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Turmoil in Government Disclosure: An Investigation of Budget Disclosures in Australia

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The Australian public sector experiences significant turmoil in performance information disclosures as it adopts New Public Financial Management-oriented changes. While these changes aim to promote greater accountability, we raise concerns about the effectiveness of current disclosures, especially in Victoria, to articulate useful perspectives on performance, due to their high turnover, high novelty and low survival rates.

The public sector in Australia, and in particular, Victoria, in the past few decades has undergone major fiscal, structural, management and financial management transformation (see, Jones, Guthrie, & Steane, 2001a, 2001b). One area of major transformation has been the changing technologies by which funding, reporting and monitoring for the budget dependent sector are achieved. A recent aspect of this process of reform has been a changing central budgetary regime, and within this a shift towards the presentation of public sector budgeting information on an 'output' basis. This transition began in the mid-1990s and continues to date.

Recent international comparative studies of public sector financial management reforms (Olson *et al.*, 1998; Guthrie *et al.*, 1999) have found a wide diversity of practice in adoption of New Public Financial Management (NPFM) oriented changes, even across multiple international jurisdictions regarded as active reformers. A significant additional finding from this body of literature is the material role of accounting and other financial management techniques in implementation of management-oriented change in government. However, it is interesting to note the

degree to which some prior international studies have tended to lack detailed analysis of the practical application of such techniques. The approach taken in this paper, reliant on detailed investigation of actual budget sector disclosures, contrasts with the broader approach taken by some earlier contributors to this body of literature.

Importantly, irrespective of suggestions that NPFM is not a uniform, global movement, some common elements do seem to exist at the “super-technical” level. These may be best understood as the outcome of a ‘reforming spirit’, intent on instilling private sector financial awareness (e.g., about financial position, accrual accounting, debt or surplus management, capital investment strategy) into public sector decision making. Jones, et al. (2001), argue that there is no “single answer” and “off-the-shelf” global NPFM solution to cure poor financial management practice despite the official (Guthrie & Carlin, 2000) advocacy in favour of this view from certain change agents, notably in central financial agencies. These studies tend to suggest that there is a considerable risk of the formation of a lacuna between what is promised in relation to the implementation of these techniques, and what is actually delivered, or capable of being delivered. It is this tension between the rhetoric associated with certain technical aspects of NPFM reform, and the underlying reality, which in large part motivates this study. In order to investigate this potential void, this paper reports on a disclosure indicator analysis (DIA), concentrating on the role and effectiveness of performance information disclosures as part of the overall new public financial management framework.

As indicated, public budgeting in Australia has undergone significant changes over the past decade. These changes have been manifested in several ways, the most important of which has been the implementation of some form of accrual output-based budgeting (AOBB) (Guthrie & Carlin, 2000; Carlin & Guthrie, 2001). The shift towards output-based budgeting has also been closely associated with the employment of accrual methods in public sector budgeting as a replacement for cash-based accounting models. A central part of the new budgeting regime has also been the presentation of non-financial performance information. These changes have been justified by their champions on the grounds that they will promote greater efficiency, transparency and accountability by governments (Guthrie *et al.*, 1999). Yet to accept such claims at face value is to ignore the political and rhetorical aspect of public sector budgeting (Wildavsky, 1974, 1992; Jones, 1997). Just as the adoption of accrual accounting by public sector agencies has been critiqued as the reflection of a rhetorical rather than technically neutral process (Guthrie, 1998), changes in budgeting process can be analyzed critically. Indeed, it has been suggested that predictions of output budgeting’s successes have not been matched in reality, again hinting at a strong rhetorical aspect to public sector budgeting changes in Australia (Guthrie & Carlin, 2000).

Because recent research has identified gaps between the claimed nature and the actual practices of central public sector budgeting, this paper is based on a detailed examination of a set of budget papers to identify and examine the use of performance information within the context of an operational AOBB management system.

Background to the Changing Face of Performance Disclosures in Victoria

In the past three decades public sectors in various Australian jurisdictions¹ have arguably undergone some of the most significant and far-reaching changes in the country's entire history. These changes have involved transforming the governance, management and accounting technologies (Guthrie & Parker, 1998). A "leader" in these changes during the 1990s was the Victorian government. In Victoria the transformation of the state's institutional rules and public sector administrative practices can be traced to two critical events: the election in 1992 of a conservative government under the premiership of Jeff Kennett, and landmark reports prepared by the Victorian Commission of Audit (VCA, 1993a, 1993b).

During the period from 1992 to 1999, the government introduced a number of changes based on the VCA recommendations, which impacted the public sector. These include the role of executive government and ministers, the role of departments, and changes to local government including radical financial management reforms. These reforms were underpinned by the use of economic theories to endorse purchaser / provider policy / operations splits, the funding of outputs to achieve outcomes, and the introduction of contestability into the provision of services (English & Guthrie, 2001; Hughes & O'Neill, 2001).

Victoria was not unique in pursuing these types of reforms; what was different in the Victorian case was the depth and speed with which the Victorian government pursued the transformation of the public sector (English, 2001; Shamshullah, 1999). Many of the reforms were borrowed or emulated from previous New Zealand public sector experiments and are largely indistinguishable from the New Zealand model, which has been operating since 1988/9 (Pallot, 1998).

