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ACCOUNTING FOR PERFORMANCE VARIATION: HOW IMPORTANT ARE INTANGIBLE RESOURCES?

by

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Abstract

The primary mission of strategic management research is to explain variations in the performance of firms. As researchers have sought to explain differentials in firm performance, they have looked to the factors that underlie competitive advantage. For many years, industry structure factors were considered the key factors of interest although recently, the resource-based view of the firm (RBV) has taken center stage and posits that firm resources – namely intangible resources – rather than structural factors, are the underlying source of competitive advantage. However, this study demonstrates that research studies that have expressly set out to investigate intangible resources contain clear deficiencies. In an effort to overcome these deficiencies, theoretical and methodological improvements are developed to study intangible resources – and to verify the RBV. Through studying 291 firms, the results indicate that intangible resources are important factors in explaining variations in firm performance, even after accounting for the effects of tangible resources and industry structure factors. Interestingly, our finding with respect to capabilities suggests that this intangible resource might not be the “ultimate” source of sustainable competitive advantage, contrary to theory.

Keywords

Resource-based view of the firm, resources, assets, capabilities, industry structure, competitive advantage, firm performance

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INTRODUCTION

The mission of strategic management research is to explain variations in the performance of firms (Rumelt, Schendel & Teece, 1991). That is, research within the field of strategic management has a specific interest in theoretically predicting the factors that will account for performance differences among firms and empirically testing those factors. As strategy scholars have searched for differentials in firm performance, they have looked for the underlying sources that lead to sustainable competitive advantage. Although different explanations exist, recently, the resource-based view of the firm (RBV) has taken center stage.

The RBV posits that sustainable competitive advantage is determined by firm resources (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). However, the central proposition of the RBV holds that not all resources are sources of sustainable competitive advantage. Those resources that are most likely to underlie sustainable competitive advantage are primarily described as intangible, as opposed to tangible, in nature (Amit & Schoemaker, 1993; Coff, 1999; Dierickx & Cool, 1989; Michalisin, Smith & Kline, 1997, 2000). Indeed, according to Hitt, Bierman, Shimizu and Kochhar (2001, p. 14), “intangible resources are more likely than tangible resources to produce a competitive advantage.” Thus, generally speaking, intangible resources are of focal concern in examining the factors that account for performance variation.

Previous research that expressly examines intangible resources generally falls into two tracks. In the first track, CEOs and/or business owners are asked to rank order the importance of each resource (e.g., Aaker, 1989; Hall, 1992, 1993). However, these studies tend to lack theoretical grounding, offer no hypotheses, do not ascertain performance measures and do not conduct

any tests of statistical significance. Such studies offer no empirical evidence as to which resources might explain performance variation. The second track tends to employ a single major intangible factor – or a very select few – to account for performance variation (e.g., Michalisin et al. 2000). The major problem with this research approach is that firms are bundles of intangible *and* tangible resources and are unlikely to compete on the basis of a single intangible resource, important as it may be (Fleisher & Bensoussan, 2003). Furthermore, firms do not compete in isolation. That is, firms compete in industries where external, structural factors can significantly affect performance (Bain, 1959; Porter, 1980). Thus, studying an individual intangible resource (e.g., capabilities, reputation) apart from other factors might offer misleading results. That is, one-dimensional studies are likely to underestimate the biases associated with examining an individual resource as such studies do not simultaneously account for the effects of other factors, be they other resources or industry structure factors (cf. Huselid, 1995).

The objective of this study is to examine the importance of intangible resources in explaining performance variation. However, our test is differentiated from previous studies in a couple of key ways. Rather than focus on a single intangible or just a few, we operationalize our constructs to include two levels of intangibles, namely intangible assets and capabilities, in addition to tangible resources. We also include industry structure variables based on Porter's (1980) five forces model to capture potential external effects on performance variation. This approach offers two major benefits.

First, the justification for our approach is built upon the premise that the necessary resources needed to compete include those that are tangible while at the same time firms operate within structural factors of industry. However, given that intangible resources are of primary interest to the RBV, one would expect that after accounting for any variations in performance explained by

tangible resources and industry structure factors, intangibles should have sufficient explanatory power to improve the prediction of the performance variables. This is not only a more stringent test of intangible resources than previous research, but is also important for comparing the two primary theories of performance variation in the field of strategic management (Hambrick, 2004). Second, while the literature does describe intangible resources as the most important sources of sustainable competitive advantage (Amit & Schoemaker, 1993; Coff, 1999; Michalisin et al., 1997, 2000; Barney, 2001; Hitt et al., 2001), intangibles are typically grouped or classified into different categories with capabilities, or firm know-how, posited as the single most important resource to the firm (Collis, 1994; Grant, 1996; McEvily & Chakravarthy, 2002). By operationalizing intangible resources multi-dimensionally, our study provides opportunity to test the significance of the so-called most important resource against the effects of other resources and even external, structural variables.

To proceed, the next section highlights previous studies of intangible resources, with a specific emphasis on their limitations. In the third section, theory and hypotheses development are presented which is followed by the methods employed in the study. Following the methods section, the fifth section describes the results. We next outline limitations in the sixth section. In the last section, concluding remarks and a discussion are provided.

