



Enhancing Entrepreneurial Orientation Research: Operationalizing and Measuring a Key Strategic Decision Making Process

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As a means to enhance prescriptive theory on a firm's entrepreneurial orientation, this paper addresses the strengths and weaknesses of three approaches to measurement: managerial perceptions, firm behaviors, and resource allocations. We examine a set of recent studies employing these approaches, propose important contingencies regarding their use, and suggest that measurement accuracy can be improved by using a triangulation of methods. The paper concludes with a discussion of theoretical, resource availability, and interpretability considerations in measurement selection. © 2000 Elsevier Science Inc. All rights reserved.

Entrepreneurial ventures explain up to 65% of the net employment growth in the U.S. in recent years (U.S. Small Business Administration, 1993). Additionally, many companies regard entrepreneurial behavior as essential if they are to survive in a world increasingly driven by accelerating change. This belief may stem, in part, from the normative bias prevalent in both the academic and popular press suggesting an inherently positive influence of entrepreneurial activity on performance. Despite considerable research, the strength of direct relationships between entrepreneurship and performance is generally less robust than the normative belief would indicate. This may be due to problems with operationalization and measurement, or in the theoretical models employed. A small but growing body of empirical research on the relationship between entrepreneurial behavior and firm performance indicates that *contingent* rather than *direct* relationships may

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provide more accurate explanations of performance outcomes. Such a process of "elaboration" (Rosenberg, 1968) permits a deeper understanding of theorized relationships through a better understanding of the links in the causal chain. Understanding of the relationships between entrepreneurship and performance improves as more contiguous variables are tested and model specification increases. For instance, Dess, Lumpkin, and Covin (1997) link entrepreneurial strategy making processes to firm strategy, the environment, and performance, and Zahra (1993) found that corporate entrepreneurship influenced firm performance depending upon the external environmental context. Such contingency modeling and other entrepreneurship issues require further scrutiny to develop useful theories and models of entrepreneurial behavior.

Despite general agreement on the effects of entrepreneurship, there is some debate regarding the definition and operationalization of entrepreneurship. The various conceptualizations include entrepreneurship that encompasses corporate venturing and strategic renewal (Guth & Ginsberg, 1990); entry into new markets (Vesper, 1980); traits of the individual and small firm (Webster, 1977; Mintzberg and Waters, 1985; Jennings & Lumpkin, 1989); and various types of behavior by established firms (Miller, 1983; Covin & Slevin, 1991). For instance, both Covin and Slevin (1991) and Miller (1983) suggest innovation, risk taking, and proactiveness as key dimensions of entrepreneurial activity. Lumpkin and Dess (1996), in an effort to focus on an important component of entrepreneurship, identified the dimensions of an "entrepreneurial orientation" (EO) construct.

We embrace Lumpkin and Dess's (1996) concept of an entrepreneurial orientation. According to those authors, an EO consists of processes, structures, and/or behaviors that can be described as aggressive, innovative, proactive, risk taking, or autonomy seeking. The competitive aggressiveness dimension of EO can be defined as the tendency of firms to assume a combative posture towards rivals and to employ a high level of competitive intensity in attempts to surpass rivals. Innovativeness refers to attempts to embrace creativity, experimentation, novelty, technological leadership, and so forth, in both products and processes. Proactiveness relates to forward-looking, first mover advantage-seeking efforts to shape the environment by introducing new products or processes ahead of the competition. Risk taking consists of activities such as borrowing heavily, committing a high percentage of resources to projects with uncertain outcomes, and entering unknown markets. Autonomy refers to actions undertaken by individuals or teams intended to establish a new business concept, idea, or vision.

Prior research on entrepreneurship (e.g., Miller, 1983; Covin & Slevin, 1989) suggests that entrepreneurial orientation is a unidimensional construct. Lumpkin and Dess (1996) argue, however, that the dimensions of EO can vary independently of each other. As an example, Nelson and Winter (1982) note that some firms may benefit more from imitation than from innovation. An imitation strategy, however, does not preclude proactiveness, risk-taking, or other forms of entrepreneurial processes and behaviors. Also, some entrepreneurs may be cautious and risk averse under some circumstances and risk-taking in others (Brockhaus, 1980). Scale development work done by Lumpkin and Dess (1997) and

Lumpkin (1998) also provide theoretical support and empirical evidence that the dimensions of EO may vary independently.

As the preceding discussion demonstrates, considerable conceptual and empirical work has been done regarding the substantive relationships between entrepreneurial orientation, related constructs, and firm performance. These various conceptualizations and dimensions of entrepreneurship inevitably give rise to questions of operationalization and measurement. Although this subject is a key antecedent to developing prescriptive theory, to the present authors' knowledge, it has yet to be addressed in a systematic manner. Thus, to further refine our understanding of research methods in entrepreneurship, this paper will examine issues related to the operationalization and measurement of the EO construct.

Development of a normative theory of a firm's entrepreneurial orientation and the development of auxiliary measurement theory cannot be divorced from one another. As Blalock (1982) has observed, if we obtain a poor fit (in, say, models of entrepreneurship and performance), we will not know whether it is the substantive theory, the auxiliary measurement theory, or both, that is to blame. To address these issues, this paper first discusses the benefits and drawbacks of three common operationalizations of a firms' entrepreneurial orientation: (1) *management perceptions* regarding entrepreneurial processes; (2) entrepreneurial *firm behavior*; and, (3) archival data denoting prior *resource allocations* as indicators of an entrepreneurial posture. We also discuss time as a contextual issue in EO research. Then, we discuss how triangulation of methods might be used to exploit the complementary nature of these three approaches to measurement. Triangulation may be particularly important in EO research because the advantages and disadvantages inherent in each methodology are quite pronounced; hence, triangulation is likely to improve both the reliability and the validity of EO research. Next, we examine the use of various measurement techniques in a set of recent studies that investigate EO and EO-related dimensions. The paper concludes with a discussion of future research concerning the EO construct, the value of multiple measures in a contingency framework, and the impact of resource availability and interpretability on the selection of EO measures.

Three Approaches to Operationalizing a Firm's Entrepreneurial Orientation

Managerial Perceptions

Management perceptions of firm-level variables such as strategy, structure, decision-making processes, and firm performance are often used in entrepreneurship research (e.g., Naman & Slevin, 1993). Perceptions can be obtained from interviews or from surveys using questionnaires. Survey-type measures that emerged from the strategy-making process literature (Miller & Friesen, 1978) are among the most widely-used measures of EO. Miller's (1983) measures of innovativeness, risk taking, and proactiveness have been used extensively by numerous researchers (e.g., Covin and Slevin, 1986; 1989), and extended to include competitive aggressiveness and autonomy by Lumpkin and Dess (1996). This multidimensional approach has a number of advantages that help account for

its frequent use. However, such measures and other perceptual approaches also have several disadvantages that need to be delineated.

One potential advantage of perceptual approaches is a relatively high level of validity because researchers can pose questions that address directly the underlying nature of a construct. To enhance content validity, surveys can be developed that contain a sufficiently comprehensive set of items to represent the subject matter of interest. Convergent and discriminant validity techniques can then be used to determine the adequacy of such measures (Mason & Bramble, 1989). Unlike measures that aggregate broadly across firms in an industry, perceptual measures are also useful for measuring current conditions within a firm with a high degree of specificity. Thus, multi-item scales and survey instruments often have a high level of construct validity. Scale items that have forced-choice responses can also contribute to greater measurement validity. Gathering perceptions via interviews, by contrast, may produce less valid results than survey instruments because the open-ended responses may be more difficult to link to specific constructs due to interviewer error or confusion in the interpretation of such data.