The main characteristic of the output-management model promoted in Victoria between the years 1992 to 1999 was the separation of the funder, purchaser and provider roles. The implementation of this model required a number of designated steps, which were supported by well-documented Victorian Department of Treasury and Finance (VDTF) manuals (VDTF, 1997a,b,c). Key elements of this recent reform program have been the adoption of methodologies such as accrual budgetary accounting, together with outcome and output-based budgeting and management systems, alternative asset valuation practices and procedures, as well as systems designed to capture the full cost of capital deployed in relation to the production of particular outputs.

Central to the output management process from a financial management perspective was the conceptualisation of linkages between funding, reporting and monitoring of defined outputs to government strategic priorities and outcomes (VDTF, 1997b, p. 42).

In the current Victorian public administration model, portfolio Ministers and departmental secretaries act as agents for the government. It is they who purchase the

¹Australia is a federation and includes three levels of government: federal, state and local. Victoria is one of six states and has its own parliament and executive government. Each state plays a major role in service delivery in areas such as education, health care, police and security, and social services.

specified services and “manage the purchase relationship in the most efficient and effective manner to meet government outcomes” (VDTE, 1997a, p. 11). The Government, via the Budget Papers, specifies the broad outputs, and responsible Ministers and their secretaries purchase these. Providers of these services can be either internal or external to the public sector, hence the idea of ‘contestability’.

At present it is too early to comprehensively review and evaluate the actual application of OABB and OBM in the Victorian public sector. However, at least one Parliamentary Committee (VPAEC, 1998) has expressed some concern that the current reform direction is ignoring public sector and parliamentary accountability. This is a theme that the VPAEC (1997, p.7) has been expressing for some time:

“Accountability is a contract between two parties. In the case of government, the contract is between the public and the government: the public gives government responsibility to govern and manage public resources, and the government is accountable to the public through the Parliament for its performance. It is a concept fundamental to our democratic system. It clearly establishes the right of the people both to know what government intends to do, and how well it has met its goals.”

That this concern has been raised, despite the growing quantity of financial, non-financial and performance related disclosures provided by a variety of communications mechanisms, speaks volumes. In particular, it raises questions about the quality of disclosures being provided - quality, rather than quantity, being the dominant hallmark of effective accountability processes.

Performance Indicators and Budget Papers

A central feature of the official position relating to public financial management has been that departmental performance and accountability ought to be viewed in output terms (as expressed in accrual financial statements and performance indicators) rather than in input terms. This shift has in turn privileged the role of accounting, which has moved from a subordinate service role to a dominating, agenda-setting role (Parker & Guthrie, 1993). In particular, these ‘new’ accounting technologies are said to offer the possibility of according greater decision-making authority and flexibility to managers, while also helping to ensure that management action is in accordance with the broader social and economic objectives of government (VDTE, 1997a,b,c).

Vitally, advocates of these new public financial management techniques argue that they are causally related to subsequent public sector performance improvement. Meaningful performance improvement, it is argued, stems from the adoption of a reflexive output and outcome-based approach to management and budgeting, an approach which by its very nature necessitates the production of increased volumes of performance-based data. This data is in turn responded to by managers in a circular process of continuous improvements in efficiency and effectiveness.

Consequently, a central feature of the official rhetoric relating to this transformation has been that output performance indicators hold the key to the provision of greater government accountability and better decision-making about resource allocation, planning and management practices. Associated with this aspect of the rhetorical

NPFM campaign has been a growing emphasis on the production and dissemination of a growing inventory of non-financial and other performance-related metrics and information traditionally reserved for a narrower, highly financially focused content.

One such forum is the annual budget paper series published in jurisdictions such as Victoria (and most jurisdictions with broadly similar governmental and governance arrangements). Indeed, annual budget papers are generally regarded as a primary vehicle by which budget-dependent agencies can communicate accountability information to the parliament and by which they can be held to account in the following year of operations. This accountability process incorporates financial and non-financial as well as performance information.

The suggestion that disclosures relating to performance indicators form a vital component of accountability regimes for a range of entities and entity types is not novel. If a narrow conception of accountability, in which information is disclosed only in order to report (Normanton, 1971) is rejected, then it follows that a part of the role of accountability disclosures is also to explain (Patton, 1992). There seems little reason to believe that the narrow view substantially guides the theoretical underpinnings of accountability regulatory regimes in Australia (MAB, 1993). Rather, if a decision usefulness perspective is applied, the inclusion of data and information surplus to basic financial disclosures can be seen to be of great significance to interested stakeholders. Indeed, it may be that the value of financial disclosures is lessened in the absence of supporting non-financial disclosures (Barton, 1999).

The debate therefore, is not as to whether financial disclosures ought to be accompanied by non-financial disclosures, including those relating to performance indicators, but rather the content, nature and quality of those non-financial disclosures. Empirical studies have highlighted the demand from report users for qualitative and quantitative non-financial information to accompany financial disclosures (Van Daniker & Kwiatkowski, 1986). Of key contextual importance, however, is the recognition that whereas the structure, form and content of financial disclosures is regulated according to a relatively prescriptive model (Micallef, 1997), no such prescription generally exists in relation to non-financial disclosures. These therefore tend to show considerable diversity (Hyndman & Anderson, 1995). Ideally however, in the context of the public sector, performance indicators should assist users of reports in understanding the inputs, outputs, outcomes and policies relating to a particular period of time (Stewart, 1984).