PREVIOUS RESEARCH ON INTANGIBLE RESOURCES

Although dominated by conceptual and theoretical advancements (Hoopes, Madsen & Walker 2003), one research stream has expressly set out to conceptualize, operationalize and study intangible resources (Aaker, 1989; Camelo-Ordaz, Martin-Alcázar & Valle-Cabrera, 2003; Carmeli, 2001; Carmeli & Tishler, 2004a, b; Hall, 1992, 1993; Michalisin et al. 2000). However, close inspection of these studies reveals a few noteworthy limitations.

First, several studies utilize simple ordinal or interval scales to ascertain the importance of intangibles. However, performance data are not obtained nor are psychometric evaluations of constructs or statistical tests of significance conducted (e.g., Aaker, 1989; Carmeli, 2001; Hall, 1992, 1993). This method makes it difficult to discern differentials in resources let alone their statistical significance with respect to accounting for performance variation, which is fundamental to strategic management research (Rumelt et al., 1991). Second, some studies clearly lack theoretical grounding and do not offer hypotheses, thus undermining justified tests of the RBV (e.g., Aaker, 1989; Hall, 1992, 1993). Third, other studies, while using statistical approaches, examine only a single or limited number of intangible resources (e.g., Michalisin et al., 2000). Studying a single or limited number of intangible resources, to the exclusion of other factors (e.g., tangible resources, industry structure variables) can bias results (Huselid, 1995). Lastly, several studies include relatively small samples sizes (≤ 100 firms – one study contains only 10 firms in its sample), thus generalizability is limited (e.g., Hall, 1993; Camelo-Ordaz et al., 2003; Carmeli, 2001; Carmeli & Tishler, 2004a, b; Michalisin et al., 2000).

In summary, we have highlighted a previous research stream that has purposely conceptualized, operationalized and examined intangible resources. However, the studies have a number of deficiencies. Among the most important include the lack of statistical testing to actually determine the association between intangible resources and performance variation; the study of only intangible resources to the exclusion of other factors that might impact performance; and, small sample sizes. To overcome these limitations, this study set out to make key improvements over previous approaches in empirically researching intangibles.

THEORY AND HYPOTHESE DEVELOPMENT

The factors that are necessary for firms to compete in the marketplace include both tangible and intangible resources (Barney, 1991; Wernerfelt, 1984). However, the RBV posits that not all

resources are sources of sustainable competitive advantage. As pointed out, it is to intangible resources that scholars have turned their attention in the quest to explain why there are variations in firm performance.¹ Unlike tangible resources, intangible resources are argued to be hard to purchase in the factor markets, hard to transfer between firms and hard to imitate (Barney, 1986a; Dierickx & Cool, 1989; Teece, 1998); they are not consumed when in use (Collis & Montgomery, 1998); and they affect multiple uses at the same time while serving simultaneously as inputs and outputs of corporate activities (Itami and Roehl, 1987). Barney (2001), Hitt et al. (2001), and Teece (1998) argue that to build sustainable competitive advantage today, firms must turn their attention to exploiting intangible resources.

The above arguments point to internal, intangible resources as the likely factors that account for performance variation. This approach differs fundamentally from the industrial organization (IO) economics inspired competitive forces approach championed by Porter (1980). Indeed, Porter (1980) argues that performance variation is directly associated with *external* factors; namely, the five forces (rivalry, ease of entry, threat of substitute products, bargaining power of buyers, bargaining power of suppliers) of industry structure. However, according to Hill and Deeds (1996), regardless of the attractiveness or unattractiveness of the structural forces of an industry, firms can leverage their resources to compete more effectively against other firms in such a way as to derive a competitive advantage that generates superior performance. Similarly, although not resource-based theories per se, the Chicago "Revisionist" School of industrial organization and evolutionary/neo-Austrian economic theories of strategy posit that performance variation is not explained by structural factors, but rather by the presence of specialized, high quality resources of firms, such as capabilities and knowledge routines

¹ We do acknowledge that under certain circumstances, tangible resources (e.g., inheriting a prime location for a retail business) might be a source of competitive advantage. However, it is unlikely that a given tangible resource will form the basis of a *sustainable* competitive advantage. Furthermore, there is ample theoretical evidence in the literature to support the proposition that intangible resources are far

(Demsetz, 1973; Jacobson, 1992; Nelson & Winter, 1982; Peteraf, 1993). Thus, from an RBV perspective, it is resources – namely, intangible resources – that underlie sustainable competitive advantage and are the focal factors of interest in explaining performance variation.

Intangible Resources

According to Hall (1992), a firm's intangible resources can be subdivided into assets and capabilities. Intangible assets represent "what a firm has" while capabilities represent "what a firm does". Following Hall's (1992) approach, we examine four classes of intangible resources, 1) intellectual property assets; 2) organizational assets; 3) reputational assets; and 4) capabilities. While other classes might exist, these four were chosen as they serve as an adequate representation of a firm's intangible resource base (Barney, 1991; Grant, 1991; Hall, 1992; Srivastava, Fahey & Christensen, 2001).

