research Policy, 32*(2), 255-276.

Baker, T., & Nelson, R. E. (2005). Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Administrative Science Quarterly, 50*(3), 329-366.

Bird, B. (1988). Implementing Entrepreneurial Ideas: The Case for Intention. *Academy of Management Review, 13*(3), 442-453.

Birley, S., & Westhead, P. (1994). A Taxonomy of Business Start-up Reasons and Their Impact on Firm Growth and Size. *Journal of Business Venturing, 9*(1), 7-31.

Bourgeois, L. J., III. (1985). Strategic Goals, Perceived Uncertainty, and Economic Performance in Volatile Environments. *The Academy of Management Journal, 28*(3), 548-573.

Bradley, S. W., Wiklund, J., & Shepherd, D. A. (2010). Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth. *Journal of Business Venturing, In Press, Corrected Proof*.

Burt, R. S. (2000). The Network Entrepreneur. In R. Swedberg (Ed.), *Entrepreneurship: The Social Science View*. Oxford: Oxford University Press.

Cassar, G. (2006). Entrepreneur opportunity costs and intended venture growth. *Journal of Business Venturing, 21*(5), 610-632.

Chandler, G. N., DeTienne, D. R., McKelvie, A., & Mumford, T. V. (2009). Causation and effectuation processes: A validation study. *Journal of Business Venturing, In Press, Corrected Proof*.

Coff, R. W. (1999). How Buyers Cope with Uncertainty when Acquiring Firms in Knowledge-Intensive Industries: Caveat Emptor. *Organization Science, 10*(2), 144-161.

Colombo, M. G., & Grilli, L. (2005). Founders' Human Capital and the Growth of New Technology-Based Firms: A Competence-Based View. *Research Policy, 34*(6), 795-816.

Colombo, M. G., & Grilli, L. (2010). On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. *Journal of Business Venturing, 25*(6), 610-626.

Dew, N., Read, S., Sarasvathy, S. D., & Wiltbank, R. (2009a). Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *Journal of Business Venturing, 24*(4), 287-309.

Dew, N., Sarasvathy, S. D., Read, S., & Wiltbank, R. (2009b). Affordable loss: behavioral economic aspects of the plunge decision. *Strategic Entrepreneurship Journal, 3*(2), 105-126.

Diamantopoulos, A., & Hart, S. (1993). Linking market orientation and company performance: preliminary evidence on Kohli and Jaworski's framework. *Journal of Strategic Marketing, 1*(2), 93.

Dutta, D. K., & Thornhill, S. (2008). The evolution of growth intentions: Toward a cognition-based model. *Journal of Business Venturing, 23*(3), 307-332.

Eckhardt, J. T., & Shane, S. A. (2003). Opportunities and entrepreneurship. *Journal of Management, 29*(3), 333.

Feeser, H. R., & Willard, G. E. (1990). Founding Strategy and Performance: A Comparison of High and Low Growth High Tech Firms. *Strategic Management Journal, 11*(2), 87-98.

Fleiss, J. L. (1981). *Statistical methods for rates and proportions*. New York, NY: Wiley.

Florin, J., Lubatkin, M., & Schulze, W. (2003). A Social Capital Model of High-Growth Ventures. *Academy of Management Journal, 46*(3), 374-384.

Goel, S., & Karri, R. (2006). Entrepreneurs, Effectual Logic, and Over-Trust. *Entrepreneurship: Theory & Practice, 30*(4), 477-493.

Goll, I., & Rasheed, A. M. A. (1997). Rational Decision-Making and Firm Performance: The Moderating Role of Environment. *Strategic Management Journal, 18*(7), 583-591.

Granovetter, M. S. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology, 91*(3), 481-510.

Greve, H. R. (2008). A behavioral theory of firm growth: Sequential attention to size and performance goals. *The Academy of Management Journal (AMJ), 51*(3), 476-494.

Haber, S., & Reichel, A. (2007). The cumulative nature of the entrepreneurial process: The contribution of human capital, planning and environment resources to small venture performance. *Journal of Business Venturing, 22*(1), 119-145.

Hamel, G., & Prahalad, C. K. (1993). Strategy as Stretch and Leverage. *Harvard Business Review*(March-April), 75-84.