Annual reports issued by public sector agencies have been the focus of considerable attention and research (Cameron & Guthrie, 1993; Guthrie, 1993; McCrae & Aiken, 1994). This reflects the assumed importance of agency annual reports as a component of the overall accountability framework (JCPA, 1989; VPAEC, 1999a). Increasingly, however, the suggestion has arisen in the literature that public sector agency reports are not as widely used or sought after as is conventionally assumed to be the case (Gaffney, 1986; Engstrom, 1988; Hay, 1994; Mack *et al.*, 2001). On the other hand, Budget papers are produced with a clear constituency in mind (Carlin & Guthrie, 2001; Guthrie & Carlin, 2000), a phenomenon which has continued over an extended period.

Wanna, *et al.*, (2000, p.1) state that "Budgets are indispensable to executive government; and accountable budgetary processes are a key mechanism of stable,

democratic societies.” Although the delivery of accountability to parliament has been the key role performed by budget papers, the format of those budget papers has changed significantly in Australia since the mid 1990s. This wave of change was brought about by the introduction of accrual and output based forms of budgeting in Australian jurisdictions.

Previous studies have questioned the introduction of accrual accounting generally, (Guthrie, 1998) and specifically as it relates to the budget process (Carlin & Guthrie, 2001, Guthrie & Carlin, 2000). In attempting to evaluate the various public management initiatives now being implemented across Australia, New Zealand and the globe, in most cases it is too soon to answer the questions “what works, what doesn't, to what extent, in which contexts, and why?” (Jones *et al.*, 2001). However, in relatively mature examples of NPFM-oriented reform (e.g., several Australian states and New Zealand), adjustments and considerable steering is evident.

It can be said that any significant experimentation with new forms of performance indicators will lead to discontinuities and issues of monitoring. If this is so, it must be asked: When does a system settle down? How long does one have to wait to get it right? Can this aspect of NPFM ever be seen to be able to deliver the claimed benefits? These are all difficult questions to answer. In the Victorian case, is a decade of performance information enough for practice to be ‘settled’?

Other jurisdictions are experiencing similar disjunction and problems with these practices. The Victorian experience is therefore instructive, as Victoria has been considered to be a leader in the adoption of Accrual output-based budgets and output-based management in Australia.

Carlin and Guthrie (2001) examined recent efforts in the Australian and New Zealand public sectors to implement accrual output-based budgeting. While agreeing with the need for public sector accounting reform, the authors used two detailed case studies—that of Queensland and New Zealand—to show that the current reforms have not yet achieved the results expected due to weaknesses in implementation. The gap between rhetoric and reality is apparent, for example, in that *de facto* there is little real difference in reporting between cash-based and accrual budgets in these two cases, leading these authors to question the degree to which management practices can change if reporting for decision making is unaltered. It is posited here that such a rhetoric-reality gap may also be a systemic feature of the manner in which performance-based information is reported in annual budget paper series.

This is a factor of significance, since alongside the change to accrual output-based budgeting came calls for the inclusion of greater quantities of performance-related information. The function of this information is “officially” to better assist users in determining whether or not claimed efficiencies relating to management improvement programs had been achieved, and to allow more accurate gauging of the efficiency and effectiveness of publicly funded endeavours (VPAEC, 2000; VPAEC, 2001). This has culminated in a situation where, in contemporary budget papers, the quantity of non-financial and performance indicator disclosures outweighs the quantity of financial disclosures. For instance, an indication of this trend is presented in Table 1 below, which documents the growth in the relative level of disclosure of performance indicator data, compared to disclosures of traditional financial data in Victorian budget

estimates papers from 1998 to 2001².

The simple fact that a range of performance indicator data has been disclosed in Budget papers does not mean that the disclosures have resulted in an enhanced comprehension capability on the part of budget paper users. Given the primary parliamentary accountability role fulfilled by the production of annual budget paper series (VPAEC, 1999), an important research question centers around the degree to which the inclusion of this performance indicator data can be seen as enhancing the quality of accountability discharged as a result of the publication of budget papers. In this paper, the preferred methodological approach to achieving this task is to concentrate on the primary source data (Broadbent & Guthrie, 1992) within the budget papers (Shaoul, 1997; Edwards & Shaoul, 1996), rather than undertaking analysis of (in this case limited) secondary sources on the matter.

Table 1: *Performance Indicator to Financial Information Ratio, Victorian Budget Estimates, 1998 vs. 2001*

Department	Performance Indicator to Financial Information page ratio 2001/02	Performance Indicator to Financial Information page ratio 1998/99
Education	3.33:1	2.00:1
Human Services	5.66:1	2.11:1
Infrastructure	4.57:1	2.00:1
Justice	5.00:1	2.87:1
Natural Resources and Environment	5.66:1	3.66:1
Premier and Cabinet	2.50:1	2.25:1
State and Regional Development	3.71:1	3.00:1

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²The ratios within the tables are calculated on the basis of the page counts.

