

A Model of the Discovery, Assembly, and Viability of Entrepreneurial Opportunities

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1. Introduction

Theorizing about entrepreneurship creates some of the most interesting conceptual and philosophical predicaments in the domain of business studies. Some of the most knotty issues in entrepreneurship theory concern the conceptualization of entrepreneurial discovery and opportunities. The current understanding holds that opportunities constitute one of the most basic elements of entrepreneurship (Shane & Venkataraman, 2000). On these grounds, some scholars see opportunities as a way to distinguish entrepreneurship from other areas of research because they are conceptually distinct as a unit of analysis (Eckhardt & Shane, 2003). The advent of an opportunity-based approach (OBA) has thus begun but the formal articulation is in its early stages (Murphy & Marvel, 2007). What is missing is a broader conceptual framework of entrepreneurship that is congruent with the OBA.

The OBA emphasizes the nature of opportunities that evolve into business ventures in ways that do not make much sense in other research areas. Within entrepreneurship, contributions based on established theory from other areas continue to appear in entrepreneurship journals. Indeed, areas such as psychology, sociology, and strategy have good reason to focus on entrepreneurship. By most accounts, this growing area enjoys strong practical relevance to contemporary business and society. Its research questions are enticing because of the ease with which they admit theory and models from other areas. If one examines recent volumes of entrepreneurship journals, one sees that models from strategy, marketing, psychology, and sociology all seem to have a place. An eclectic nature brings conceptual

richness to entrepreneurship. However, it also fosters reliance on imported theory and brings a lack of depth and distinctiveness to the research.

Attempts to build distinct theory are rare in the entrepreneurship's top journals. Instead, ideas not endogenous to the area marginalize theory development by masking what is unique and novel about entrepreneurship. Entrepreneurship begs unique questions. For instance, how do discovered opportunities open the way to new ones? How is error positive and foundational to new discoveries? Unfortunately, such questions are out of bounds for theory from other areas or run counter to the assumptions of those areas. For instance, the industrial organization paradigm, which is instrumental to strategy research, is oriented toward the elimination of error and maximization of efficiency. However, entrepreneurship scholars know that 90% of opportunities either fail or evolve substantially from their initial form. Error and waste are thus critical in certain ways. Entrepreneurship research seems fanciful when based directly on human creativity theory, the resource-based view, or other external models because entrepreneurial phenomena are different from the phenomena those models were originally intended to explain.

This paper offers a discovery-assembly-viability framework that emphasizes error and is distinct to entrepreneurship. The framework also provides context for concepts from other areas. It engages ontological issues facing entrepreneurship research such as the knowledge problem and the nature of opportunities. The OBA can help engage these peculiar issues in ways other research approaches cannot with bolder theoretic angles around the role of opportunities.

2. Background

Entrepreneurship is a research area in the domain of management. It examines the process by which opportunities for the creation of markets for new products and services are recognized, pursued, and exploited via the foundation and growth of new ventures (Shane &

Venkataraman, 2000). This definition does not necessarily include or exclude the creation of a new firm, nor does it require that the same person or firm engage in all parts of the process (Eckhardt & Shane, 2003). Entrepreneurship begins with the discovery of opportunities, which are temporal and spatial convergences of various resources instrumental to introducing market offerings with potential for generating financial capital or other kinds of positive value (Casson, 1982; Murphy & Marvel, 2007; Shane & Venkataraman, 2000).

One stream of research emphasizes opportunities when examining entrepreneurial phenomena. These studies reflect a set of assumptions distinct to entrepreneurship (e.g., Chandler, DeTienne, & Lyon, 2003; Dimov, 2003; Eckhardt & Shane, 2003; Murphy & Marvel, 2007; Murphy & Shrader, 2004). Whereas other research areas are limited to emphasizing individuals, firms, and aspects of the environment, this stream holds that entrepreneurial activity originates from, transpires, and rotates more evenly around opportunities than people or firms (Eckhardt & Shane, 2003; Jacobson, 1990; Kirzner, 1997; Murphy, 2004). The promise of a novel paradigm accompanies the approach (Shane & Venkataraman, 2000; Venkataraman, 1997; Yates, 2000).