Hansen, G. S., & Wernerfelt, B. (1989). Determinants of Firm Performance: The Relative Importance of Economic and Organizational Factors. *Strategic Management Journal, 10*(5), 399-411.

Hart, S., & Diamantopoulos, A. (1993). Marketing research activity and company performance: Evidence from manufacturing industry. *European Journal of Marketing, 27*(5), 54-72.

Hart, S., & Tzokas, N. (1999). The Impact of Marketing Research Activity on SME Export Performance: Evidence from the UK. *Journal of Small Business Management, 37*(2), 63-75.

Hmieleski, K. M., & Corbett, A. C. (2006). Proclivity for Improvisation as a Predictor of Entrepreneurial Intentions. *Journal of Small Business Management, 44*(1), 45-63.

Keh, H. T., Nguyen, T. T. M., & Ng, H. P. (2007). The effects of entrepreneurial orientation and marketing information on the performance of SMEs. *Journal of Business Venturing, 22*(4), 592-611.

Kim, W. C., & Mauborgne, R. (2005). *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant*. Boston, US: Harvard Business School Press.

Kohli, A. K., & Jaworski, B. J. (1990). Market orientation: the construct, research propositions, and managerial implications. *The Journal of Marketing, 54*(2), 1-18.

Kolvereid, L., & Isaksen, E. (2006). New Business Start-up and Subsequent Entry into Self-Employment. *Journal of Business Venturing, 21*(6), 866-885.

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing Models of Entrepreneurial Intentions. *Journal of Business Venturing, 15*, 411-432.

Lane, D., & Maxfield, R. (1996). Strategy under complexity: Fostering generative relationships. *Long Range Planning, 29*(2), 215-231.

Narver, J. C., & Slater, S. F. (1990). The Effect of a Market Orientation on Business Profitability. *The Journal of Marketing, 54*(4), 20-35.

Priem, R. L., Rasheed, A., & Kotulic, A. G. (1995). Rationality in strategic decision processes, environmental dynamism and firm performance. *Journal of Management, 21*(5), 913.

Read, S., Song, M., & Smit, W. (2009). A meta-analytic review of effectuation and venture performance. *Journal of Business Venturing, 24*(6), 573-587.

Sarasvathy, S. D. (2001). Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *Academy of Management Review, 26*(2), 243-263.

Sarasvathy, S. D. (2008). *Effectuation: Elements of Entrepreneurial Expertise*. Cheltenham, UK & Northampton, MA, USA: Edward Elgar.

Sarasvathy, S. D., & Dew, N. (2005). New Market Creation through Transformation. *Journal of Evolutionary Economics, 15*, 533-565.

Shane, S. (2000). Prior Knowledge and the Discovery of Entrepreneurial Opportunities. *Organization Science, 11*(4), 448-469.

Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review, 25*(1), 217-226.

Siegel, R., Siegel, E., & Macmillan, I. C. (1993). Characteristics distinguishing high-growth ventures. *Journal of Business Venturing, 8*(2), 169-180.

Slater, S. F., & Narver, J. C. (2000). The Positive Effect of a Market Orientation on Business Profitability: A Balanced Replication. *Journal of Business Research, 48*(1), 69-73.

Song, M., Wang, T., & Parry, M. E. (2010). Do market information processes improve new venture performance? *Journal of Business Venturing, 25*(6), 556-568.

Stevenson, H. H., & Jarillo, J. C. (1990). A Paradigm of Entrepreneurship: Entrepreneurial Management. *Strategic Management Journal, 11*, 17-27.

Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2009). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing, In Press, Corrected Proof*.

Wiltbank, R., Dew, N., Read, S., & Sarasvathy, S. D. (2006). What to Do Next? The Case for Non-Predictive Strategy. *Strategic Management Journal, 27*(10), 981-998.

Wiltbank, R., Read, S., Dew, N., & Sarasvathy, S. D. (2009). Prediction and control under uncertainty: Outcomes in angel investing. *Journal of Business Venturing, 24*(2), 116-133.