The disadvantages associated with managerial perceptions stem primarily from the technique of self-reporting. In contrast to the use of objective sources of data such as industry reports, financial statements, and other archival data, perceptual measures rely on data that is subjective (c.f., Boyd, Dess, & Rasheed, 1993). Entrepreneurship researchers frequently use the self-reported perceptions of business owners and entrepreneurial executives because those individuals are typically quite knowledgeable regarding company strategies and business circumstances (Hambrick, 1981). In fact, studies of young and/or small entrepreneurial firms often rely on the responses of a single key player to represent the views of the whole firm (Brush & Vanderwerf, 1992; Chandler & Hanks, 1993). The use of single respondents can increase the possibility of common method variance problems, which can artificially amplify relationships (Campbell & Fiske, 1959). (See Podsakoff and Organ (1986) for a detailed discussion and examples of studies dealing with common method variance.)

On the other hand, there are a number of advantages to using only a single informant. For instance, as noted by Glick et al. (1990), there is a high likelihood that the most knowledgeable individual in the organization will provide the information. Further, particularly in the case of small organizations, the views of the respondent may, in fact, reflect those of the firm. Also, the use of a single informant helps to increase sample size by: (1) reducing the strain on the research budget, thereby allowing the researcher to target more firms; and, (2) increasing the probability that firms will participate since only one individual in the organization is impacted.

There is also empirical evidence arguing for the reliability and validity of self-reported, single-respondent data. For example, Chandler and Hanks (1993) examined the self-reports of owners or chief executives of small firms and found that owner/CEO assessment of business volume (earnings, sales, and net worth of the founder) was highly correlated with archival sales figures. Those researchers also found strong evidence of convergent and discriminant validity between

self-reported business volume and sales growth through factor and alpha analysis. Hence, research using single-respondent self-reports can be an appropriate and necessary means of operationalizing key constructs when carefully performed.

Two other problems often associated with perceptual measures are functional biases and an inability to identify sources of variation in responses. Regarding functional bias, top management team members might perceive the dimensions of EO differently (Boyd, Dess, & Rasheed, 1993; Hambrick & Mason, 1984; Finkelstein & Hambrick, 1996). Risk taking to a financial officer, for example, may consist of incurring a large debt or otherwise making a large financial commitment to a new endeavor. A production manager, by contrast, might consider such investments to be essential for continuous success and might consider failure to make such improvements even more risky. A marketing manager might consider abandoning a declining product line, leading to a cost savings, to be a risky decision. Such differing views might lead to inconsistent findings when EO is assessed using perceptual measures.

Similar problems could arise with any of the dimensions of EO such that it may be difficult to draw conclusions about how the firm undertakes value-adding activities. That is, it might be difficult to determine the sources of variability in a firm's entrepreneurial orientation and how those differences contribute to or detract from performance. A firm, for example, may be quite innovative and "leading edge" in its manufacturing operations, but rather conventional in all of its other value activities. These issues led Lumpkin and Dess (1996) to conclude that the dimensions of EO, traditionally thought to covary in strong entrepreneurial firms, might vary independently depending on the organizational and environmental context. Thus, when using perceptual measures, measurement effectiveness may be enhanced by evaluating the dimensions of EO in a contingency framework.

Another contextual issue that may be problematic is the "mortality" (Campbell & Stanley, 1963) of respondents to a survey administered over a period of time. The risk of attrition of respondents due to departure from the firm, job changes within the firm, loss of interest, and so on, increases when the study is of relatively long duration. As Pedhazur and Schmelkin (1991: 228) note, "Mortality may be characterized as a self-selection process, the reasons for which are generally very difficult, if not impossible to discern." Hence, for those studies where randomization is a concern, unless the researcher assumes that "mortality is due to a random process — a highly untenable assumption in most instances — it is clear that (mortality) vitiates the effects of randomization." (1991: 228)

A related issue concerns the possibility that, to some extent, a firm's EO may be an artifact of the EO of the individual completing the survey. As noted above, top managers can be expected to be aware of important firm activities and their views may, in fact, reflect those of the firm. However, when data are collected over a period of time, the original respondent may have been replaced. In that case, the researcher must be concerned with the degree to which an observed change in EO may be an artifact of the change in respondent or may reflect an actual change in the firm's EO. Also, retrospective accounts by managers may not be entirely valid and reliable due to cognitive and perceptual limitations of

managers (Huber, 1985). Golden (1992) illustrated these limitations in an analysis of the retrospective accounts of 259 hospital CEOs regarding firm strategy. The study cited faulty memory and attempts to depict past behaviors in positive manner as possible reasons for a marked divergence between retrospective accounts of strategy and previous, validated accounts of past strategy. In such cases, and particularly when firm-level changes in EO are the phenomena of interest, validity testing and triangulation of methods (discussed subsequently) become particularly salient issues.

Firm Behavior

As noted by Covin and Slevin (1991), conceptualizing entrepreneurship as firm behavior has several advantages. For instance, firm behavior can be directly observed and measured. Second, organization-level attributes, such as entrepreneurial strategy-making processes or characteristics of the management team, can only facilitate (or impede) entrepreneurial activity — they do not make an organization entrepreneurial. Third, firm behavior can be managed through the creation of particular strategies, structures, cultures and other organizational phenomena, thereby making it amenable to managerial intervention and control.

However, actually measuring entrepreneurial behavior on the part of firms poses special challenges and drawbacks that may not be immediately apparent. The competitive dynamics literature provides one potential approach to measuring entrepreneurial behavior. Briefly, this approach involves the content analysis (Jauch, Osborn & Martin, 1980) of headlines and abstracts contained in the print media concerning the competitive behaviors of a sample group of companies, and the coding of those actions into categories. Typically, this approach would allow the researcher to examine dimensions of an entrepreneurial orientation such as aggressiveness (number of actions, time to respond to a rival's action) or innovativeness (number of innovative actions). Of course, researchers must be careful to devise coding rules that are consistent with both the needs of the specific research and with the wider body of literature, lest actions that are not truly representative of the construct (e.g., innovation) be classified or counted incorrectly.

The usefulness of such measures has been supported in empirical research. For instance, competitive aggressiveness, operationalized as rapid response to a competitor's action (Chen & MacMillan, 1992; Chen & Miller, 1994; Chen & Hambrick, 1995) and total number of actions (Young, Smith & Grimm, 1996) has been found to enhance firm performance. Innovation, operationalized as the number of innovative actions, has also been linked positively to firm performance (Lyon & Ferrier, 1998). There are several advantages to this approach. The source of data, that is, published news accounts, is independent of researcher inference and interpretation given proper coding schemes and tests of interrater reliability. Also, secondary data sources allow replication and comparison across studies. This stands in contrast to, for example, interview data which is characterized by researcher inference and interpretation, and greater difficulty in replication. Furthermore, the use of secondary data reduces the problems associated with man-

agerial biases (Huber & Power, 1985) and nonrespondent bias when collecting survey data.

Despite the demonstrated utility of this approach, several methodological issues diminish its usefulness. First, while it may be possible to distinguish between tactical and strategic actions in single-industry samples (e.g., Miller & Chen, 1994), it may be difficult or impossible to accurately separate tactical and strategic actions in multi-industry samples since deep knowledge of the competitive behaviors characterizing each individual industry would be required to make such judgments. Second, counting and classifying firm actions undertaken in a given year and then linking those actions to firm performance presupposes that each individual action will impact performance within the same time frame. For instance, an aggressive price cut undertaken by Kellogg's Co. would likely have a performance impact in a relatively short amount of time. However, an additional manufacturing line announced in the press on the same day as the price cut may impact firm performance only many years later. These actions would both be part of the firm's repertoire of competitive actions in a given year and would be linked to performance in that year (e.g., Ferrier, Smith, & Grimm, 1999). Third, although researchers may be able to employ methods to reduce the likelihood of coding errors on their part, there remains the possibility the news media did not accurately report the event or even that the firm itself, either deliberately (i.e., market signaling; Porter, 1980) or inadvertently, issued a misleading press release.