Empirical Investigation of Performance Indicator Disclosures in Budget Papers

Table 1 (above) outlined the changing ratio of disclosure between non-financial performance indicators and traditional financial data. An alternative means of capturing the increase in volume in performance indicator data disclosures is to examine the absolute number of performance indicators disclosed by departments. Table 2 (Departmental Performance Indicator Counts in Budget Papers) shows this data, and demonstrates that in the case of most departments, there has been significant growth in the quantity of performance indicator disclosure since 1999. The overall growth in performance indicator disclosure over the three-year period studied was 32.5 percent.

Table 2: *Departmental Performance Indicator Counts in Budget Papers*

Department	1999/00	2000/01	2001/02
Education	131	176	165
Human Services	143	206	258
Infrastructure	158	265	282
Justice	184	207	227
Natural Resources and Environment	268	256	282
Premier and Cabinet	150	192	131
State and Regional Development	225	254	280
Treasury and Finance	147	265	237
Total	1406	1821	1862

Growth rates varied from this average in individual departments, the highest rate of growth being experienced in the Department of Human Services, whose performance indicator count appears to have increased by 80 percent over the three-year data horizon. Over the same period of time, the Department of the Premier and Cabinet actually reduced the number of performance indicators reported on in its budget paper series. This data suggests a prima facie commitment to disclosure quality enhancement by means of increased performance indicator disclosure.

However, despite the material increases in volumes of disclosures, concerns have been raised about the usefulness of these additional disclosures, especially as a result of apparently low survival rates for performance indicators (VPAEC, 2000). Variation in performance indicator disclosure can be measured in several ways. The simplest is to track the rate of change in the number of disclosed indicators over time. This provides a basic measure of variation. However, because existing measures may be deleted over time and replaced with new measures, examining the quantity of disclosed measures alone provides insufficient data for a detailed analysis. For this reason, two other phenomena must be studied.

The first of these is the “survival rate”. This quantifies the propensity of performance indicators to persist through several reporting cycles. The second is the

“novelty rate”, which measures the proportion of each year’s performance indicators which have been newly introduced relative to the reported set of indicators for a given base year. Together, these three metrics—number, survival, and novelty—provide a detailed picture of the stability of performance indicator reporting over time, and therefore allow insights into the quality of disclosure and accountability, particularly from an inter-temporal perspective.

In order to develop more detailed insights into performance indicator disclosure characteristics, two of eight departments were chosen, at random, for examination. These were the Department of Education and the Department of Infrastructure. Within each of these departments, an output group was selected for detailed review. The output groups selected for each of the departments were the School Education for the Department of Education and the Metropolitan Transport Services for the Department of Infrastructure.

All performance indicators for each output within these output groups were then examined on a time-series basis. Survival rates stated in the tables are calculated using the 1999/00 disclosures as the base year. Thus, if for a particular output in 1999/00, five performance measures had been reported on, and by 2000/01 only three of the original five continued to be reported on, the stated survival rate for 2000/01 would be 60 percent. If by 2001/02, only two of the original five indicators set out in the 1999/00 budget papers, the stated ‘survival rate’ as at 2001/02 would be expressed as 40 percent.

‘Novelty rates’ are calculated as follows. If five performance indicators had been specified in 1999/00, and all five continued to be reported on in 2000/01, but an additional five performance indicators were added to the disclosure inventory for that output in that year, then the novelty rate for that output/year would be 50 percent. If in the following year (2001/02), all of the original ratios continued to survive but an additional five ratios were added, bringing the total disclosed to fifteen, then the novelty rate would be expressed as 67 percent, because two thirds of the performance indicators reported on for that year would be new, vis a vis the base year (1999/00).

High disclosure instability will therefore be suggested where low survival and high novelty rates are observed. On the other hand, low novelty rates and high survival rates indicate a stable reporting format and content, giving rise to conditions conducive to meaningful reporting and performance analysis, assuming that the reported content is meaningful and representative of the underlying activities of the budget sector entity under review.

Data for each of the detailed reviews is set out in tables 3 to 6. The analysis suggests a significant variation in the performance indicator selection and reporting practices of Victorian government departments. Both of the output groups studied (School Education and Metropolitan Transport Services) revealed a surprisingly high rate of performance indicator change, novelty, and correspondingly low survival rates over the time series. Note that the performance indicators examined in the tables set out below categorize performance indicators according to three general descriptions: quantity, quality, and timeliness. These categories, used in the budget papers, are also used here for the sake of consistency and interpretability.

Note the combined volatility of the underlying performance disclosure inventories, as captured by the three dimensions: number, survival, and novelty. This tends to

reinforce concerns set out above, in relation to the potential gap between indicator quantity and indicator quality.