Figure 1: Schematic Representation of Different Strategies in Terms of Prediction and Control Usage

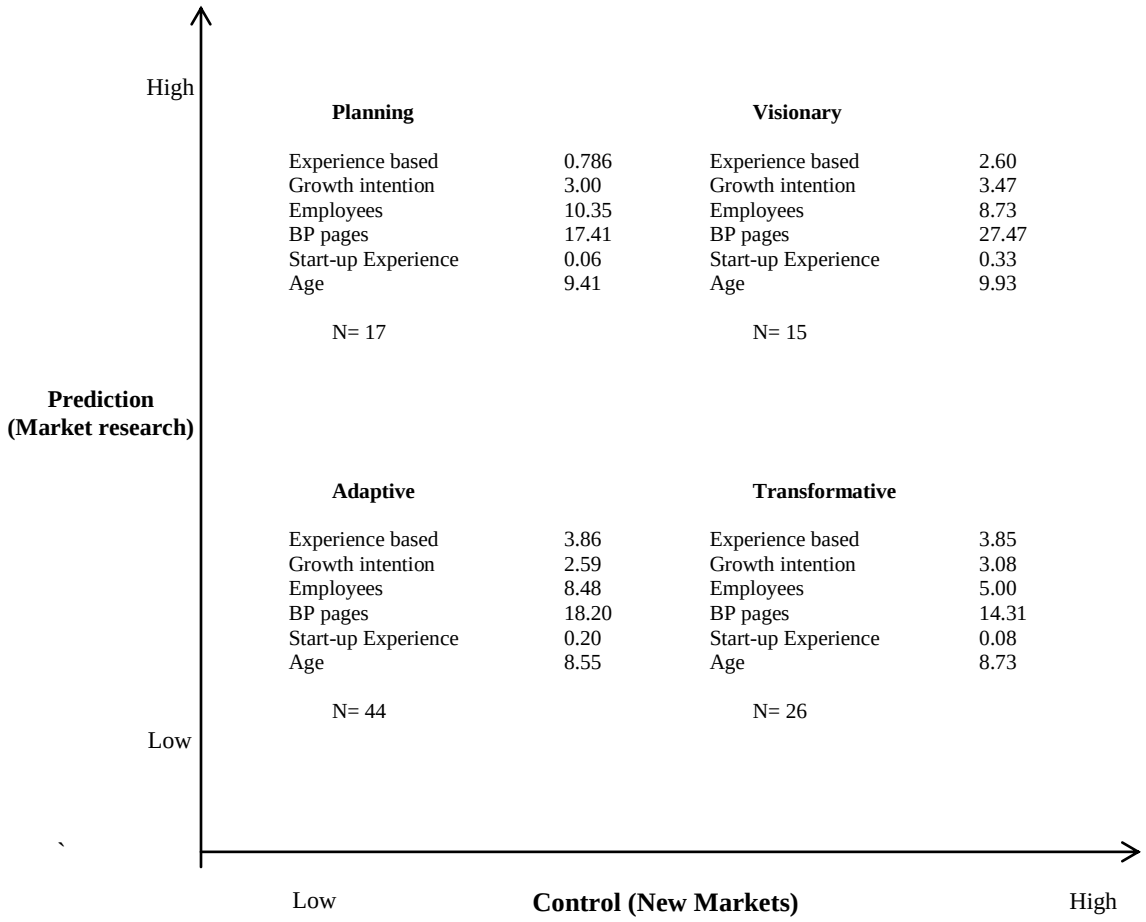

Figure 2: Schematic Representation of Different Strategies in Terms of Means and Ends Orientation