Fourth, and perhaps most importantly, structured content analysis of firm actions appearing in the press presupposes a sample of firms large enough to generate the comprehensive media coverage necessary to capture substantially all of the firms' externally directed competitive actions. Under-reporting bias may result when the researcher depends on media accounts for data on smaller or otherwise less newsworthy firms (Fombrun & Shanley, 1990). This may pose a special problem when investigating entrepreneurial firms: much of the entrepreneurship research examines issues of import to small and mid-sized firms that would be unlikely to generate the comprehensive press coverage necessary to reliably capture all of such firms' competitive actions. The usefulness of normative theory developed from studies of large firms may not be generalizable to the competitive situations of smaller firms.

Resource Allocations

A number of researchers have suggested examining firm resource allocations to operationalize strategy concepts (Gale, 1972; Miller & Friesen, 1978). Many of these efforts are similar to the subdimensions of the entrepreneurial orientation construct — innovativeness, risk taking, proactiveness, competitive aggressiveness, and autonomy (Lumpkin & Dess, 1996). Measures of innovativeness, for example, might include the percentage of scientists and engineers relative to the total number of employees a firm. Hitt, Hoskisson, and Kim (1997) employed R&D intensity, measured as the ratio of research and development expenditures to the firm's total number of employees, as a proxy for innovation. Measures of propensity for risk taking could include indicators of financial leverage, such as total debt to total equity, as well as an indicator of business risk, such as the

standard deviation of a firm's return on assets over time. For example, several studies have focused on financial risk, operationalized as the debt to equity ratio, and found a negative association between debt to equity ratio and firm profitability (e.g., Arditti, 1967; Gale, 1972). Also, Baird and Thomas (1985) identified "borrowing heavily" as a type of risk. Again, both of these definitions suggest some permutation of a firm's debt to equity ratio as an appropriate operationalization of risk. Other studies have examined business risk, measured as the standard deviation of a firm's return on assets over a period of years (Oviatt & Bauerschmidt, 1991; Miller & Leiblein, 1996). For example, Miller and Leiblein (1996) employed this measure in a study assessing the influence of organizational slack and downside risk on firm performance. The reliability of archival measures such as research and development expenditures and debt to equity ratio as indicators of an entrepreneurial orientation is quite high as such information is usually available from a variety of sources. These typically include a publicly held company's financial statements, which have been audited by a third-party public accounting firm.

Despite the high reliability of such measures, even the best, most-often used measures may suffer problems of construct validity. For instance, consider expenditures for research and development, in one form or another, an often used proxy of innovation (c.f., Hitt, Hoskisson & Kim, 1997; Baysinger & Hoskisson, 1989; Hambrick & MacMillan, 1985). The income statement line item for R&D expenses might include a great deal of administrative overhead that does not, of itself, increase the innovativeness of the firm. In such cases, R&D expenses may overstate a firm's entrepreneurial orientation on the innovativeness dimension. This problem may be further exacerbated by differences in accounting practices between firms. For instance, one firm may capitalize certain R&D related expenditures while other firms expense those items. Management may alter capitalization/expense policies from year-to-year for financial, tax, or operating reasons entirely unrelated to their commitment to innovation.

This suggests that R&D spending may or may not be an entirely accurate reflection of firm innovation. For example, when performing longitudinal research a change in EO as measured by a change in R&D spending may, to a large or small degree, reflect a change in the accounting policies associated with R&D expenses rather than an actual change in EO over time. Hence, if not carefully validated in the context of the relevant study, virtually any measure can lead to erroneous conclusions based on seemingly robust findings (Pedhazur & Schmelkin, 1991).

Further, innovation is a multidimensional construct (Van de Ven, 1986). One cannot know from this rather crude measure the dimensions of innovation captured by R&D expenses. Does R&D capture technological innovation?, new product innovation?, process innovation?, marketing innovation? — it is difficult to determine with a high degree of certainty. Also, while firms spending more on R&D may be more innovative, R&D expenditures do not necessarily capture the *outcomes* of innovation (Kochhar & David, 1996). As with the aforementioned use of managerial perceptual data, the part of the firm's value chain affected by the expenditures is unclear. Thus, it may be; (1) difficult to ascertain the effect of

inter- and intrafirm accounting practices on the components of the R&D expenses line item; (2) impossible to determine the specific dimension of innovation captured by R&D expenses; or (3) difficult to determine the outcomes of innovation efforts.

Some authors have argued that because the resource allocations of firms, particularly large firms, are likely to remain relatively stable over time, resource allocations reflect not so much an entrepreneurial orientation on the part of management as a "firm effect" (Lieberson & O'Connor, 1972). That is, the level of expenditures for a particular item tends to remain relatively stable over time and, in effect, reflect "constrained" strategic choice. Thus, although resource allocations for R & D, for example, may appear to be substantial, they may not reflect a high degree of entrepreneurial activity. Hence, management may have relatively little effect on the level of those expenditures, at least in the short run.

Nonetheless, we do *not* believe that resource allocations in general, or research and development expenditures specifically, are an invalid proxy for innovation. As noted above, research and development expenditures have been used successfully in quite a number of studies, both as proxies for innovation and in construct validation schema. However, consistent with the tradeoffs between generalizability, simplicity, and accuracy (Weick, 1976), and researcher judgment, additional efforts to establish the validity of such measures may be necessary.

Before moving on, we will address time as an important contextual issue in the relationship between entrepreneurial orientation and firm performance (Bird & West, 1997). The impact of time on the relationship between EO and performance has been examined in a number of contexts using several different measures of EO. For instance, research and development spending has been shown to have a positive association with firm performance, with the returns lagging four to six years (Ravenscraft & Scherer, 1982). Zahra and Covin (1995) employed managerial perceptions as a measure of corporate entrepreneurship and found that such activities have a modest positive impact on company performance over the first few years but that the effect on performance increases over time. This effect was particularly pronounced in hostile environments. Zahra (1991) suggested that the lagged effect of corporate entrepreneurship on firm performance may exceed the concurrent performance impact. These studies suggest that cross-sectional research that links EO with current performance outcomes, while useful, may not fully capture the long-term impact of such activities on firm performance. Thus, whether using management perceptions, resource allocations, or firm behaviors to measure EO, researchers should consider incorporating the lag effects on performance. The tradeoffs associated with each of the three measurement methods are discussed in the following section.