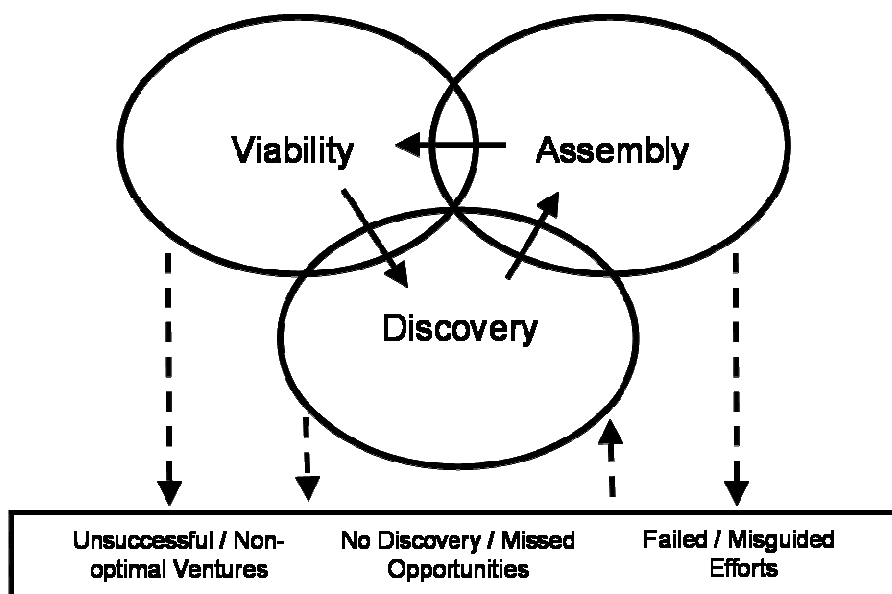
One of the most unique aspects of the OBA is its treatment of error. Error, in entrepreneurship contexts, comes in many different forms that are not always negative. For instance, the degree to which venture plans are not realized constitutes error, but these inefficiencies usually open the way for new prospects. Unintended consequences are a kind of error that can be valuable because it leads to new opportunities for the same firm or other firms (McGrath, 1999). In this dynamic context, person-centric characteristics are not reliable explananda because it seems that many different kinds of people recognize many different kinds of opportunities. The logic also applies to firms: many different kinds of firms can incur many

different kinds of opportunities. On these grounds, a crosshatched and evolutionary domain frustrates traditional approaches emphasizing the nature of people or firms as antecedents of discovery.

3. Discovery, Assembly, and Viability

An opportunity brings who, what, where, and when together. It subsumes the right knowledge, in the right place, at the right time. Thus, research questions in the tradition of the OBA do not emphasize people or firms because knowledge transcends those factors. Because opportunities and serendipity are basic, the OBA regards error as an underpinning of discovery. Error is instrumental to discovery at any stage of the entrepreneurial process. Figure 1 presents the DAV framework, which entails discovery, assembly, and viability stages and a foundational error component.

Figure 1
The DAV Framework



Independent instances of the DAV process can operate concurrently within or across entrepreneurs or ventures. This transcendence aspect is important. It means that different people can participate in or exit the process, and that a discovery emerging from some inefficiency can

be co-opted by the firm created that inefficiency or by a different firm. Yet, the basic character of the phenomenon maintains itself. In other words, the framework is concerned with opportunities and does not confine itself to the limits of people or firms. This aspect is a point of differentiation from person or firm-centric theory in other areas. The discovery, assembly, and viability components overlap to indicate that there are not clear demarcations across stages.

Unlike most process models of entrepreneurship, the DAV framework is not deterministic or teleological with respect to a definite end-point. Its non-recursive nature reflects an ongoing and holistic process. From the perspective of market actors, it assumes a logic of renewal and growth, not exploitation. From a research perspective, the model is not limited by levels of analysis issues germane to person-situation interactionism. For instance, unlike a personal trait, possessed knowledge is something people can gain and lose, not unlike possessed capital. As opportunities transcend person and environment, the DAV framework mitigates barriers associated with the empirical levels of analysis. Therefore, many different kinds of people can discover many different kinds of opportunities. The DAV framework thus allows for dramatic change because it does not statically typify people or firms.

The DAV framework entails a few premises. Its components are stages of opportunity formation. Different kinds of resources are assembled in the course of building a venture in relation to an opportunity. Subsequent viability of the venture is demonstrated as the venture either grows or declines. To be sure, error can and does happen at each stage. Its results can serve as a foundation for ancillary discoveries by the same individuals or firms who made the original error or by different individuals or firms. Each stage is necessary but not sufficient for the ensuing one to occur.