Table 3 : *Department of Education – School Education Output Group Performance Indicator Count*

Department	1999/00	2000/01	2001/02
Primary P – 6			
Quantity	7	7	11
Quality	4	5	14
Total	11	12	25
Junior Secondary			
Quantity	6	6	10
Quality	4	5	10
Total	10	11	20
Senior Secondary			
Quantity	3	4	5
Quality	4	5	11
Total	7	9	16
Grand Total	28	32	61

Table 4 : *Department of Education – School Education Survival and Novelty Analysis*

	Survival Base + 1	Survival Base + 2	Novelty Base + 1	Novelty Base + 2
Primary Education				
Quantity	57%	14%	43%	91%
Quality	50%	50%	60%	80%
Junior Secondary				
Quantity	67%	33%	33%	80%
Quality	100%	100%	25%	60%
Senior Secondary				
Quantity	100%	33%	25%	80%
Quality	100%	75%	20%	73%

The Quality of Performance Indicator Disclosures

There is no necessary nexus between the fact of disclosure and the quality of the information transmitted within the disclosure. The data reported in this paper suggests a growth in the quantity of performance-related disclosures over the period studied, both in absolute and relative terms. However, this paper has raised concerns about the ability of that data to effectively articulate useful perspectives on agency performance due to high turnover, high novelty and low survival rates. From a quantitative analytical perspective, the measurement of change in numbers of reported indicators, survival, and

Table 5: Department of Infrastructure – Metropolitan Transport Services
Performance Indicator Count

Department	1999/00	2000/01	2001/02
Metropolitan Train Services			
Quantity	1	2	2
Quality	1	4	4
Timeliness	2	0	0
Total	4	6	6
Metropolitan Tram Services			
Quantity	1	3	2
Quality	1	5	6
Timeliness	1	0	0
Total	3	8	8
Metropolitan Bus Services			
Quantity	1	1	2
Quality	3	4	3
Timeliness	1	1	1
Total	5	6	6
Grand Total	12	20	20

Table 6: Department of Infrastructure – Public Transport Services
Survival and Novelty Analysis

	Survival Base + 1	Survival Base + 2	Novelty Base + 1	Novelty Base + 2
Metropolitan Train Services				
Quantity	0%	0%	100%	100%
Quality	100%	100%	75%	75%
Timeliness	0%	0%	0%	0%
Metropolitan Tram Services				
Quantity	0%	0%	100%	100%
Quality	100%	100%	25%	60%
Timeliness	0%	0%		
Metropolitan Bus Services				
Quantity	100%	100%	25%	80%
Quality	100%	50%		
Timeliness	100%	100%	20%	73%

novelty rates captures a vital dimension of performance indicator quality. However, in order to be more comprehensive, a six-component quality assessment methodology which rates quality in terms of six key factors is proposed. It is posited that performance indicator data captured and reported by agencies should be:

1. **Correlative** – The suite of indicators selected by an agency should correlate closely with its key operational imperatives and activities. Indicators whose content relates to matters which are largely peripheral or cosmetic should be excluded. If this dimension of quality is satisfied, then performance indicator disclosures assist the accountability process in two interrelated ways. First, the indicators, because they correlate closely with the underlying activities of the agency, provide an additional descriptive framework to assist report users in developing comprehension of the scope and nature of the activities undertaken by the agency. Secondly, and derivatively, they assist report users in assessing the effectiveness and efficiency of the agency's operations. A detailed review of reported performance indicators for a sample of Victorian budget sector agencies suggests that a significant degree of compliance with this quality dimension is currently being achieved.
2. **Controllable** – In order to facilitate meaningful analysis of the degree to which an agency's changing performance profile has been driven by endogenous rather than exogenous factors, it is preferable that performance information published by agencies relates to factors which are largely within the agency's control. This dimension is far less satisfactorily met in the budget paper disclosures we reviewed. While comprehensively cataloguing the nature of observed deviations from this objective is outside the scope of this paper, a number of common stylistic errors were observed during the conduct of the empirical research. For example, many agencies report extensive data on the number of projects they have initiated or completed during a particular period of time (for example "number of road safety campaigns conducted"). It is suggested however, that whether a program is run or not is largely due to the influence of external funding decisions rather than factors internal to the agency. A better approach to shaping data in relation to programs undertaken would be to concentrate on the internal value added dimension; for example, level of participation in road safety programs, changed level of awareness as a result of road safety programs, and so on. A similar problem exists when agencies report on indicators such as "households receiving mains electricity concessions". Again, it is observed that whether or not households are able to receive such concessions is the result of a non agency-based policy decision. What would be more useful from an agency-focused performance analysis and reporting perspective would be to report data such as "percentage of eligible households receiving mains electricity concessions" and so on. In that way, the operational effectiveness of the implementing agency would be highlighted, rather than the impact of a high level policy decision to offer concessions to a segment of the population.

3. **Comprehensible** – In order to be useful, report readers must be able to understand reported indicators. A starting point is to ensure that a relevant unit of measure is provided for each reported indicator. There were almost no observed exceptions to this requirement in the Victorian budget papers we reviewed. In addition to clear specification of appropriate unit measures, performance indicators ought to be able to be described succinctly and pointedly. Again, a detailed review suggests that this is generally the case.
4. **Contemporaneous** – In order to maximise usefulness, reported indicators should relate as closely as possible to the present. Unfortunately, this is a dimension that is systematically breached in budget paper reporting of performance data. In the 2001/2002 Victorian budget papers, the latest year for which actual data is reported on any performance indicator is 1999. This means that data is largely out of date by the time that it is reported in the budget paper series, a phenomenon which arises from the production of budget estimates before the completion of the prior period, necessitating a two period delay for the disclosure of actual data. This represents a critical matter, since recourse to old data for decision making purposes raises the likelihood of inappropriate judgements. Further, continued production of old data such as that observed in this study clouds the accountability process. Thus, both accountability and performance have the potential to suffer in consequence of a failure to produce indicators consistent with this dimension.
5. **Consistent** – it is argued that consistency across time is a key dimension of quality in performance reporting. Since earlier sections of this paper have included detailed data on the degree to which a sample of agencies' reported indicators satisfy this criterion (they did not), no further comment is made here other than to reinforce that this quality dimension has been systematically breached in Victorian budget paper disclosures.
6. **Constrained** – it is argued that the selection of a suite of performance indicators for reporting purposes must be the result of a disciplined, focused process. Reported indicators should be constrained to that set necessary to convey a clear and accurate picture of the operations of a reporting agency, rather than expanded to include measures of potentially little interest or use. An empirical review suggests, on the basis of an observed increase in the population of reported performance measures, that this quality dimension may not be receiving adequate attention at present.