Improving the Measurement of Entrepreneurial Orientation

In considering how effectively various techniques, such as those described above, measure a construct, researchers often consider three criteria: validity, reliability, and practicality (Emory & Cooper, 1991). Whereas validity and

reliability are scientific considerations that researchers must address, practicality is concerned with the operational requirements of research. Table 1 summarizes the advantages and disadvantages of each of the three measurement approaches in terms of validity and reliability issues associated with measuring entrepreneurial

Table 1. Three Approaches to Measuring Entrepreneurial Orientation: Advantages and Disadvantages

<i>Approach</i>	<i>Advantages</i>	<i>Disadvantages</i>
Managerial Perceptions	<p><i>Validity</i></p> <ol style="list-style-type: none"> 1. Scales can be developed that tap into underlying constructs thus enhancing construct validity. 2. Perceptual measures can achieve a higher level of specificity than aggregation methods. 3. Perceptions typically provide the most precise assessments of conditions within a firm. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Convenience: Surveys can be very easy to administer, especially when design features such as layout and instructions are carefully prepared. 2. Interpretability: Use of scales with standardized responses facilitates uniform interpretations and enhances comparability. 	<p><i>Reliability</i></p> <ol style="list-style-type: none"> 1. Measures of perceptions may lack internal consistency due to functional bias or 'silo-thinking' of multiple respondents. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Economy: Surveys can be costly to develop, produce, and score; interview techniques may also be time consuming and expensive. 2. Interpretability: Interview data that requires content analysis and/or standardized coding may create interpretation problems.
Firm Behavior	<p><i>Reliability</i></p> <ol style="list-style-type: none"> 1. External data sources are generally free of interpretation errors and researcher inference. This is enhanced when interrater reliability techniques are used to correlate scores of multiple judges. 2. Secondary data is typically free of managerial bias or non-respondent bias. 3. Findings can be compared across studies and studies can readily be replicated. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Economy: relatively low cost to administer. 2. Convenience: few respondents (judges) required. 	<p><i>Validity</i></p> <ol style="list-style-type: none"> 1. Difficult to assess how accurately secondary sources represent underlying constructs. 2. Construct measurement may be imprecise if data sources are incomplete and/or do not capture the range of relevant items under study. 3. External data content may be contaminated with misleading or extraneous information. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Interpretability: accuracy may suffer depending on the expertness of judges. 2. Convenience: can be "messy" if extensive secondary sources are required.

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Table 1. *continued*

<i>Approach</i>	<i>Advantages</i>	<i>Disadvantages</i>
Resource	<i>Reliability</i>	<i>Validity</i>
Allocations	<ol style="list-style-type: none"> 1. Archival measures, especially firm financial data and organizational demographics, are generally easy to confirm. 2. Standardized resource allocation measures, such as expenditures, can be compared across time and across firms, and replicated across studies. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Economy: a low cost method of measuring EO via resource allocations. 2. Convenience: data collection is simple if data is accessible. 	<ol style="list-style-type: none"> 1. Archival measures at best represent only outcomes—the results of decisions and practices. They generally do a poor job of tapping underlying constructs, thus construct validity may be quite low. They can provide adequate performance measures. 2. Resource allocation measures may not accurately reflect the content of firm-level activities. 3. Resource allocations may lack relevance if industry-level practices and trends are not considered. <p><i>Practicality</i></p> <ol style="list-style-type: none"> 1. Interpretability: too narrowly constructed for fine-grained analysis.

orientation. The pros and cons of each measurement technique are also discussed in terms of three practicality issues: economy, convenience, and interpretability.

As Table 1 indicates, there are a number of advantages and drawbacks to each of the approaches to measuring EO, and significant tradeoffs among them regarding validity, reliability, and practicality. For instance, scales that tap into management perceptions can be designed to assess very specific constructs, and hence, can be quite useful indicators of those underlying constructs. However, scales that measure management perceptions may suffer from problems with validity. The most salient of these include difficulty in generalizing findings across studies, and differences in perceptions among managers within the same firm. Measurements of firm behavior and firm resource allocations can also suffer from problems with validity. For instance, direct assessment of firm behavior may be problematic due to difficulty in determining the relative importance of different types of firm behavior or of specific competitive actions (c.f. Miller & Chen, 1994). Also, resource allocations do not directly assess entrepreneurial orientation itself (Kochhar & David, 1996). Hence, resource allocations are somewhat removed from the actual construct of interest and, consequently, validity suffers. There are also tradeoffs between the approaches regarding practicality. Managerial perceptions, for instance, can be costly and time consuming to obtain if management interviews and/or travel is required. By contrast, firm behavior and resource allocations can generally be assessed archivally at correspondingly less cost in terms of both time and money.

This discussion suggests that the advantages and disadvantages of each of the approaches to operationalizing EO are complementary. The reciprocal nature of these approaches provides a powerful argument for multiple approaches to op-

erationalizing the EO construct. Therefore, we will now address triangulation of methods as a means of improving the reliability and validity of EO research.

Enhancing EO Measurement Via Triangulation

Combinations of the measurement techniques described above could be used to achieve greater measurement accuracy via triangulation. Triangulation is a research technique wherein multiple methods are used to analyze the same theoretical question (Campbell & Fiske, 1959). For example, researchers might triangulate on firm performance by comparing archival reports found in financial statements and the informed judgments of industry experts with the perceptual measures of firm executives obtained from a field study. Many researchers regard triangulation as a highly preferable research method because it can both detect problems with and confirm the validity of findings. Thus, it has traditionally been promoted as an ideal methodological strategy (e.g., Runkel & McGrath, 1972).

To enhance EO research, triangulation could be used to verify the usefulness of the three approaches suggested in this paper and to identify potential problems with operationalizations of the EO construct. For example, consider a study designed to measure the EO dimensions of innovativeness, proactiveness, and risk taking. To begin, Covin and Slevin's (1989) nine-item scale that measures these dimensions using managerial perceptions represents a reasonable starting point because it has been applied successfully in numerous studies of EO (e.g., Miles & Arnold, 1991). Firm behaviors could be measured by examining published evidence of product line enhancements or technological upgrades to indicate innovativeness; first-mover activities that suggest proactiveness; and strategic actions such as international expansion into countries with high risk factor rankings to depict risk taking. The third component in a triangulation schema, resource allocations, could be assessed by investigating archival reports of relative levels of investment in factors such as R&D, technical personnel, new product development, facilities expansions, and entry into unexplored markets. Each operationalization provides a different, yet complementary view of EO. For instance, the data on management perceptions of a firm's EO provides a rich and detailed view of the firm's posture and can be regarded as having a high degree of construct validity. The difficulty of replicating such studies, however, may necessitate the use of measures of firm behavior or resource allocations to increase the reliability of the assessment of the firm's EO. Thus, by evaluating how closely the individual measures are aligned with one another and/or how similarly they are related to a secondary variable, researchers can appraise the effectiveness of the different approaches. This, in turn, can aid in modifying faulty operationalizations and guide researchers toward more accurate measures.

Even though a research strategy involving triangulation sounds promising, the ideal of triangulation is seldom realized (Martin, 1982). Several factors typically impede the actual use of triangulation in empirical studies. First, a multimethod approach is more costly. In addition to the cost of administering different types of procedures, more time and skills on the part of the researchers are required to prepare for such a study (Jick, 1979). Triangulation, then, is an unlikely choice when considered only in terms of practicality — one of the

aforementioned tests of sound measurement. Second, Martin (1982) reports that there are methodological reasons that also inhibit widespread use of triangulation. Use of multiple approaches often results in competing conclusions, that is, findings with considerable levels of methods variance. Although this is clearly informative, it may be an outcome that researchers consider more troubling than revealing. A related problem is that journal editors are often reluctant to publish studies that highlight multiple methods preferring instead “to publish articles that rely on a restricted set of methodological choices” (Martin, 1982:31). Except for studies where the aim is to compare methods, an article that uses multiple approaches, especially one that reports conflicting findings, may be a less attractive candidate for publication.

For investigating operationalizations of the EO construct, there may be several “partial” approaches that can be employed even if a “full” triangulation model is not practical. For example, a realistic strategy for measuring EO could be achieved by combining resource allocation and firm behavior approaches, two relatively economical methods. Both rely on analysis and interpretation of existing records, a technique that requires relatively few raters and is frequently less time consuming than other methods such as content analysis of management interviews. Financial information regarding resource allocations and published accounts of firm actions would yield data from two different methodologies that could be used for hypothesis testing as well as compared to assess the appropriateness of different operationalizations. Such approaches may be especially important for entrepreneurship research since a number of central concepts are still in a developmental stage and theoretical and definitional issues need to be examined empirically.