Intellectual property assets. Knowledge has become a prime focus of strategic management theorists (e.g., Grant, 1996; McEvily & Chakravarthy, 2002; Teece, 1998). Key topics of discussion involve knowledge in the context of routines (Nelson & Winter, 1982), capabilities (Day, 1994) and core competencies (Prahalad & Hamel, 1990). However, one "output" of knowledge, intellectual property, has long been of interest to scholars as a source of sustainable competitive advantage due to the isolating mechanism of legal property rights (Hoopes et al., 2003). Thus, given that IPA, such as patents and copyrights, are intangible assets that are protected by law, competitors cannot perfectly imitate them. Such legal protection benefits the building and sustaining of a firm's competitive advantage, which preserves the economic benefits of IPA from being eroded (Hoopes et al., 2003).

Organizational assets. Organizational assets contribute order, stability and quality to the firm (Brooking, 1996). For example, culture defines and underpins the unique values and behaviors

more likely to be sources of sustainable competitive advantage than tangible resources, which is the core

of firms, which in turn creates an environment where employees can excel to meet market challenges more effectively than competitors (Barney, 1986b). According to Barney (1986b), culture is a key driver of sustainable competitive advantage. Human resource management (HRM) policies, on the other hand, not only reflect the firm's policies as to the recruitment and selection of employees, but also to the various practices that nurture, develop, and retain talent; namely, training, compensation and recognition programs that directly impact the human capital of firms (Huselid, 1995). Such programs are characterized by path dependency and specificity, thus creating a source of economic benefit that is difficult to imitate by competing firms (Becker & Huselid, 1998; Huselid, 1995; Lado & Wilson, 1994). Effective organizational structure, according to Sanchez and Mahoney (1996), is also a key intangible asset affecting the ability of a firm to perform well in the market. The organizational structure of the firm may serve as the basis for synergistic development of product innovations across many departments, and even divisions, which competitors cannot easily imitate.

Reputational assets. Numerous marketing scholars have emphasized the impact of reputation on firm performance (e.g., Day & Wensley, 1988; Srivastava et al., 2001). Reputational assets, in their various forms, “summarize a good deal of information about firms_and shape the responses of customers, suppliers, and competitors” (Teece, Pisano & Shuen 1997, p. 521). Similarly, as signaling theory suggests, since consumers in many situations are not able to tell the quality of the goods offered for sale prior to purchasing, reputational assets can inform them about the trustworthiness, credibility and quality of the firm. Therefore, reputational assets are a key driver of consumers' positive reactions toward a firm vis-à-vis its competitors, thus positively impacting firm performance.

Although not legally protected by property rights, reputation is argued to be a path- dependent asset that is characterized by specificity and social complexity, thus creating a barrier to

premise behind our study.

imitation (Srivastava et al., 2001). Porter (1980) suggests that a strong reputation can deter competitors from entering markets thus protecting the erosion of firm performance. Finally, Dierickx and Cool (1989) argue that reputation is built, not bought, suggesting that it is a nontradeable asset that can capture and sustain economic benefits. Given the argued importance of intangible assets, we offer the following hypothesis:

H1. Intangible assets will explain performance variation after accounting for the effects of tangible resources and industry structure variables.

Capabilities. Following Hall's (1992) logic, capabilities represent an intangible resource that constitutes what the firm "does" as opposed to "what it has." However, developing hypotheses with respect to capabilities is problematic largely because of the disagreements over how to conceptualize this construct. Indeed, perhaps of all of the resource constructs that constitute the RBV, capabilities remain the most amorphous and difficult to define, having been conceptualized in multiple and inconsistent ways (Hoopes et al., 2003). Amit and Schoemaker (1993), for example, conceptualize capabilities as organizational processes. Day (1994) argues that although closely intertwined with organizational processes, capabilities are separate and can be defined as skills and accumulated knowledge (cf. Hall, 1992). However, according to Grant (2002), whether defined as organizational processes (or organizational routines) or as firm level "activities" such as research and development, marketing, customer service and the like, know-how is the fundamental building block of capabilities (see Grant [1996] for a corroborating explanation). Know-how involves knowledge that is tacit, highly complex, causally ambiguous and difficult to codify (Nelson & Winter, 1982). Crossan, Lane and White (1999) suggest that know-how is mainly held and exercised by individuals and "collectively" by teams and even the firm at large. Thus, it can be argued that know-how is the basis of capabilities, whether conceptualized as routines or specific firm level activities.

Capabilities, as reflected by the firm's know-how, are widely held to be the most important source of firm performance. Grant (1996), for example, observes that the productivity and performance of any firm is solely dependent upon the know-how of its employees. Itami and Roehl (1987) argue that employee know-how is the main driver of a firm's performance because employees decide how, when and where a firm will use its other resources for gaining a market advantage. Similarly, Castanias and Helfat (1991, 2001) suggest that firm performance is driven by the know-how of managers. Coff (1999) also argues that managerial know-how is one of the most essential resources for generating a sustainable competitive advantage.

Conversely, the ability to build and maintain advantageous relationships external to the firm is not only essential for competitive success (Powell, Koput & Smith-Doerr, 1996), but is largely reflective of the knowledge-generating, knowledge-sharing and learning ability of the firm (Slater, 1997). In other words, building and maintaining advantageous external relationships is critical for the firm and largely consists of a collective, firm-wide effort of the know-how of a variety of employees and managers. Thus, these relationships constitute a socially complex – and unique – interchange of tacit know-how between firms and their external constituents. Given the idiosyncratic nature of building and maintaining these relationships, their specificity to individual firms and their orientation to transacting highly specialized knowledge, it is a resource that cannot be traded on open markets and is not easily observable by competitors, all of which creates a formidable barrier to imitation. Given the preceding discussion, the hypothesis concerning capabilities is developed.