As noted, discovery is a case of the right knowledge in the right place at the right time. It is usually a case of knowledge that is possessed combining with knowledge that is needed. Thus, knowledge transcends the discoverer. It can be derive from earlier failed experiences, and it can derive from knowledge possessed by another individual. Discovery can also occur at the firm level based on management decisions. In those cases, the knowledge germane to the discovery can be institutional or archival. It can occur based on the contributions of many individuals and is not limited to the individual level. When a discovery is made, it need not involve the deployment of personal or firm resources. It can remain solely in the domain of formulation, prior to implementation. Errors that occur at this stage appear as false starts and dead ends over the course of subjective sensemaking. When an early discovery is regarded as impractical, it becomes error. However, the knowledge associated with the error is recyclable; it can emerge again in the context of ancillary discoveries.

At the assembly stage, different kinds of factors become relevant. The earlier factors related to discovery become less central. When resources are deployed and plans are implemented, an opportunity that was previously discovered begins to enter the stage in which it is assembled into a going concern. These resource deployments can occur in the context of nascent ventures or large organizations. They can include new product and service rollouts, patent applications, new organizational structures, product licenses, or the procurement of financial capital. These events herald traceable allocations of resources that are more objective than the ones at the preceding stage. In the assembly stage, errors result in unused inventory, sunk costs, or suboptimal technology or personnel. As in the discovery stage, these errors are also recyclable and can be instrumental to ancillary discoveries.

At the viability stage, marketing and strategy become more important. The dynamics of consumer feedback, managing growth, market share, and managerial decision-making bear upon the viability of a venture. At this stage, a growing venture may take on a “life of its own.” An entrepreneurial opportunity does not usually prove to be a success until it reaches the viability stage. Many ventures clear the assembly stage but fail over the long term without achieving viability. Yet again, these errors also drive ancillary discoveries that transcend firm boundaries. For instance, they may provide the opportunity for another venture to acquire them. Another aspect of error at the viability stage that is unique to entrepreneurship concerns error that is associated with success. When a venture achieves viability, it opens up opportunities for other firms to act as imitators or fill a niche created by the viable venture’s action. For example, successful sports franchises rarely serve all the needs of their customers, especially with regard to their desires for merchandise and apparel, which constitutes a kind of error. Such ancillary opportunities can be pursued by the original venture via new divisions or subsidiaries or they can be pursued by other ventures.

The function of error in the DAV framework is very important. It holds the most promise for distinguishing entrepreneurship from other research areas. It is worth emphasizing that, in practice, discoveries of opportunities to undertake entrepreneurial ventures usually emerge from inefficiencies or errors. By building the model on a foundational error component, the DAV framework distinguishes itself from other theories but acknowledges the real-world value of error as essential to new venture activity.

3.1 The Influence of External Areas

Each stage of the DAV framework indicates a different conceptual and empirical domain. Discovery, for instance, has been explained by psychology research using variables like risk-

aversion, alertness, or achievement orientation (Baron, 2008; Gaglio & Katz, 2001; Shaver & Scott, 1991). By contrast, the assembly stage receives almost no attention from psychology research. Instead, small business management research, team building studies, and some sociological studies focuses on phenomena at that stage (Aldrich, 1990; Keeble & Walker, 1994; Reynolds, 1991). Variables at that stage can include deregulation and barriers to entry as well as macroeconomic, legal, and institutional policy (Gnywali & Fogel, 1994). Still other streams of research have examined elements of the viability stage, as with marketing studies on firm behavior in market system contexts or firm orientation (Lumpkin & Dess, 1996; Hunt & Morgan, 1995). Thus, although the DAV framework is integrative, it provides context for studies from a range of different theoretic traditions. It helps direct those studies to the appropriate parts of the entrepreneurial process and in relation to one other.

Without a formal context provided by an integrative conceptual framework, entrepreneurship studies contribute to a discontinuous body of research. As previous scholars have noted, a framework for integration is required to help reduce stratification and disorganization in the entrepreneurship literature (Shane & Venkataraman, 2000). The next section explains how the DAV framework contributes to entrepreneurship studies.