Further evidence of significant interest in these issues by various jurisdictions can be found in the report from the 2001 Australasian Council of Public Accounts Committees 6th Biennial Conference held in Canberra (ACPAC, 2001). While it is worth noting that there is currently high interest in the potential need for audit of performance related disclosures, we conclude that in Australia at least, for the present, this quality control is not being systematically applied.

Summary and Conclusions

The empirical review of performance indicator disclosure in recent Victorian budget papers over three budget cycles reveals considerable turmoil in indicator disclosure. This runs contrary to the goal of enhancing the quality of disclosures in budget papers, because users are often, by reason of high turnover, unable to observe time series results. Furthermore, when new indicators are added to budget papers, it will often be the case that no data relating to actual outcomes with respect to that indicator will be available for up to 2 years after the indicator is first reported. Given the low survival rates noted in the empirical analysis, this means that in many cases, no actual data is ever reported in respect of performance indicators. Instead, during the (often brief) period of their survival, the only reported data is in the form of targets. An inability to compare actual outcomes with targeted outcomes is a fundamental flaw in any system of accountability. Likewise, the inability to construct consistent performance time series represents a serious weakness in the current budget accountability regime in Victoria.

These difficulties should be viewed in light of the technical characteristics of the reform process and model outlined above. Specifically, recall that a key claim made in relation to the operation of the accrual output based budgeting and management model is that it is a causal trigger for enhanced agency and sector performance. That causal link, however, rests on the structure provided by reflexive performance feedback generated with respect to the linkages between inputs, outputs and subsequent outcomes. The empirical analysis conducted within this paper suggests, however, that the information performance bridge necessary for the sustenance of the reflexive improvement process, discussed above, is consistently and systematically broken, as a result of performance disclosure inconsistency. This difficulty is heightened in particular because of the lack of timeliness of much of the data produced and relied upon for decision purposes within the accrual budgeting and management framework studied.

This paper has not speculated about the causes of the apparently high turnover, low survival and high novelty rates of performance indicator disclosures in Victoria over the period under consideration. A hypothesis proposed elsewhere in relation to annual report disclosures suggests that disclosure variability may be related to a desire on the part of report preparers to obfuscate (Courtis, 1998). An alternative view is that the patterns observed are consistent with a lack of thought and planning prior to the implementation phase. Explanations of variation in the budget papers examined tended to suggest that changes were based on a desire to improve the extant performance indicator inventory, to provide an enhanced view of the underlying operations, efficiency and effectiveness of Victorian government agencies. This may be consistent with the notion of recognition after the fact of implementation, of weaknesses and gaps in indicators, structures and operational assumptions.

At present there appears no reason to prefer either explanation, and this may offer an opportunity for further research in the future. However, irrespective of the inability to reach conclusions as to the cause of the high performance indicator turnover observed, there is no difficulty in concluding that at least at present, the quality of disclosure has suffered as a result of the observed lack of disclosure stability, as well

perhaps as a result of the lack of a systematic audit quality control framework in Australian jurisdictions. Resolving this problem represents a significant challenge for policy makers and practitioners.

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Is Sustainable Competitive Advantage an Achievable Holy Grail: The Relevance Gap between Academia and Business

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Competitive advantage, especially sustainable competitive advantage, is one of the most celebrated concepts in business research and strategic management fields in particular. It is a common belief that competitive advantage leads to superior performance, and sustainable competitive advantage leads to prolonged superior performance. To survive and prosper in an ever-competitive marketplace where firms operate on a global scale, businesspeople are in dire need of critical information and knowledge that will lend them a competitive edge over their rivals in search for regional, national, international, or global dominance. In fighting for their relevance, business scholars churn out volumes of research, trying their very best to discover, develop, and accumulate knowledge that may be useful for practitioners. This paper takes a close look at the relevance issue between management research and practice, pointing out that researchers must be realistic about their research agenda and practitioners must have reasonable expectations in order for both parties to foster a better and mutually beneficial relationship.

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The issue of winning and beating competitors has grown acute more than ever in today's hypercompetitive environment (Meloche & Plank, 2006; Ngamkroeckjoti & Johri, 2003; Selsky, Goes, & Baburoglu, 2007). Managers are in constant search for innovative strategic maneuvers or magic formulas that enable them to gain competitive advantage (CA), ideally sustainable, thereby resulting in prolonged superior performance (Henard & McFadyen 2005; Pfeffer, 2005). For example, companies spend billions of dollars each year on information technology (IT) in hopes of achieving business dominance (Brynjolfsson & Hitt, 1998).