First, compared to capabilities, tangible resources are generally described as observable, easy to acquire, and easy to replicate (Dierickx & Cool, 1989; Teece, 1998). Second, intangible assets have been described as resources that are created as a result or outcome of capabilities. For example, Michalisin et al. (1997) argue that intellectual property assets are an outcome of

the firm's know-how. Hall (1992) and Fombrum (1996) suggest that reputational assets are built as a result of previous managerial decisions and actions, which stem from a firm's management capabilities. Lastly, capabilities are predominately viewed as, overall, a superior resource and the *most* critical determinant of a firm's performance because they are highly tacit in nature, reflect substantial time compression diseconomies, are the most socially complex and are necessary for the development and use of the firm's other resources (Dierickx & Cool, 1989; Grant, 1996; McEvily & Chakravarthy, 2002). Logically, if capabilities are more resistant to competitor imitation than tangible resources or intangible assets due to their substantial isolating mechanisms, and if capabilities underpin the development and deployment of all other resources, then:

H2. Capabilities will explain performance variation after accounting for the effects of tangible resources, intangible assets and industry structure variables.

METHODS

Sample

Certain parameters for the selection of the sample were considered necessary. First, in order to ensure an adequate sample size and to maximize the generalizability of the results, firms operating in both manufacturing and services industries constituted the population frame. Second, to ensure a minimum operating structure, only firms with 20 or more employees were included. Finally, to explore the notion of firm resources and *sustained* firm performance, only firms that had been in business for at least three years were included.

To select the sample, a database with executive names, company names and addresses of firms was obtained from the Kompass Australia CD-ROM. In order to obtain a broad, representative sample, 1000 manufacturing and 1000 services firms were randomly selected,

for a total sample of 2000 firms. Prior to administering the instrument to the firms, business leaders in the field were contacted to assess clarity, relevance and face validity of the questionnaire. An Australian and US CEO both provided their assessment. Additionally, the research instrument was tested with 56 managers in an Australian MBA program. Based on the feedback, some of the questions were reworded for greater clarity and comprehensibility. Following revisions, the instrument was mailed to CEOs with a covering letter detailing the study, and issues of privacy and anonymity, together with a pre-paid return envelope. Two weeks after the initial mailing, a reminder follow-up letter was sent.

Of the 2000 questionnaires sent, a total of 291 of responses were useable. The sample was revised to account for the ineligible and undeliverable surveys received. Subsequently, the sample was decreased from 2000 to 1696, resulting in an effective (total) response rate of 17 percent. The average age of the firms was 44.78 years while the average size was 324.77 employees. With respect to annual revenue, two hundred firms earned between AUD\$1-\$50 million; one firm earned less than AUD\$1 million; 33 firms earned between AUD\$50-\$100 million; 18 firms earned between AUD\$100-\$200 million; and 35 firms earned over AUD\$200 million. Four cases were missing data on annual revenue.

Nonresponse bias is a potential problem when utilizing a survey methodology (Armstrong & Overton, 1977). Using the independent samples test, respondents were compared to the full sample chosen for the study and no significant differences were found between firm size ($t = -.829$, $p = .407$) and age ($t = 1.186$, $p = .236$). Thus, the respondents appeared to be representative of the broader population.

Measures

According to the literature, several methods are prescribed and are, in fact, encouraged to test the RBV (Barney, Wright & Ketchen, 2001). In this study, we chose to employ a survey-based method. Survey research is very useful for capturing data and discovering relationships among variables, particularly for unobservable constructs such as resources (Kerlinger, 1992). In order to measure the constructs, multiple-item five-point Likert scales were used – with the exception of the performance construct, which used a seven-point scale. Appendix 1 displays all construct items.

Resources

The resource constructs were operationalized by a series of multiple-item scales. Where possible, only items which had been consistently identified in the literature as belonging to the six resource groups were used to ensure content and discriminant validity. Specifically, tangible resources included the following two constructs:

Financial assets. Financial assets (FA) consisted of three items including cash earned from operations (new item), raised financial capital (new item) and financial investments (new item). Cronbach's alpha of this measure was 0.61.²

Physical assets. Physical assets (PA) consisted of two items including physical structures (new item) and land (new item). Cronbach's alpha of this measure was 0.78.

Intangible resources included the following four constructs:

Intellectual property assets. Intellectual property assets (IPA) consisted of four items including copyrights (Hall, 1992), patents (Fahy, 2002), designs (Fahy, 2002) and trademarks (Hall, 1992). Cronbach's alpha of this measure was 0.88.

² Some of our construct alphas fell below the generally prescribed 0.70 level. However, Churchill (1991) suggests that a reliability alpha as low as 0.60, but no lower, is acceptable for hypothesis testing with new scales.

Organizational assets. Organizational assets (OA) consisted of three items including culture (Welbourne & Wright, 1997), human resource management (HRM) policies (Welbourne & Wright, 1997) and organization structure (Spanos & Lioukas, 2001). Cronbach's alpha of this measure was 0.70.

Reputational assets. Reputational assets (RA) consisted of three items including company reputation (Hall, 1992), customer service reputation (Welbourne & Wright, 1997) and product reputation (Hall, 1992). Cronbach's alpha of this measure was 0.73.