4. Entrepreneurship's Ontological Issues

Tracing the volatility of entrepreneurial action frustrates the assumptions of most research methodologies (Murphy, 2004; Robinson & Hofer, 1997). This issue stems from the fact that entrepreneurial plans change inexplicably whereas research methods seek statistical reliability (Nunnally, 1978). Entrepreneurial action is dynamic by nature because it is not just concerned with present circumstances - it is oriented toward expectations about the future (Arrow, 1974). Thus, entrepreneurial behavior can seem irrational to observers. The problem

here is that most existing models of the entrepreneurial process have a kind reliability in their structures. They impose equilibrium on an open process with expected range limits and levels of variables. They have parameters based on assumed population distributions. Whereas parametric approaches are suitable in domains where events are reliable, they do not work very well in entrepreneurship, where dynamism, novelty, and outliers are common.

The conceptualization of managerial decision-making as an efficiency maximization process does not always fit the entrepreneurial context (Casson, 1982). The importance of error, as in the DAV framework, works against efficiency because it is wasteful by definition. Another issue is that person-centric models of entrepreneurial action cannot describe aspects of the environment, which also impinge upon the process (Kirzner, 1997). Some of the ontological issues for research created by these shortcomings include the knowledge problem, conceptual asymmetry, and entrepreneurial error.

4.1 The Knowledge Problem

Because opportunities pertain to future value, effects from events outside the sample space and a priori unknowable information contribute to entrepreneurial outcomes (Kirzner, 1984). The unknowable information that nonetheless contributes to future outcomes constitutes the knowledge problem. Entrepreneurship theory currently engages the knowledge problem with a synthesis of motivation and willingness of individuals to bear uncertainty (McMullen & Shepherd, 2006). Yet, the knowledge problem goes beyond the purview of entrepreneurs; it also has an effect on entrepreneurship research. Low and Macmillan (1988) state that the randomness of unknown events in entrepreneurship renders person-centric research to be futile. Eckhardt and Shane (2003) make the same point. Research on individual action misses important aspects of circumstance. For instance, one market actor's actions create new data instrumental to the

unpredictable decision-making of other market actors (Hayek, 1948: 38). A focus that emphasizes individuals can only address such data with the idea of uncertainty. The knowledge problem thus pertains to research focusing just on individuals. Firm-level research influenced by Simon (1957) engages the knowledge problem differently. It describes imperfect procedural rationality and appropriate deliberation (Dickson, 1992; Hunt & Morgan, 1995). This research shows probabilistic decision-making by firms to be volatile because of deliberation by market actors. Other research in the tradition of economics engages the knowledge problem with the notion of second-order probability distributions for sensemaking because entrepreneurs are aware things will change (Yates, 2000).

The DAV framework is compatible with emergence at various stages of the entrepreneurial process. Emergent resources accompany inefficiency and can constitute a discovery when there is a way to put them to use. The logic of the framework is therefore self-generative and not based on efficiency because error is a potential resource rather than something that is definitely negative. The framework deals with the knowledge problem by allowing error to recycle into new discoveries. This aspect describes the idea that one opportunity can lead to more opportunities that would otherwise be impossible (Shane & Venkataraman, 2000). This aspect strains empirical research methodologies that require statistical reliability. Opportunities are dynamic because resources like episodic knowledge can be patently new - not just a new combination of existing elements. As I will now illustrate, their nature varies so dramatically that they can seem asymmetric to each other in empirical research settings.

4.2 Conceptual Asymmetry

Opportunities exist at all levels of an economic system, and each one is a nexus for individual and environmental-level factors (Venkataraman & Sarasvathy, 2001). Because

opportunities are traceable across levels of analysis (entrepreneur, firm, system) streams of research have emerged that correspond to these levels (Low & Macmillan, 1988). As each stream raises understanding within its own boundaries, irrelevancies grow between them. Therefore, there are conceptual asymmetries between macroperspectives on market systems as settings for innovation, firm formation, or economic growth (Aldrich, 1990; Reynolds, 1991) and microperspectives on entrepreneurial decision-making or perception (Baron, 2008; Gaglio & Katz, 2001). Moreover, those two perspectives do not account for the meso-level of the firm (Covin & Slevin, 1991; Lumpkin & Dess, 1996). Yet, studies at each level are concerned with similar entrepreneurial outcomes. These conceptual asymmetries compromise the coherence of the body of entrepreneurship research (Bull & Willard, 1993). Research at one level can be irrelevant or contradictory to research at another level. Moreover, two events that are different at a microperspective can appear similar at a macroperspective (e.g., remedying inefficiency versus building on a technological innovation).