Zahra and Covin’s (1993) study investigating the link between business strategy, technology policy, and firm performance is an exemplar of such research. Those authors corroborated their data concerning managerial impressions of firm technology policy with data from secondary sources. For instance, management survey-based data concerning process innovations was found to be highly correlated ($p < 0.001$) with a component of R&D spending. Secondary sources were also consulted to assess the reliability of the survey-based measures of new product introductions. In this case, the research benefits from the high construct validity associated with the survey-based measures, and the reliability of the secondary data. Such “partial triangulation” greatly enhances both the validity and reliability of entrepreneurship research without placing undue burdens on the researcher. We encourage researchers to examine the tradeoffs between the effort associated with increased data quality and the potential rewards.

To investigate issues of validity, reliability, and triangulation in EO research, a set of recent studies employing one or more of the three approaches to EO measurement discussed in this paper was compiled through a review of the *Academy of Management Journal*, *Journal of Management*, *Strategic Management Journal*, *Journal of Business Venturing*, and *Entrepreneurship Theory & Practice* from 1995 to present (see Table 2). The examination of the studies suggests that triangulation, and tests for reliability and validity are relatively infrequently performed. The highest incidence of testing for reliability was found

Table 2. Reliability, Validity, and Triangulation in Recent Studies Examining Dimensions of EO

<i>Author(s)</i>	<i>Measure</i>	<i>EO Dimension</i>	<i>How Measured</i>	<i>Sample</i>	<i>Reliability or Validity Testing</i>	<i>Multiple Level of Methods Analysis</i>	<i>Summary Findings</i>
Aragon-Correa, 1998	Management	Proactiveness	Original scale item	105 CEOs of firms in 10 different industry sectors	Reliability tested Validity tested	No	Firm Strategic proactiveness related to efforts to safeguard the natural environment
Barney, Busenitz, Fiet, & Moesel, 1996	Management Perceptions	Innovativeness	Original scale items based on Porter, (1980) and Sandberg & Hofer, (1987)	205 new ventures	Reliability tested Validity not required	No	Firm Differences exist among new venture teams regarding views towards management assistance from venture capitalists
Barringer & Bluedorn, 1999	Management Perceptions	Innovativeness, Risk taking, Proactiveness	Scale items based on Covin & Slevin, (1986)	169 manufacturing firms	Reliability tested Validity tested	Yes	Firm Positive relationship between corporate entrepreneurship intensity and various strategic management practices
Becherer-Maurer, 1997	Management Perceptions	Innovativeness, Risk taking, Proactiveness	Scale items based on Covin & Slevin, (1989)	147 entrepreneurs who had started or purchased a business	Reliability tested Validity not reported	No	Firm EO directly related to change in profits, partial support for moderating effect of environment
Busenitz & Barney, 1997	Management Perceptions	Risk taking	Jackson Personality Inventory	124 entrepreneurs and 95 managers from large firms	Reliability tested Validity not reported	No	Individual Entrepreneurs and managers differ in decision making style

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Table 2. continued

Author(s)	Measure	EO Dimension	How Measured	Sample	Reliability or Validity Testing	Multiple Methods	Level of Analysis	Summary Findings
Chaganti, DeCarolis, & Deeds, 1995	Management Perceptions	Autonomy	Original scale items	903 business owners from the National Federation of Independent Business	Reliability not reported Validity not reported	No	Individual	Entrepreneurs' influence capital structure decisions
Chen & Hambrick, 1995	Firm Behavior	Competitive aggressiveness, Proactiveness	Aggressiveness: average amount of time a firm spent to execute an announced action; Proactiveness: total number of actions in year/Number of routes	Content analysis of responses of 28 large and small airlines chronicled in <i>Aviation Daily</i>	Reliability not reported Validity not reported	No	Action—response dyad	Small airlines were more active and speedy in initiating and executing competitive actions than large airlines
Deeds, DeCarolis, & Coombs, 1998	Resources Allocations	Innovativeness	R&D intensity: 3 year average of R&D expenditures/ Total expenditures	89 biotechnology firms	Reliability not reported Validity not reported	No	Firm	Intense R&D investment improves firm performance
Dess, Lumpkin, & Covin, 1997	Management Perceptions	Innovativeness, Risk taking, Proactiveness	Scale items based on Hart, (1991)	32 non-diversified firms from a variety of industry segments	Reliability tested Validity not reported	No	Firm	Four strategy-making processes identified; strategy-making process, strategy, and environment interact to influence performance.

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Table 2. *continued*

<i>Author(s)</i>	<i>Measure</i>	<i>EO Dimension</i>	<i>How Measured</i>	<i>Sample</i>	<i>Reliability or Validity Testing</i>	<i>Multiple Methods Analysis</i>	<i>Summary Findings</i>
Hitt, Hoskisson, & Kim, 1997	Resource Allocations	Innovativeness	R&D intensity (3 year average): R&D expenditures/Total number of employees	295 midsize and large firms	Reliability not reported Validity not reported	No	Firm International diversification is positively related to R&D intensity
Hitt, Hoskisson, Johnson, & Moesel, 1996	Resource Allocations	Innovativeness (internal-inputs)	R&D intensity: R&D expenditures per \$1000 of sales	250 mid and large size industrial firms	Reliability not reported Validity tested	No	Firm Firms engaging in mergers and acquisitions engage in less internal innovation and more external innovation
Hitt, Hoskisson, Johnson, & Moesel, 1996	Firm Behavior	Innovativeness (internal-outputs)	New product intensity: Mean of new products introduced over two years/Mean of sales over two years	250 mid and large size industrial firms	Reliability not reported Validity tested	No	Firm Firms engaging in mergers and acquisitions engage in less internal innovation and more external innovation
Hitt, Hoskisson, Johnson, & Moesel, 1996	Management Perceptions	Innovativeness (external)	Original scale items	250 mid and large size industrial firms	Reliability tested Validity tested	No	Firm Firms engaging in mergers and acquisitions engage in less internal innovation and more external innovation
Hundley, Jacobson, & Park, 1996	Resource Allocations	Innovativeness	R&D intensity: R&D expenditures/Sales revenues	454 U.S. and 177 Japanese manufacturing companies	Reliability not reported Validity not reported	No	Firm Profitability declines lead to increased R&D intensity in Japanese firms

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Table 2. *continued*

<i>Author(s)</i>	<i>Measure</i>	<i>EO Dimension</i>	<i>How Measured</i>	<i>Sample</i>	<i>Reliability or Validity Testing</i>	<i>Multiple Methods Analysis</i>	<i>Summary Findings</i>
Kassiech, Radosevich, & Umbarger, 1996	Management Perceptions	Innovativeness	Entrepreneurial Attitude Orientation Scale from Robinson, Stimpson, Huefner, & Hunt, (1991)	237 inventors from three large national laboratories	Reliability tested Validity not reported	No	Lack of support from laboratories did not appear to affect entrepreneurial attitudes on the part of the inventors
Kelm, Narayanan, & Pinches, 1995	Resources Allocations	Innovativeness	Relative R&D intensity: 3 year average firm R&D intensity (R&D exp./sales)/3 year average industry R&D intensity	501 new product introduction or progress announcements for firms in 23 industries	Reliability not reported Validity not reported	No	The variables related to the market value associated with firms' R&D projects differ between the innovation stage and the commercialization stage
Knight, 1997	Management Perceptions	Innovativeness, Proactiveness	Scale items based on Khandwalla (1977)	258 French and English speaking CEOs (208 English, 50 French)	Reliability tested Validity tested	Yes	ENTRESCALE cross-culturally valid and reliable
Koberg, Uhlenbruck, & Sarason, 1996	Management Perceptions	Innovativeness	Adapted from Miller & Friesen, (1982)	326 CEOs of non-diversified firms	Reliability tested Validity not reported	No	Life cycle stage found to be contingency factor in organizational innovation
Kochhar & David, 1996	Firm Behavior	Innovativeness	Total number of new product announcements	135 manufacturing firms in several industry segments	Reliability not reported Validity not reported	No	Institutional ownership of firm shares may increase firm innovation