In spite of the fact that a myriad of studies that were intended to provide practical guidance to managers have discussed competitive advantage and how businesses could develop it to achieve superior performance (e.g., King, 2007; Gottschalg & Zollo, 2007; Zander & Zander, 2005), there is still a highly contested charge that academia is drifting apart from business. As the gap between management research and practice is growing wider, the blame is placed squarely on the shoulders of researchers (Hambrick, 1994). Although management research has become a more productive, systematic, rigorous, and sophisticated enterprise than ever, having the most cutting edge investigative methodologies and tools at its disposal, critics complain that scholarly endeavors in academia are losing their relevance to the business community as (1) research results are difficult to comprehend to managers, and (2) they offer little actionable guidance to practice (Starkey & Madan, 2001).

In this paper, I will examine why business scholars do not meet practitioners' needs for the winning formulas. In particular, I will explore the legitimacy of sustainable competitive advantage in management research and business practice. Is sustainable competitive advantage an achievable Holy Grail for most firms? Does academic research help businesses achieve sustainable competitive advantage? Insightful analysis of these questions will shed light on the ever enlarging gap between academia and business. The organization for the remainder of the paper is as follows: first, background information is provided about sustainable competitive advantage and a brief discussion of resourced-based view. Then, sustainable competitive advantage is subjected to close scrutiny by addressing the above two questions. Finally, an alternative concept is offered in the discussion section, followed by some concluding remarks.

Resource-based View (RBV) and Sustainable Competitive Advantage (SCA)

While competitive advantage (CA) is believed to be the source of superior performance, sustainable competitive advantage (SCA) is the path to prolonged superior performance (Porter, 1985). As such, it is well understood by companies of differing sizes and varying industries to pursue CA, even more so SCA, in their quest for stellar performance. SCA has become the Holy Grail to the business community, as ever-demanding stakeholders or investors are increasingly results-oriented (Griffiths, 2007). As the consensus on the importance of SCA is transparent, evidenced by the popularity of the concept in both academic and business press, various functional departments or disciplines (e.g., management, marketing, management information systems) all strive to make a case that they can be a source, if not the only source, of

SCA (Adner & Zemsky, 2006; Bourlakis & Bourlakis, 2006; Pfeffer, 2005; Vorhies & Morgan, 2005). In spite of volumes of research documenting what SCA is and how to establish it, practitioners still complain about research being of little use, if not totally irrelevant, to their practice (Bleakley, 1993; Samuelson, 1993). If the significance of SCA in business research and practice is well received and agreed upon between academicians and practitioners, researchers must wonder what is amiss. Before tackling this thorny issue, a brief background on SCA will be provided.

The resource-based view of firm theory and competition is one of the major research streams in strategic management (Barney, 1991; Grant, 1991; Wernerfelt, 1984). The theory asserts that sustainable competitive advantage can be achieved when the firm has resources that are valuable, rare, inimitable, not substitutable, and have an organizational orientation, which is also known as the VRIO framework (Barney, 1986a, 1997). The logical flow from the framework is that superior company resources lead to SCA, which, in turn, leads to sustainable superior performance.

SCA under Scrutiny

Critics point out that the resource-based view (RBV) of firm theory is tautological at best in that resourceful entities surely have a better chance of being successful than their less fortunate counterparts (Porter, 1991). Thus, the theory does not say much about reality beyond the obvious. However, in defense of RBV, Barney (2001) argued that the discrepancy in the unit of analysis, such as resources at the functional level and performance at the corporate level, makes theory meaningful and valuable.

In spite of the differing level of analysis, it is still intuitive to connect resources with performance. However, the connection can be tenuous and may be taken for granted. Powell (2001) suggested firms' weaknesses, in addition to strengths, must be included in the discourse. That is, sustained superior performance requires that firms possess SCA in the absence of any competitive disadvantage, which may corrode or neutralize firms' SCA. For instance, a firm may not be able to achieve desired sales volume for its high quality merchandise due to inadequate channels of distribution. It is a given that any firm, regardless of its size or experience, is not free of weak points. As various external factors shaping competition wax and wane over time, the firm's strengths and weaknesses evolve. That is, as the firm develops a new competitive edge, it will also uncover the corrosive effect on performance of a new sore spot or an old one accentuated by the newest round of competition. These dynamics suggest that the "SWOT" analysis (strengths, weaknesses, opportunities, and threats) be carried out on a regular basis, which explains the non-dwindling popularity of the framework for strategy formulation (Black & Boal, 1994). It is possible that the firm achieves superior performance at one point in time, or for a short period of time, resulting from its strengths during which its disadvantage luckily has a flimsy effect on the bottom line. However, it is difficult to shield the weaknesses from exerting negative influence on performance at all times. In other words, superior performance may be a temporary phenomenon, at best, for most firms. Presuming that SCA leads to sustainable superior performance is a leap of faith. In fact, through analytical modeling, Pacheco-de-Almeida and Zemsky (2007) show that SCA and superior performance don't necessarily go hand-in-hand.