Capabilities. Capabilities (CAP) consisted of three items, including employee know-how (Hall, 1992), know-how of managers (Fahy, 2002) and advantageous relationships that employees and managers establish and maintain (Spanos & Lioukas, 2001).³ Cronbach's alpha of this measure was 0.69.

The list of 18 resource items were provided in the survey and key informants (i.e., CEOs) were asked to rate the relative contribution of each one to their firm's performance (where 0 = "comparatively no contribution to performance" and 4 = "comparatively high contribution to performance"). From an ordering perspective, it was believed that ordering the resource-based questions by category (e.g., capability items first, reputational asset items second, organizational asset items third and so forth) could have potentially introduced order bias, in which informant's answers would be influenced by the order of response categories (Frazer & Lawley, 2000). Therefore, the 18 resource items appeared in random order and were not rotated.

Furthermore, the relatively low alphas might have been a result of the small number of composite scale items (Gainer & Padanyi, 2005).

³ The advantageous relationships item was designed to tap into the 'collective', as opposed to the individual, know-how of the organization.

With respect to measuring the resource constructs, we believe that in order to measure the appropriate domains, subjective versus objective measurements are appropriate. Largely, using secondary sources (e.g., Compustat) containing objective data to study resource effects on performance variation is a problem regarding intangible resources (Das & Tang, 2000). Unlike tangible resources, intangible data are rarely, if at all, quantitatively reported on balance sheets. Without robust, objective data on intangible resources available via the balance sheet, researchers are left with only a few proxy measures such as investments in advertising or R&D. Mauri and Michaels (1998) argue that far more precise measurements than those are required in order to measure the underlying domains of the various resource constructs that constitute the RBV. Survey-based research that utilizes subjective measures, particularly when relying on the knowledge of a single informant such as the CEO, is an appropriate method for measuring the unobserved constructs of the RBV (Fahy, 2002; Spanos & Lioukas, 2001).

Industry Structure

The measurement of the industry structure variables included a series of questions designed to capture Porter's (1980) five forces. Based on a 5-point scale, informants were asked to rate each force with respect to its impact on their industry. Several new items were developed for the industry rivalry construct (Rivalry) and the other four forces – barriers to entry (Entry), threat of substitute products (Sub); bargaining power of suppliers (SPOW), bargaining power of buyers (BPOW) – used single item measurements drawn from Spanos and Lioukas (2001).⁴ Cronbach's alpha for rivalry was 0.68.

⁴ The items for rivalry included number of competitors in the industry vying for customers (new item), intensity with which competitors jockey for a better position in the industry (new item) and the extent to which price competition is used regularly in the industry (new item).

Performance

The firm performance construct was treated as multi-dimensional. That is, although Fahy (2002) suggests that the central strategic concern of the RBV is the deployment of resources to earn profits exceeding the cost of deploying those resources, Spanos and Lioukas (2001) suggest that many scholars within the RBV argue that market- or *external*-based performance (e.g., market share, sales growth), in addition to *internal* performance (i.e., profitability), is a manifestation of performance determined by firm resources. Thus, for this study, performance was operationalized on two distinct levels, one internal and one external. The internal measure consisted of one item, profitability, and the external measure consisted of one item, sales growth. These two performance measurements were chosen as they are the most widely used indicators of firm performance (Davis, Schoorman, Mayer & Hoon Tan 2000). Following Spanos and Lioukas (2001), the key informants were asked to evaluate their performance, namely their sales growth and profitability.

Although this study was cross-sectional, scales were utilized to ascertain the self-reported performance measures for the previous three-year period relative to close competitors. This was done in order to proximate a notion of sustained performance, which is important in RBV theory (Barney, 1991). To mitigate the effects of autocorrelation, the performance items were placed in a separate part of the questionnaire relative to the resource and industry structure items.

Control Variables

According to scholars (e.g., Welbourne & Wright, 1997), firm age can affect both short and long-term performance. Therefore, to remove whatever affects it might have on performance, age was systematically controlled for. Additionally, firm size (number of employees) is a common

control variable and was also included in this study. With respect to the control variables, firm age and firm size were self-reported in two separate questions in the survey.

RESULTS

To assess the convergent and discriminant validity of the constructs (reliability is reported above), principal components factor analysis with VARIMAX rotation was conducted. Each construct was paired with another construct and all items loaded at .50 or higher with their corresponding constructs, which is considered very significant (Hair, Anderson, Tatham & Black, 1995). Thus convergent validity was confirmed. Lastly, all items loaded higher on their predicted constructs than on their cross-loadings, indicating that discriminant validity was achieved.

To assess the independence of the predictor variables, correlation analysis was conducted (Table 1). Although there were some significant inter-correlations between the predictor variables, all of the correlation coefficients were below the level considered to be serious, which is generally accepted as .80 or higher (Licht, 1995). Thus, independence among the predictor variables appeared not to be in violation and multicollinearity was likely not a problem.