In order to deal with levels of analysis issues, individual-level studies in entrepreneurship borrow concepts from system-level theory, even though the incompatibility between the levels of analysis leads to incomplete theoretical models (Gartner, 1988; Kaish & Gilad, 1991). This difficulty establishes a need for a genuinely integrative approach to help distinguish the entrepreneurship domain as an area of research (Gartner, 2001). The DAV framework and the OBA (Murphy & Marvel, 2007) engages the levels of analysis issues by conceptualizing opportunities as a variable that transcends levels.

4.3 The Nature of Error

In entrepreneurship theory, alertness to opportunities is a way to preempt error before it occurs. Kirzner (1973: 10) articulates error in terms of plans never realized or plans realized but

not having capitalized on what would have led to better performance. Error in both forms is evident in the survival rates of ventures. It has been estimated that >50% of ventures do not last ten years and only 2% prove viable (Schoonoven & Romanelli, 2001). The entrepreneurs that launch these ventures take action based on incorrect hunches. Other times, they do not take action when it would have been a good idea to do so. Both instances are a kind of error that can lead to failure. However, many evolve into successful ventures in second and third attempts based on earlier experiences. The DAV framework explains this process by regarding error as a kind of proving ground that channels back into the process.

A person-centric approach to entrepreneurship, by contrast, views error as related to uncertainty and based on what an entrepreneur does not know. The assumption is that, with the right information, the entrepreneur would not have made the mistake. Since not all necessary knowledge is available, it is not always possible to make correct decisions. Error in the DAV framework stems is how ancillary opportunities emerge. It is natural because trial and error is a basic part of creative activity (March & Shapira, 1987). Failure can be a discovery procedure that generates longer-term value if its short-term costs are bounded. Moreover, a mistaken decision can become a successful one if the environment changes (McGrath, 1999). The DAV framework is congruent with this idea that failure is a *potential* benefit. The logic is that information, ideas, knowledge, and other resources associated with failed undertakings are sometimes recyclable and potentially valuable.

5. Opportunity Ontology and the OBA

The DAV framework is a wide-ranging conceptualization that helps engage the knowledge problem and conceptual asymmetry in entrepreneurship research by acknowledging the idea that the full stock of information about opportunity is never concentrated in a single

mind (Hayek, 1948: 77). The approach mitigates conceptual asymmetry because an opportunity circumscribes where information known to an entrepreneur combines with system-level information unknown to the entrepreneur (Fiet, 1996). It goes beyond characteristics of entrepreneurs, firms, and environments to target an integrated nexus that maintains bearing across perspectives. It represents a convergence of diverse and episodic factors scattered across levels of analysis that may include the entrepreneur or firm and are not necessarily limited by them.

5.1 Opportunities as Units of Analysis

Although case study research treating opportunities in this way already exists (Shane, 2000), the notion that an opportunity transcends individuals and firms is a novel idea (Murphy, in press). Whereas most theories in the domain of business studies emphasize people, firms, or environments, few theories emphasize novel elements that transcend individuals and firms. One exception is transaction cost economics (Williamson, 1981), which focuses on *transactions* as the units of analysis in a way functionally similar to the OBA. This particular aspect of the OBA will help distinguish the entrepreneurship area in terms of its methodologies.

Like research in other areas, entrepreneurship research uses data to obtain support for its theoretic explanations. The intention requires operationalizing opportunities as data. Empirical observations are theory-laden, so appropriate methods tend to follow from conceptual foundations (Cook & Campbell, 1979: 23-25). Let us examine some relevant methodological aspects of the DAV framework.

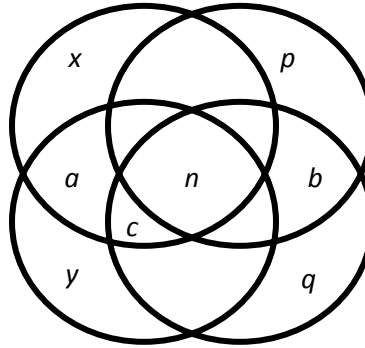
The empirical nature of opportunities frustrates most approaches in empirical social science research. An opportunity is not reducible into a set of reliable or recurring factors. There is no reliable set of precedents to form a structure, nor is there a set of underlying

researchable dimensions. These antecedents are discontinuous (Carroll & Mosakowski, 1987). Empirically, an opportunity is an idiosyncratic convergence of episodic resources pertaining to particular circumstances of place and time (Drucker, 1985: 111-115; Hayek, 1945; Kirzner, 1984). Its volatility derives from the evolutionary nature of individual beliefs and changing circumstances. These elements occupy a vast range that is liable to price differentials, plans or activities of competitors, consumer trends, developing technologies or other factors that converge circumstantially.