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Table 2. continued

Author(s)	Measure	EO Dimension	How Measured	Sample	Reliability or Validity Testing	Multiple Level of Methods Analysis	Summary Findings
Kochhar & David, 1996	Resource Allocations	Innovativeness (control variable)	R&D intensity: R&D expenditure per employee	135 manufacturing firms in several industry segments	Reliability not reported Validity not reported	No Firm	Institutional ownership of firm shares may increase firm innovation
Kotabe & Swan, 1995	Firm Behavior	Innovativeness	New product innovations coded from announcements in the <i>Wall Street Journal</i>	905 new product innovations announced in the <i>Wall Street Journal</i>	Reliability tested Validity not reported	No Firm	Small firms and horizontal linkages are among the largest contributors to product innovativeness
Lerner, Brush, & Hisrich, 1997	Management Perceptions	Autonomy	Scale items based on Hisrich & Brush, (1982; 1985)	220 women entrepreneurs	Reliability tested Validity not reported	No Individual	Autonomy motivation negatively related to revenues
Palich & Bagby, 1995	Management Perceptions	Risk taking	Scale developed by Gomez-Mejia & Balkin, (1989)	92 entrepreneurs and non-entrepreneurs	Reliability tested Validity not reported	No Individual	Entrepreneurs don't perceive themselves as risk takers, but tend to view business situations more positively than others
Rajagopalan, 1997	Management Perceptions	Innovativeness	Original scale items	50 large electric utility firms	Reliability tested Validity not reported	No Firm	Stock-based incentive plans lead to increased performance among firms with Prospector strategic orientations

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Table 2. *continued*

<i>Author(s)</i>	<i>Measure</i>	<i>EO Dimension</i>	<i>How Measured</i>	<i>Sample</i>	<i>Reliability or Validity Testing</i>	<i>Multiple Methods Analysis</i>	<i>Level of Analysis</i>	<i>Summary Findings</i>
Sapienza & Grimm, 1997	Management Perceptions	Innovativeness, Risk taking, Proactiveness	Scale items based on Covin & Slevin, (1989)	70 CEOs involved in founding of shortline railroads	Reliability tested Validity not reported	No	Firm	EO not related to performance
Shane, Venkataraman, & MacMillian, 1995	Management Perceptions	Autonomy	Original scale items	1,228 individuals from 30 countries and 4 different organizations	Reliability tested Validity not reported	No	Group	Uncertainty avoiding, power distant, and collectivist societies exhibit different preferences for innovation champion behavior
Sitkin & Weingart, 1995	Management Perceptions	Risk taking	Original scale items	38 MBA students	Reliability tested Validity not reported	No	Individual	Risk propensity and perception mediate the effects of problem framing and outcome history on risky decision-making behavior
Smith, Grimm, Wally, & Young, 1997	Firm Behavior	Competitive aggressiveness, Proactiveness	Total competitive activity, Degree of rivalry instigation, Proclivity toward price cutting, Speed of response to competitor actions	Content analysis of actions and responses of 28 large and small airlines chronicled in <i>Aviation Daily</i>	Reliability not reported Validity not reported	No	Firm-year, Action-response dynam	Strategic group membership is an indicator of the manner by which firms compete with one another

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Table 2. continued

<i>Author(s)</i>	<i>Measure</i>	<i>EO Dimension</i>	<i>How Measured</i>	<i>Sample</i>	<i>Reliability or Validity Testing</i>	<i>Multiple Methods</i>	<i>Level of Analysis</i>	<i>Summary Findings</i>
Tan, 1996	Management Perception	Innovativeness, Risk taking, Proactiveness	Original scale items	53 Chinese business owners	Reliability tested Validity not reported— tested in previous study	No	Firm	EO related to various environmental variables
Zahra & Covin, 1995	Management Perceptions	Innovativeness, Aggressiveness, Risk taking	Miller & Friesen's (1982) index	108 firms from diverse industry segments	Reliability tested Validity tested	No	Firm	Corporate entrepreneurship becomes more effective over time, particularly in hostile environments
Zahra, 1996 (a)	Management Perceptions	Innovativeness, Proactiveness	Original scale items	138 large manufacturing companies	Reliability tested Validity tested	Yes	Firm	Executive stock ownership and long-term institutional ownership positively associated with corporate entrepreneurship
Zahra, 1996 (b)	Management Perceptions	Innovativeness, Proactiveness	Original scale items	176 CEOs of established manufacturing companies	Reliability tested Validity not reported	No	Firm	Environment moderates the relationship between technology policy and performance

in those studies employing managerial perceptions to measure one or more of the EO dimensions. This may be due to the relative ease of calculating Cronbach's alpha — a measure of internal consistency reliability (Pedhazur & Schmelkin, 1991). The lowest incidence of testing for reliability (none) was for constructs measured using resource allocations. This is probably due to the presumed inherent reliability of such measures since they are typically obtained from audited financial statements. Firm behavior was subjected to testing for reliability in one of the five articles that used firm behavior. Again, this may be due to the relatively high presumed reliability of archival measures.

Testing for validity and the use of multiple methods were observed infrequently enough to warrant additional comment. Of the 32 measures listed in the table, eight were tested for validity, and three of those were from one study — Hitt, Hoskisson, Johnson, and Moesel, (1996). One test for validity was performed because the purpose of the study was to test a scale measuring EO for reliability and validity in a cross-cultural setting — Knight (1997). Two of the remaining measures were validated using multiple methods. For example, Zahra (1996a) used survey data to measure three dimensions of corporate entrepreneurship — innovativeness, proactiveness, and strategic renewal. The author then validated the scale by correlating it with Miller's (1983) scale, correlating it with an archival indicator based on R&D spending, and testing for interrater reliability by surveying a second executive from a subsample of the responding companies.

The Nature of the Research Process and the Selection of EO Measures

The discussion of the three approaches to measurement is similar to Mintzberg and Waters' (1985) distinction between intended, emergent, and realized strategies. That is, while survey measures may gauge intent, resource allocations or observation of firm behavior may more clearly capture emergent or realized entrepreneurial behavior. Such a delineation is also akin to the distinction in the strategic management literature between process and content (Bourgeois, 1980): survey measures may depict the processes associated with firm strategies, whereas resource allocations and firm behaviors may describe the content of firm strategies.

This is a useful distinction because it allows one to test the relationship between an entrepreneurial orientation and decision outcomes. Hence, the choice of measures may hinge upon the nature of the research question. The selection of measures may vary depending on whether one is examining the content of entrepreneurial strategy, the process of entrepreneurship, or the relationship between the two. On the other hand, depending on the availability of data, one may be forced to infer from resource allocations or firm behaviors the entrepreneurial orientation of a firm. For example, significant resources devoted to research and development may indicate a commitment to innovation that reveals a strong entrepreneurial orientation on the innovativeness dimension.

Debate regarding the relative suitability of various measurement methods is not uncommon in the management literature. Boyd, Dess, and Rasheed (1993: 220) argue, however, that “such debate is short-sighted — the central issue is not

superiority, but rather determining which perspective is most appropriate theoretically for a given research question.” We agree and would add that resource availability and the interpretability of results also influence the choice of measures. The discussion that follows evaluates potential EO measurement techniques in terms of three considerations — theory development, resource availability, and interpretability.