Means, Standard Deviations and Correlations																	
Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Firm size	324.77	963.68	1.00														
2. Firm age	44.78	37.92	0.113*	1.00													
3. Entry	3.110	1.217	0.005	-0.085	1.00												
4. Threat of substitutes	2.880	1.227	0.000	0.070	-0.072	1.00											
5. Bargaining power over suppliers	2.870	.889	0.197*	0.014	-0.039	0.062	1.00										
6. Bargaining power of customers	3.530	.945	0.002	-0.011	0.224**	0.114*	-0.050	1.00									
7. Industry rivalry	3.969	.7790	0.065	0.102*	-0.387**	0.163**	0.053	0.424**	1.00								
8. Financial assets	1.633	.9041	0.047	-0.075	0.022	0.048	0.132*	0.065	0.169**	1.00							
9. Physical assets	1.823	1.116	-0.074	0.043	0.063	0.056	0.121*	-0.152**	0.100*	0.276**	1.00						
10. Intellectual property assets	1.155	1.080	0.092	-0.010	0.213**	0.138**	0.140**	0.015	0.021	0.195**	0.097*	1.00					
11. Organizational assets	2.828	.7557	0.098*	0.020	-0.115*	0.015	0.062	0.056	0.151**	0.180**	0.150*	0.148**	1.00				
12. Reputational assets	3.520	.4997	-0.008	-0.068	-0.020	0.092	0.121*	0.067	0.202**	0.245**	.0202**	0.059	0.299**	1.00			
13. Capabilities	3.449	.4785	0.020	-0.020	-0.095	0.077	0.132*	0.211**	0.255**	0.137**	-0.023	0.03	0.370**	0.513**	1.00		
14. Sales growth	4.560	1.460	0.092	0.034	-0.047	0.106*	0.074	-0.177**	-0.024	-0.077	0.029	-0.019	0.223**	0.154**	0.142**	1.00	
15. Profitability	4.700	1.650	0.059	0.048	0.039	-0.173**	0.043	-0.071	-0.122*	-0.158**	-0.056	0.05	0.160**	0.035	0.117*	0.490**	1.00

* p <.05; ** p <.01

Table 1. Descriptive statistics and correlation analysis

Test of hypotheses

To test the hypotheses, we used multiple hierarchical regression analysis. The character of multiple hierarchical regression analysis that differentiates it from univariate techniques is that it predicts changes in a dependent variable by simultaneously accounting for the impact of various independent variables via their weighted combination (Tabachnick & Fidell, 2001). In each model for testing, the control variables, industry structure variables and tangible resources (and where appropriate, intangible assets) were entered into one block of the regression while the focal resource(s) of interest was entered into the second block. Thus, the technique allowed us to study the explanatory power of intangible resources in improving the prediction of the performance variables, after accounting for the effects of tangible resources and industry structure variables.

With respect to Hypothesis 1, across both of the dependent variables, changes in R^2 s were significant (Table 2). Thus, after accounting for the effects of the control variables, industry structure variables and tangible resources, intangible assets explained variation in both sales

	Sales Growth				Profitability			
	Model 1		Model 2		Model 1		Model 2	
	β	t	β	t	β	t	β	t
Constant		8.025***		4.238***		7.391***		4.683***
Firm age	0.018	0.294	0.030	0.513	0.064	1.067	0.070	1.196
Firm size	0.081	1.342	0.064	1.079	0.048	0.798	0.028	0.465
Entry	-0.083	-1.294	-0.065	-1.017	0.002	0.030	-0.002	-0.033
Sub	-0.101	-1.697*	-0.102	-1.759*	-0.164	-2.741***	-0.171	-2.895***
SPOW	0.054	0.894	0.047	0.793	0.066	1.077	0.054	0.895
BPOW	-0.187	-2.827***	-0.193	-3.014***	-0.013	-2.040	-0.018	-0.286
Rivalry	0.048	0.678	0.012	0.175	-0.073	-1.033	-0.102	-1.453
FA	-0.075	-1.191	-0.124	-1.996**	-0.134	-2.136**	-0.177	-2.813***
PA	0.018	0.28	-0.029	-0.4680	-0.017	-2.2720	-0.050	-0.792
IPA			-0.012	-0.1960			0.070	1.132
OA			0.214	3.495***			0.188	3.024***
RA			0.142	2.288**			0.064	1.003
R	0.251		0.370		0.263		0.345	
R -Squared	0.063		0.137		0.069		0.119	
F	2.054**		3.588***		2.246**		3.028***	
R -Squared Change			0.074				0.050	
F for R -Squared Change			7.738***				5.074***	
Std. Error of Estimate	1.442		1.392		1.626		1.590	

* $p < .10$; ** $p < .05$; *** $p < .01$

Table 2. Results for Hypothesis 1

growth and profitability. As predicted, the data offered support for Hypothesis 1. As for Hypothesis 2, the results suggested partial support (Table 3). After accounting for the effects of the control variables, industry structure variables, tangible resources and intangible assets, capabilities produced a significant change in the R^2 with respect to profitability. However, sales growth revealed a nonsignificant change in R^2 .