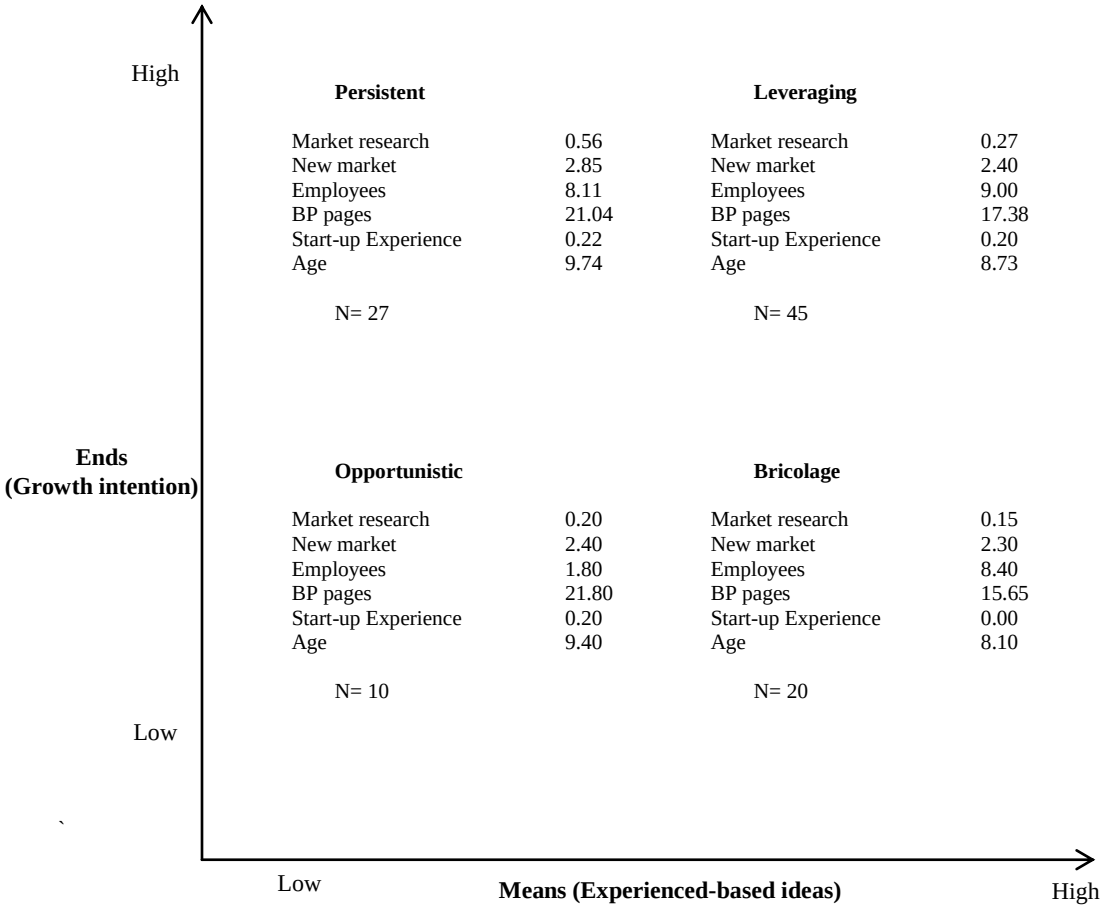

Table 1 Descriptive statistics

Construct	Variable	Mean	Minimum	Maximum	S.D.
Prediction	Market research	0.31	0,00	1,00	0.466
Control	New market	2.50	0,00	3,00	0.755
Means	Experienced based ideas	3.64	1,00	5,00	1.209
Ends	Growth intention	2.91	1,00	4,00	0.924
Performance	Employees	7.94	0,00	55,00	10.072
Controls	BP pages	18.44	2,00	60,00	11.868
	Start-up Experience	0.17	0,00	1,00	0.375
	Age	8.94	0,00	25,00	5.212

N=102

Table 2 Descriptive statistics per group of prediction and control combinations and non-parametric independence test results (Kruskal-Wallis test)

Variable	Adaptive (N=44)	Transformative (N=26)	Visionary (N=15)	Planning (N=17)	p-value
Experienced based	3.86	3.85	2.60	0.786	≤ 0.05
Growth intention	2.59	3.08	3.47	3.00	≤ 0.05
Employees	8.48	5.00	8.73	10.35	n.s.
BP pages	18.20	14.31	27.47	17.41	≤ 0.10
Start-up Experience	0.20	0.08	0.33	0.06	≤ 0.10
Age	8.55	8.73	9.93	9.41	n.s.

Table 3 Descriptive statistics per group of means and ends combinations and non-parametric independence test results (Kruskal-Wallis test)

Variable	Opportunistic (N=10)	Bricolage (N=20)	Leveraging (N=45)	Persistent (N=27)	p-value
Market research	0.20	0.15	0.27	0.56	≤ 0.05
New market	2.40	2.30	2.40	2.85	≤ 0.10
Employees	1.80	8.40	9.00	8.11	≤ 0.10
BP pages	21.80	15.65	17.38	21.04	n.s.
Start-up Experience	0.20	0.00	0.20	0.22	n.s.
Age	9.40	8.10	8.73	9.74	n.s.