The convergences are operationalized by reported episodic knowledge of them (Kirzner, 1997; Hayek, 1948). Unlike settings where it is possible to develop reliable multi-item measurement scales, opportunities thus operate in a disequilibrium framework (Eckhardt & Shane, 2003). The dynamic nature of these convergences has led entrepreneurship scholars to call for different empirical methods for well over a decade (Bygrave, & Hofer, 1991; Robinson & Hofer, 1997; Fiet, 2002: 222; Robinson & McDougall, 1998). Murphy and Marvel (2007: 173) use the logic of the model in Figure 2 to illustrate the convergence notion. The opportunity is the nexus, n , of four converging factors: x , y , p , and q . The illustration is stylized and the number and types of factors in an actual instance can vary. This variety of factors, such as market trends, experience, training, key relationships, and resource acquisition, contribute to the existence of an opportunity. Absent any of these factors, n is incomplete. The convergence of two factors (x and y or p and q) can constitute other unique spaces (a or b), whereas that of three factors (areas x , y , and q) constitutes still other ones (c). Considering areas a , b , and c conveys a rudimentary sense of the complexity facing studies of n . That is, operationalizing the opportunity entails incorporating all four factors. From a person-centric view, the conceptual asymmetries of system-level versus individual-level factors complicate the logic. Moreover, the

unreliability of these factors frustrates normative research. Knowledge about an opportunity is episodic, which makes any operationalization of an opportunity unreliable by nature.

Figure 2
Stylized Illustration of Converging Factors in an Entrepreneurial Discovery



6. The Nature of Episodic Knowledge

If knowledge about an opportunity is disseminated among many entrepreneurs in a market system, it is likely that only a small number of them will incur discoveries based on it (Shane, 2000). The reason is that only a few of them possess the right complementary knowledge. The differences among the individuals in experience, skills, or education are episodic. The total stock of knowledge derives from the system *and* the individual, and it precedes the venture temporally. Knowledge therefore must have the character of an expectation about the future (Hayek, 1948; Popper, 1990: 32). It follows that an operationalization of opportunities entails episodic knowledge of future circumstances (not just present or past ones).

Uncertainty bears on entrepreneurs (Knight, 1921). The knowledge that helps reduce uncertainty comes from a variety of sources, including expert guidance, critical relationships, market reports, experience. These elements are dynamic, and they occupy different levels of analysis but derive from the environment to join with knowledge already possessed (Fiet, 1996; Shane, 2000). Any operationalization must transcend individual and environment.

6.1 Operationalizing Episodic Knowledge

Opportunity data are based on indicators, not the actual object to be explained. It is not possible to observe an opportunity directly. Fiet and Kosnick (1995), for instance, speculate that an effective way to measure aspects of an entrepreneurship context is to collect data on indicators of the phenomena. Moreover, Hayek (1948: 33) posits explicitly that “propositions about the acquisition of knowledge” are the most meaningful empirical element in economic theory. The OBA adopts this view. These “knowledge reports” are different from the phenomena to which they refer, but they are indicators of them. Using these data requires stipulating whether such data are (1) specific to observer or actor, and (2) assumed to be known or not known across all actors (Hayek, 1948: 39).

Entrepreneurs make definite statements about circumstances, including expected future ones, as they understand them. When used as data, these reports have a disequilibrium character because episodic knowledge is specific to an entrepreneur. The character has implications for the operationalization as data. Hayek (1948: 60) illustrates the implications with an illustration of multiple individuals possessing idiosyncratic knowledge. Each individual will define reality categorically; in terms of unique beliefs, regardless of whether others concur. By contrast, if the knowledge of the various actors was similar, the beliefs would participate in a general sense, and each individual definition could be considered in relation what is shared among them. The sharedness creates a framework for the traditional normative method of inquiry. Researchers can use it to target the essence of the matter. The former case of categorical explanations, not the latter case of sharedness, describes entrepreneurial circumstances. The OBA aligns with the former case; person-centric approaches align with the latter case. This breakout away the dominant view with respect to conceptual and empirical elements offers a paradigm shift.

7. Paradigm Shift

The ramifications of using opportunities as units of analysis entail a significant break from the current research and theory. The discovery-assembly-viability framework and the opportunity-based approach hold promise for development of a new entrepreneurship research paradigm. One way to illustrate the logical foundation of this paradigm, and how it differs from existing dominant research tradition, is through logical argument.