Martin’s (1982) ‘garbage can’ model of the research process provides a useful framework for a discussion of theory, resource availability, and interpretability in the operationalization and measurement of EO. Martin’s (1982) model of the research process is roughly analogous to the nonrational model of organizational decision making (e.g., March & Simon, 1958). Briefly, Martin’s (1982: 22) model “is concerned with problems that are theoretical, resources that are available to research participants, choice opportunities as they refer to selection of methodology, and solutions that are the result of the research process.” The rational model of the research process would hold that the selection of a research problem and relevant theory, selection of method and design of the study, and the collection and analysis of data are sequential and discrete activities. As Martin (1982) argues however, such is often not the case. As a practical matter, the research process is constrained by a number of factors that cause it to depart from the rational ideal. The nonrational model of the research process is a useful framework for the present discussion because it acknowledges the multidimensional nature of the tradeoffs that explicitly or implicitly guide the selection of research questions, methods, data sources, and interpretation of results. In the following paragraphs we discuss the impact of these issues in terms of how they might guide a decision to use one or more of the three approaches to measuring EO.

Theory Development

The different methods of operationalizing EO reflect different perspectives on how an entrepreneurial orientation might be manifested. As the discussion on triangulation suggests, these approaches are complementary and interactive. Yet each represents a somewhat competing view of how important different types of entrepreneurial activity are to a firm’s success. Understanding and improving performance is a central aim of both strategic management (Schendel & Hofer, 1979) and entrepreneurship (Murphy, Trailer & Hill, 1996). To evaluate the merits of these three methods of measuring EO, therefore, we need to ask how they enhance our understanding of firm performance. To do so, the effectiveness of the three approaches — managerial perceptions, firm behavior, and resource allocations — can be analyzed in a contingency framework.

Configurational models of EO might help address the dynamics surrounding the EO–performance relationship with greater precision. Figure 1 describes contingency approaches to investigate EO issues. Studies in both the strategy literature (e.g., Miller, 1988; Rajagopalan, Rasheed & Datta, 1993) and the entrepreneurship literature (e.g., Sandberg & Hofer, 1987; Dess, Lumpkin & Covin, 1997) have illustrated the importance of such multivariate methods to understanding entrepreneurial processes.

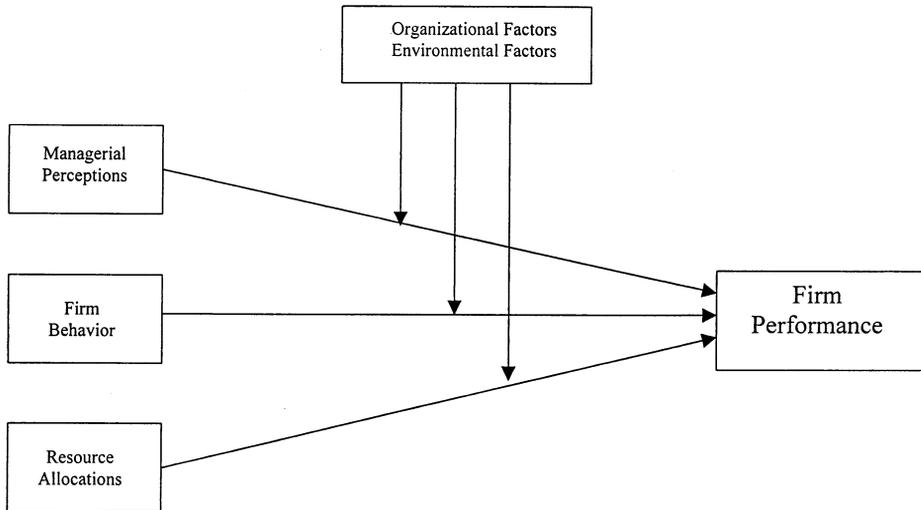


Figure 1. Enhancing Measurement of Entrepreneurial Orientation Via Contingency Modeling

Numerous researchers (e.g., Stinchcombe, 1965) have described the types of factors that might influence the EO–performance relationship using two broad categories: organizational factors and environmental factors. Organizational factors include internal contingencies such as organizational size, structure and strategy, and the characteristics of the top management team (TMT). Environmental factors include external forces such as industry trends, growth rates and business cycles, as well as the power of a firm’s customers, suppliers and competitors.

Some types of contingencies may be tested more precisely by using different methods of operationalizing EO. In some cases, even partial triangulation may be precluded by the nature of the research question. For example, it might be difficult to test the impact of TMT characteristics on firm performance by using a resource allocations approach to measuring EO. That is, archival reports of expenditures on R&D or resource commitments that are revealed by analyzing debt ratios or other financial statement items would probably fail to capture important nuances of TMT interactions. Testing EO via surveys of managerial perceptions, by contrast, is more likely to provide insights into the views of various management team members. Thus, when examining the role of TMT on the EO–performance relationship, perceptual measures of EO may provide more precise information. The opposite might be the case for researchers investigating firm size, another organizational factor. Here, because a firm’s size and its resource endowments are usually correlated, relative resource allocations might be a more meaningful indicator of EO than managerial perceptions. Firm behavior, the type of information revealed by news headlines and abstracts from print media, might repre-

sent a middle ground that could reflect both managerial decision processes as well as resource allocation issues.

Empirical tests of environmental contingencies might also aid the development of improved techniques for measuring entrepreneurial orientation. For example, hypothesis tests of the moderating role of environment on the EO–performance relationship that relied exclusively on perceptual measures of EO and environment might be compared to a similar test using firm behavior or resource allocation measures to score EO. Using techniques for confirming the validity and reliability of findings, the three approaches could be evaluated to determine if one is relatively more effective. Institutional or archival measures of environment could also be explored in terms of which measurement method most reliably taps into the underlying dynamics of the relationship between EO, performance, and the environment. Such empirical tests, for example, may expose findings that disconfirm previous research. Future research may be modified through the reexamination of the erroneous interpretive understanding presumed in the failed hypotheses. Thus, empirical testing using contingency modeling may assist in selecting among competing interpretive understandings those deserving of additional inquiry (Lee, 1991).

To do so, future research needs to address these issues with an aim of continuous improvement of theory development and measurement technique. All three of the above approaches to measurement implicitly assume that the underlying constructs reside inside a “black box” that prevents their direct examination. To address these issues, researchers should employ more fine-grained research methods (Harrigan, 1983) such as in-depth case analysis, that would better capture the inherent “richness” of entrepreneurial processes and behaviors. Also, use of multiple measures in tandem with qualitative approaches, perhaps from each of the categories discussed above, would allow for triangulation of methods (Jick, 1979). Such multimethod approaches could aid in addressing problems that are unique to the study of entrepreneurship. For example, a common problem when studying entrepreneurial firms is the high incidence of single respondents. Young and small firms are often managed by a key executive who is the only top decision maker. Triangulation approaches which serve to confirm the views of such respondents could minimize the incidence of common method variance in entrepreneurship research findings. A related problem is that executives of larger firms, especially rapidly growing firms, are often unavailable to participate in interviews or complete lengthy questionnaires (Hambrick & Mason, 1984). Alternative methods, such as resource allocations and/or firm behaviors might be realistically employed if prior research had indicated that they were reasonable proxies for perceptual data.