	Sales Growth				Profitability			
	Model 1		Model 2		Model 1		Model 2	
	β	t	β	t	β	t	β	t
Constant		4.238***		3.848***		4.683***		4.111***
Firm age	0.030	0.513	0.029	0.497	0.070	1.196	0.068	1.166
Firm size	0.064	1.079	0.066	1.119	0.028	0.465	0.033	0.547
Entry	-0.065	-1.017	-0.067	-1.044	-0.002	-0.033	-0.007	-1.060
Sub	-0.102	-1.759*	-0.103	-1.769*	-0.171	-2.895***	-0.172	-2.906***
SPOW	0.047	0.793	0.040	0.679	0.054	0.895	0.042	0.699
BPOW	-0.193	-3.014***	-0.200	-3.104***	-0.018	-2.860	-0.030	-0.469
Rivalry	0.012	0.175	0.005	0.074	-0.102	-1.453	-0.115	-1.640*
FA	-.1240	-1.996**	-0.124	-2.002**	-0.177	-2.813***	-0.178	-2.831***
PA	-0.029	-0.468	-0.019	-0.297	-0.050	-7.920	-0.030	-0.469
IPA	-0.012	-0.196	-0.009	-0.148	0.070	1.132	0.075	1.220
OA	0.214	3.495***	0.197	3.090***	0.188	3.024***	0.161	2.504***
RA	0.142	2.288**	0.113	1.632*	0.064	1.003	0.012	0.162
CAP			0.067	0.948			0.118	1.635*
R	0.370		0.374		0.345		0.357	
R -Squared	0.137		0.140		0.119		0.128	
F	3.588***		3.380***		3.028***		3.019***	
R -Squared Change			0.003				0.009	
F for R -Squared Change			0.899				2.674*	
Std. Error of Estimate	1.392		1.392		1.590		1.585	

* $p < .10$; ** $p < .05$; *** $p < .01$

Table 3. Results for Hypothesis 2

LIMITATIONS

As with any empirical study, ours is not without limitations. The relatively low amount of variance explained in the regression models is a limitation. However, the low explanatory power is not surprising given the use of a wide variety of industries in the analysis. According to Slater (1995), low R^2 s and changes in R^2 s can be expected in multi-industry studies. He states (1995,

p. 263), “Nevertheless, researchers and reviewers should expect lower R^2 s and higher p -values [non-significant parameters] in multi-industry studies.” Furthermore, according to Slater and Atuahene-Gima (2004), the effect of a set of variables is almost certain to decrease as more heterogeneity is found in a sample.

A second limitation concerns *sustainable* performance. In this study, we asked informants to assess their performance, relative to competitors, over the previous three-year period. Three years might not be long enough to reach equilibrium although in his seminal work on the RBV, Barney (1991) does not describe sustainable competitive advantage or sustained performance in the context of calendar time. However, we do acknowledge that the three-year performance measurement might be a limitation.

The final limitation is the use of a single informant for the research. The measurement of the constructs relied solely on the judgment of the CEO. Using such a measurement technique raises the issue of common method bias, which can be particularly problematic when a single informant fills out items that measure independent and dependent variables within the same survey instrument. We checked for the presence of common method bias through the use of factor analysis and there was no common factor loading on all measures. Furthermore, using CEOs may also be problematic in that the constructs are assessed via perception. However, the alternative approach that is also taken to assess resources – large secondary datasets such as Compustat – has an alternative set of limitations in that it may struggle to accurately tap into these inherently complex constructs (Das & Teng, 2000). Therefore, we remained with the perceptual measures approach used by previous research assessing the importance of particular intangible resources and simultaneously acknowledge the limitations associated with this method.

CONCLUSIONS AND DISCUSSION

Since the early 1990s, there has been a significant amount of debate on the nature and importance of a firm's resources, particularly with respect to the necessary factors for outperforming rivals (Prahalad & Hamel, 1990). From a theoretical perspective, one theory in particular places special emphasis on resources as the sources of sustainable competitive advantage; namely, the resource-based view of the firm (RBV). Specifically, arguments have been made in this paper that the RBV generally points to intangible, rather than tangible, resources – or even industry structure – as the factors that lead to building and sustaining competitive advantage (Barney, 2001; Hitt et al., 2001); thus, intangibles can be considered the focal constructs of interest in accounting for variations in firm performance. In this study, we adopted the argument that the RBV is a particularly useful theory to explain variations in the performance of firms.

To test the RBV, past research, as described in this paper, has expressly conceptualized, operationalized and examined intangible resources. However, these studies suffer from deficiencies. Most importantly, some previous studies on intangibles have lacked proper theoretical grounding, have not posited hypotheses and have not conducted statistical analysis; thus, sound empirical inferences cannot be made. Other studies have examined a single or a very limited number of intangible resources, which can lead to biased results. Still others contain relatively small samples, which minimizes generalizeability. To avoid these shortcomings, the intent of this research was not to isolate on any one intangible resource but was rather to examine the power of intangibles in predicting performance variation given the broader resource base. We developed theoretically justified hypotheses, used a powerful statistical technique to test the hypotheses while our final sample contained nearly 300 firms.

Furthermore, as an antithesis to the RBV, other theories posit that external structural characteristics, not internal resources, are the key factors that explain performance variation (Porter, 1980). Thus, in order to test the proposition that intangible resources account for performance variation our study purposely included both tangible resources and industry structure variables. By including a broader conceptualization and operationalization of resources and by pitting the RBV against the other major theoretical explanation of performance variation in the strategic management literature (cf. Hambrick, 2004), we believe our methodological approach offers improvements over previous studies of intangible resources, with the results suggesting important theoretical and managerial insights.