Research widely acknowledges that entrepreneurs describe similar circumstances in novel ways (Shane, 2000). Building on this foundation requires the adoption of disequilibrium assumptions with respect to individuals and environments. The OBA carries such assumptions, as conveyed by the following two sets of premises:

- (1) Entrepreneur A describes Situation X in terms of Description P.
- (2) Entrepreneur B describes Situation X in terms of Description Q.

In this first set, Situation X is identical. An approach focusing on types of individuals or environments permits no conclusion to follow logically from the premises. Thus, entrepreneurs A and B cannot both be correct because each describes the same situation differently.

- (1) Entrepreneur A describes Situation X in terms of Description P.
- (2) Entrepreneur A describes Situation Y in terms of Description P.

In the second set, Situation X and Situation Y are not identical. Again, an approach focusing on types of individuals or environments permits no conclusion to follow logically from the premises. Therefore, entrepreneur A's description cannot be correct twice because the situations are not the same.

Whereas traditional approaches would reject these circumstances or treat the non sequitur as a kind of error, the OBA accepts such arguments. As it uses episodic knowledge as data, the limits of people and situations do not confine the approach. This approach eschews the current

paradigm that emphasizes people and situations, and it assumes disequilibrium circumstances. Economic game theory describes such instances as typical of market action in uncertain circumstances (Morgenstern, 1935; Neumann & Morgenstern, 1944). Yet, the logic of current entrepreneurship research holds premises (1) and (2) to be non-valid arguments. In other words, current approaches replicate a long tradition of treating episodic knowledge as error with static models assuming such data are constant (Hayek, 1948: 94-95).

Research taking cross-sectional approaches to defining essential types adopts the same approach, and regards the circumstances illustrated by these premises as statistically unreliable at best and not valid in general. This research misattributes variance belonging to opportunities to individuals instead (Shane, 2000). By moving away from theory focusing on types of individuals and environments, the OBA represents a breakout from the person-situation interactionism (Lewin, 1935).

7.1 Moving Beyond Interactionism

At the discovery stage of the DAV framework, the inapplicability of the interactionist approach is the reason most theoretic structures are strained. Convergences of episodic knowledge transcend the Lewinian model because knowledge at the environmental-level (systems of information, knowledge possessed by others) joins with knowledge at the individual-level (experience, skills). The OBA describes these convergences. This interaction is the basis for Lewin's (1935) functional model,

$$B = f(P, E)$$

which defines individual behavior (B) as the product of the interaction between a person (P) and his/her environment (E). The model the interaction between a person and environment describes the vast majority of social science research, including much of the research in entrepreneurship.

It does not describe entrepreneurial discovery because of the asymmetry between the kinds of knowledge.

The Lewinian model comes in multiple forms in entrepreneurship research. For example, Cooper, Folta, and Woo (1995) showed that cognitive activities affect the way in which entrepreneurs seek information, but only under particular environmental conditions. In these studies, interaction effects in least squares regression models can indicate the conceptual interplay between person and environment. Studies with this orientation target the entrepreneur as the unit of analysis and allow for interaction with the environment. They carry assumptions about the parameters of the functional form of variable interrelations and distribution of the population represented by the empirical sample. These approaches thus use parametric statistics. However, entrepreneurship research methodological approaches that can explain breakouts from the limits of prior knowledge. Such breakouts are not amenable to universal laws or norms delineated by parametric statistics.

7.2 Moving Beyond Parametric Statistics

Episodic knowledge eludes static means-ends frameworks or process models with variance that is categorical and idiosyncratic, not degressed or normative. Parametric statistics are appropriate for many content areas in social and management sciences, but not for research involving the discovery of opportunities (Eckhardt & Shane, 2003). This observation is of great importance because it implies that empirical research should not analyze content to detect entrepreneurial discovery's lawful nature. It reframes that line of inquiry into an orientation that delineates how an opportunity acts holistically and how it changes in the presence of other factors. The OBA shifts toward idiographic and holistic research.

It is impossible to achieve reliable explanation of a phenomenon by measuring composite factors and elements that are not reliable themselves. As idiosyncratic factors constitute entrepreneurial opportunities, there are no reliable composite factors that afford the predictive power of a reliable item scale (Eckhardt & Shane, 2003). Instead, every entrepreneurial discovery has a unique character at the empirical level. This inherent newness comes from unpredictable combinations of episodic knowledge. Opportunities are distinctive by definition because their uniqueness gives them value.