Resource Availability

The rational model of the research process suggests that resources are a passive component of the research endeavor. The nonrational or “garbage can” (Martin, 1982) view of the research process, on the other hand, assigns resources a much more active role. Resources can be broadly defined to include such things as data availability, expertise, time, financing, and so on. Resources can influence

the selection of methodology in a number of ways. For instance, data availability may hinge, at least indirectly, on the size of the firm and whether or not the firm is privately held. Entrepreneurship research frequently concerns small companies that are not publicly traded and therefore are not required by the Securities and Exchange Commission to provide audited financial statements. Also, larger firms may be privately held and reluctant to disclose sensitive financial information. Hence, there may be a lack of archival data necessary to use resource allocations as a means of operationalizing EO. In the case of smaller firms, measurement of management perceptions via survey or interview may be a viable option. Given a sample of larger firms however, executives may not be available or willing to respond to requests for information (Hambrick & Mason, 1984). In the case of larger, newsworthy firms, content analysis of published articles concerning firm activities may provide a reasonable alternative. Such is frequently not the case with smaller firms as they are typically not covered in sufficient depth to avoid underreporting bias (Fombrun & Shanley, 1990). An exception might be when smaller firms are covered in an industry trade publication (e.g., Chen, Smith & Grimm, 1992).

As Table 2 indicates, firm behaviors are a relatively frequent means of operationalizing EO, at least for samples of large firms. That may be because of the relative accessibility of such data. For example, it is a relatively easy task (although somewhat time consuming) for researchers to content analyze headlines or abstracts and code actions into general categories such as "new product announcement" (Kochhar & David, 1996), or "innovative" (Lyon & Ferrier, 1998). As noted above however, for more sophisticated questions concerning such issues as the division of actions into strategic and tactical categories, or the determination of the time required for individual actions to impact firm performance, considerable time and expertise may be required (e.g., Miller & Chen, 1994). This is particularly true of multi-industry studies given the extensive industry expertise required to make such assessments.

Level of analysis may also influence data availability. At the individual level of analysis, the means of operationalizing EO frequently involves the application of a psychological-type battery to a group of individuals (e.g., Busenitz & Barney, 1997). Hence, the individual EOs of large company top executives have received comparatively little research attention, likely due to problems in obtaining access to those individuals. By contrast, at the industry level, average resource allocations may be the only practical means of assessing the level of entrepreneurship prevalent across a group of firms. Firm-level operationalization of EO may take the form of management perceptions (e.g., Zahra, 1996a,b), firm behaviors (e.g., Miller & Chen, 1994), or resource allocations (e.g., Hitt et al., 1996). The following example illustrates how data availability has influenced the use of archival data versus management perceptions of group processes within management teams in both the upper echelons (Hambrick & Mason, 1984) and the entrepreneurship literature.

The popularity of the upper echelons perspective on strategic leadership derives, at least in part, from the relative ease of data collection. A fundamental tenet of the upper echelons perspective is that executives make choices based

upon their idiosyncratic experiences, dispositions, and value systems. Demographic characteristics are frequently employed as proxies for those underlying psychological phenomena. As Hambrick and Mason (1984: 196) note, not only are certain aspects of executive demography subjects of great a priori interest, but also “top executives probably are quite reluctant to participate in psychological batteries, at least in the numbers needed for an ongoing research program.” Hence, upper echelons researchers frequently rely on archival sources of demographic information such as the *Dun & Bradstreet Reference Book of Corporate Managements*, annual reports, and so on, to obtain data on top management teams. Thus, the availability of data are at least partly responsible for the large amount of demography-based studies of top management teams (c.f., Finkelstein & Hambrick, 1996).

In entrepreneurship research, the data availability issue takes a related form and is no less salient. Entrepreneurship research frequently involves the investigation of individual entrepreneurs, and management teams of small businesses. Demographic data on those individuals are generally not available from archival sources since small businesses are not typically catalogued in publications like the *Dun & Bradstreet Reference Book of Corporate Managements*, nor are they publicly traded with the corresponding disclosure requirements. Hence, while demography may be an issue of significant a priori interest to entrepreneurship researchers, that information must generally be gathered via survey or interview. In the case of EO research, the relative accessibility of entrepreneurs permits the use of management perceptions. Thus, it is not surprising that relatively little research has been done regarding the demography of entrepreneurial teams, early attempts to identify the traits characterizing entrepreneurs notwithstanding (c.f., Gartner, 1988). This may be due to concerns regarding the validity of demographic proxies (Finkelstein & Hambrick, 1996), or due to the broader repertoire of research questions permitted by surveys or interviews tailored to specific issues. An examination of Table 2 bears this out. Of the 21 studies listed in Table 2 that employ management perceptions, only one explicitly incorporated demography into the research model — Busenitz and Barney (1997).

Interpretation of Results

The interpretability of empirical results may also influence the choice of measure. When interpreting the results of empirical testing, researchers make certain implicit and explicit assumptions regarding the predictive validity and explanatory power of measures. One may interpret statistically significant empirical results as possessing certain descriptive and normative implications when the true nature of such relationships may be obscured by measures inappropriate for the purpose of the particular research (Emory & Cooper, 1991).

For instance, consider the relative interpretability of statistical results obtained using ‘fine-grained’ versus ‘coarse-grained’ (Harrigan, 1983) measures of entrepreneurial orientation. Depending on the nature of the theoretical question, management perceptions may provide considerably richer information regarding EO than resource allocations, which may be somewhat removed from the construct of interest. Firm behaviors may fall somewhere in between. They assess

entrepreneurial behavior directly but say little about entrepreneurial processes internal to the firm. Such processes must be inferred from resource allocations and firm behaviors. Management perceptions may provide a greater understanding of the causal links in models of entrepreneurial orientation. As Rosenberg (1968: 63) notes, "the greater one's understanding of the links in (a causal) chain, the better one's understanding of the relationship." Hence, when explanation of entrepreneurial processes is the objective, management perceptions may be the preferred measure of EO. If descriptive theory building is the goal, then any of the three methods may be appropriate contingent upon the demands of the theoretical question and resource availability.

Conclusion

The importance of entrepreneurship to the economy is reflected in its growing visibility as a topic in the popular business press as well as the increased attention it has received in the scholarly business literature. On the leading edge of entrepreneurship research are issues of definition and measurement. These issues are especially important to strategic management as an entrepreneurial perspective is often regarded as crucial to sound strategic management. The current paper endeavors to focus, therefore, on a key concept that is related to a strategy making and decision-making process at the heart of the strategy field, that is, entrepreneurial orientation. As such, this paper has addressed three approaches to measuring and operationalizing EO in an effort to advance understanding of the concept and further the goal of accurate prediction. To do so, three fundamentally different, yet complementary approaches to conceptualizing and measuring EO have been examined in terms of how they might (a) contribute to or detract from a richer understanding of the entrepreneurial orientation construct; and, (b) facilitate the development of both descriptive and normative theory. Additionally, this paper has examined the usefulness and practicality of different research methods that might employ these three approaches, ranging from the ideal of triangulation, to partial triangulation, to a "garbage can" approach to designing research.

Despite the seemingly disparate nature of these measures, the conceptual similarities between them in terms of how they influence performance outcomes may be greater than the measurement differences would suggest. When exploring measurement options, then, the important issue becomes the relative merits of each of the operationalizations. Sometimes, the answer to this question may be driven by the nature of the research process (e.g., Martin, 1982). At other times, the method of operationalization may stem from a desire to examine a specific research question. For instance, researchers may wish to examine patterns and speed of entrepreneurial actions over time and may therefore employ measures similar to those used in the competitive dynamics literature. Conversely, a researcher may be directly interested in how the perceptions of EO by specific functional area managers compare to overall firm-level perceptions and whether those differences are related to performance outcomes. For other research questions, it may be beneficial to employ multiple and diverse measures to enhance

validity and generalizability. In sum, disparate consequences, many that are not readily apparent, influence the viability of common measures of entrepreneurship. A more systematic and rigorous approach to EO operationalization and measurement will lead to greater validity, reliability, and convergence in entrepreneurship research. Developing viable and useful measurement theory is a key issue in the study of entrepreneurship (Low & MacMillan, 1988) and a necessary precursor to the development of normative theory — a fundamental objective of the strategy field (Barney, 1991).

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