From a theoretical perspective, intangibles did account for variations in performance, even after accounting for the effects of both tangible resource and industry structure variables. One would expect that if intangibles did not have the power to explain performance variation as predicted by the RBV, then this result would have not been found. However, we believe the results do need to be tempered. More specifically, in Hypothesis 1, the model (model 1) containing only the control variables, industry variables and tangible resources was significant while in model 2, both individual tangible asset and industry structure variables remained significant. The finding suggests that factors *other* than intangible resources might also explain variations in performance, lending evidence to other theories of performance variation in strategic management research, such as industry structure. Here, we believe a degree of confirmation is offered to scholars who theorize that both firm resources and industry structure are important in explaining performance variation (Henderson & Mitchell, 1997).

With respect to individual resources, theory posits that capabilities are the firm's most critical (Grant, 1996; McEvily & Chakravarthy, 2002). The results of our test of capabilities were not as strong as predicted. For example, only with respect to one of the performance variables –

profitability – did capabilities have the power to explain variation after accounting for the effects of tangible resources, industry structure and the control variables. The association between capabilities and profitability in Hypotheses 2 was not surprising as it is this association that is central in the RBV (Fahy, 2002; Peteraf, 1993; Peteraf & Barney, 2003). However, some scholars have questioned the importance of capabilities as the “ultimate” source of sustainable competitive advantage (e.g., Collis, 1994). That our findings did not support capabilities with respect to explaining variation in the sales growth variable mildly supports Collis’ (1994) argument.

Lastly, managers face a constant struggle with respect to resource allocation. The results of this study suggest that investments in intangible resources might be a means to drive sustainable competitive advantage. For example, organizational and reputational assets were positively and significantly associated with performance. The finding suggests that developing, leveraging and protecting intangible assets such as culture, human resource management policies, organization structure and product reputation might be important to gaining and sustaining competitive advantage (Barney, 1986b; Becker & Huselid, 1998; Sanchez & Mahoney, 1996; Srivastava et al., 2001). With respect to capabilities, in addition to building individual and team know-how, management teams are advised to explore how they can leverage their know-how to continually build, disassemble and rebuild new resource combinations that are valuable to customers and defensible against would-be rivals (Black & Boal, 1994; Dierickx & Cool, 1989; Foss, 1998; Lippman & Rumelt, 2003; Teece et al., 1997). On the other hand, while statistically significant, financial assets were negatively associated with the performance variables. This finding suggests that corporate managers should be cautious with respect to how much emphasis they place on building a competitive advantage based on tangible resources. Such an effort might actually have a detrimental effect on performance, which is consistent with theory (Barney, 2001; Hitt et al., 2001).

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Appendix A. Scale Items

Below is a list of several tangible and intangible resources. Please indicate how each factor impacts on your firm's performance, where 0 = *comparatively no impact* and 4 = *comparatively high impact*.

- (1) The organizational structure (i.e., the operating and reporting structure) of the firm
 - (2) Shared organizational values, beliefs, attitudes and behaviors (i.e., firm culture)
 - (3) Trademarks
 - (4) Organizational policies (e.g., recruitment, compensation, reward, training) designed to acquire, develop and retain the human talent of the firm
 - (5) Buildings and other physical structures (e.g., factories, offices, warehouses, stores, showrooms)
 - (6) Raised financial capital (e.g., debt from secured bank loans, equity from the issuance of shares or bonds)
 - (7) Relationships that employees and managers have established and maintained with external constituents (e.g., customers, strategic alliances, suppliers) for the benefit of the firm
 - (8) Company reputation
 - (9) Registered designs
 - (10) Customer service reputation
 - (11) The overall skills, creativity and know-how of non-management employees of the firm
 - (12) Land
 - (13) Patents
 - (14) Cash earned from operations
 - (15) Copyrights
 - (16) Financial investments (e.g., in interest bearing accounts, in company shares, in equity positions in other companies, in government instruments)
 - (17) Product/service reputation
 - (18) The skills, expertise and know-how of the managers of the firm
-

Appendix A.1. Resource items

Please circle the single most appropriate response for each of the items listed below.

	Very Low				Very High	
(1) The number of competitors vying for customers in our industry is:	1	2	3	4	5	
(2) The intensity with which competitors jockey for a better position in the industry is:	1	2	3	4	5	
(3) The extent to which price competition is used regularly in our industry is:	1	2	3	4	5	
	Very easy to enter				Very difficult to enter	
(4) How easy is it for <i>new</i> firms to enter and compete in your industry?	1	2	3	4	5	
	Very low threat				Very high threat	
(5) To what degree is your industry threatened by substitute products/services?	1	2	3	4	5	
strong	Very weak power				Very power	
(6) What level of bargaining power (i.e., ability to negotiate lower prices) do you have over your suppliers?	1	2	3	4	5	
(7) What level of bargaining power (i.e., ability to negotiate lower prices) do customers have over your firm?	1	2	3	4	5	

Appendix A.2. Industry structure items

Please circle the number best estimating how your firm's performance compared to close competitors over the last three (3) years.

Over the last 3 years, relative to close competitors, our firm:

	More slowly		At about the same rate		Much		
faster							
(1) has been growing sales revenue: 7	1	2	3	4	5	6	
profitable	Less profitable		About equally profitable		More		
(2) has been:	1	2	3	4	5	6	7

Appendix A.3. Performance items