The distinctiveness of each and every opportunity creates problems for parametric or linear research methods, which depend on the existence of reliable composite factors. Multiple regression and MANOVA are parametric methods because they utilize functional forms and linear relationships between economic variables (Hardle, 1994: 8). They are cross-sectional and static methods that are not versatile enough to handle spurious, evolving, or non-linear relations between variables. A fixed functional form with a meaningful middle point such as a Gaussian distribution is too restrictive for research on entrepreneurial discovery. Parametric techniques also do not handle outliers, which are common in entrepreneurship research. These extreme values shift the equilibrium of the scale and distort the measured sample distribution of scores. Thus, variables such as the possessed financial capital can cause problems, because they include scores several standard deviations above the mean of the distribution. These scores frustrate the parameters of the model dramatically. However, in the reality of entrepreneurship, such scores are valid, interpretable, and interesting.

7.3 Moving Toward Nonparametric Statistics

Some contributions to the entrepreneurship area show that nonparametric methods (Hardle, 1994; Siegel & Castellan, 1988) provide flexibility that fits the entrepreneurship area.

For instance, Robinson and McDougall (1998) showed that entrepreneurship data violate parametric analysis assumptions. Robinson and Hofer (1997) show examples in which parametric statistics failed to identify 90% of the findings identified using nonparametric procedures and that 50% of the findings generated by parametric procedures were spurious. The reason is that entrepreneurship data violate analysis assumptions. They conclude, “Future entrepreneurship research should utilize nonparametric statistical data analysis techniques if the stringent assumptions underlying the usage of parametric procedures are not satisfied by the data utilized in such studies.” Additional work in the field echoes this point (Bygrave & Hofer, 1991; Eckhardt & Shane, 2003; Fiet, 2002: 222; Murphy, Liao, & Welsch, 2006; Venkataraman, 1997).

Nonparametric analysis methods are especially appropriate for future entrepreneurship research in the tradition of the DAV framework and the OBA (Murphy, 2004). However, nonparametric techniques are not as well known as the parametric ones based on the general linear model, such as MANOVA, multiple correlation and regression, reliability analyses, and other similar methods. Moreover, nonparametric techniques can be inaccessible to scholars unfamiliar with statistics or mathematics journals. Scholars interested in incorporating these methods into their entrepreneurship research may consult a variety of contemporary publications that help make nonparametric statistical techniques straightforward.

Siegel and Castellan (1988) describe nonparametric techniques as offering the most suitable methods for behavioral science research and explain the methods in terms that are familiar to researchers who do not consult statistics publications regularly. Tabachnik and Fidell (1996) also discuss nonparametric analysis techniques. Hardle (1994) explains the logic of applied nonparametric regression models and contrasts them with parametric approaches. DeMaris (1995) and Menard (1995) provide introductions to logistic regression for binary,

nominal, and ordinal outcomes. Garner, Mulvey, and Shaw (1995) discuss nonlinear regression models for count outcomes. Liao (1994) illustrates nonlinear regression models for use with discrete outcomes. Long (1997) and Greene (1997) give detailed and comprehensive explanations for many kinds of nonlinear regression models.

Statistical software to conduct nonparametric analyses is available in the latest packages of SPSS, STATA, STATISTICA, and SAS, and the econometric program LIMDEP (Greene, 1997) executes nonparametric analyses. The methods include techniques such as multiway frequency and chi-square analyses and logistic regression. They tend to be sample specific instead of inferential with respect to a population, and they analyze frequencies and categorical data. One can thus see that they are fitting to the categorically different reports of entrepreneurs regarding their unique circumstances.

8. Conclusion

The purpose of this chapter was to offer the DAV framework as a context to help integrate the OBA into entrepreneurship research. This chapter makes the case for distinct research in a specific new tradition, justified by calls in the literature and the logical nature of the opportunity phenomena examined by entrepreneurship research. Henceforth, scholars must refine and develop these conceptual and empirical notions into an area of research that is distinct from other areas of research in the domain of business studies.

A distinct area enjoys its own models, boundaries, and variables. Those conceptual elements are accompanied by distinct analysis strategies that follow from the nature of those elements. The DAV framework and the OBA provide foundations for future contributions and the conceptual development of entrepreneurship research and theory into a more distinct area.

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