Empirical Evidence in Search for SCA

Although researchers have a consensus on the importance of competitive advantage to firms' success, they differ on the sources of performance variance among firms. The two competing schools of thought are the industrial organizational theory and the resource-based view of competition (Yiannis & Lioukas, 2001). The former believes that the industry structure in which a firm operates determines the firm's performance to a large extent, leaving little discretion to the manager (Porter, 1980; Powell, 1996; Teece, 1984). Contrarily, the latter emphasizes the critical role the firm's resources and managerial decisions play in influencing its performance, irrespective of the industry factors (Amit & Schoemaker, 1993; Wernerfelt, 1984; Wernerfelt & Montgomery, 1988). A myriad of studies have examined how industry factors, vis-a-vis firm specific resources, contribute to a company's financial performance (Hansen & Wernerfelt, 1989; Mauri & Michaels, 1998; Teece, 1996).

While it is one thing to explore the sources of competitive advantage (CA), it is another to examine SCA. In comparison to competitive advantage, data and research methodology required to study SCA may be a little different. Although SCA is CA that exists for some time period, the precise length (e.g., five years or ten years) for the presence of CA to be called SCA is not discussed in the literature. In any event, cross-sectional data is inadequate to demonstrate the necessary time framework for SCA. Instead, a longitudinal dataset covering various firms for a period of time must be available. Furthermore, researchers debated whether qualitative not quantitative methodology is key to isolating the sources of SCA (Rouse & Daellenbach, 1999, 2002; Levitas & Chi, 2002). In spite of the fact that empirical research has examined the persistence of superior economic performance, which is considered the consequence of SCA, the phenomenon turns out to be elusive at best. With data for over six thousand companies from forty industries over a span of twenty-five years, Wiggins and Ruefli (2002) found only few had achieved superior performance and very rarely kept it for an extended period. In a more recent article, Wiggins and Ruefli (2005) confirmed the rarity of SCA and prolonged superior performance. Furthermore, they found that SCA is not the same CA maintained over time, but differing CAs occurring at vary points of time.

The Role of Strategy in RBV

As the name itself suggests, the resource-based view places a heavy emphasis on the nature and amount of resources in generating revenues. According to Barney (1986b), resources can be categorized as tradeable and non tradeable assets or factors. While tradeable factors are identifiable assets whose value can be determined through a relevant marketplace, or a strategic factor market, non tradeable factors refer to firm specific assets instrumental to the firm, outside of which their intrinsic value cannot be established in public. RBV believes that, unless with luck, tradeable assets acquired through a strategic factor market will not produce supernormal returns to the firm, because their economic rent-generating ability should be reflected in the price paid for them. Thus, non tradeable assets, whose value and functionality are only known to the

firm but are murky to the outside world, should be a source of abnormal returns. Dierickx and Cool (1989) proposed that movements of assets, or asset flows, can be adjusted quickly, but asset stocks, which is the accumulation of assets, cannot. Due to time compression diseconomies and other reasons, it is difficult for any firm to accumulate pieces of valuable assets and integrate them into an organic whole within a short time frame. Thus, asset stocks or lack of asset stocks often become a determining factor for superior performance.

It is implicit in a RBV discussion about the role corporate or business unit strategies play in securing superior performance. Since tradeable assets are not a source of competitive advantage, whether or not a firm acquires a piece of asset in the strategic factor market is a strategic decision. That said, once assets are in place, both tradeable and non tradeable, how they produce superior performance is not examined closely. There is a black box between competitive advantage (assets) and subsequent performance (Priem & Butler, 2001). In other words, what strategies are implemented to utilize the resources are not emphasized by RBV (Porter, 1991).

Is SCA an Achievable Holy Grail for Most Firms: The Gap between Academia and Business

In today's hypercompetitive environment (Selsky, Goes, & Baburoglu, 2007), managers are constantly on the lookout for ways to improve their bottom line. In response to practitioners' needs, academia works diligently in search for a magic formula that hopefully will become a panacea for superior performance. Business scholars proposed various noble concepts and esoteric theories in demystifying the sources of superior performance, among which SCA and RBV are important and enduring contributions to the literature. Although competitive advantage has its logical and philosophical enigma (Powell, 2001) and RBV has its own critiques (Priem & Butler, 2001), their popularity in the press remains intact due to the fact that they possess high practical value to managers (Powell, 2001). That is, research on SCA and RBV may well churn out useful guidelines to practitioners in aiding their quest for superior performance. A great deal of work has been conducted to analyze, theorize, and demonstrate the existence of competitive advantage and its connection with superior performance. Such being the case, the question arises why managers still complain about the relevance of academic research (Aldag, 1997; Hambrick, 1994).

According to RBV, unique resources are the source of sustainable competitive advantage, which leads to sustainable superior performance. Of course, it is a given that companies prefer superior performance to mediocre performance, and sustainable superior performance to transitory superior performance. Depending on the precise definitions of superior performance (perhaps above industry average performance) and sustainability (five or ten years), often, consistent superior performance is a must for top management to stay in the job. Such being the case, RBV strikes a cord among managers and should resonate well with practitioners. The problem, however, is that SCA and sustainable superior performance are a stretch beyond ordinary managers' reach (Guo, 2004). In other words, researchers glamorize these buzz concepts and their theory with intent to increase the research relevance to practice in such a way

that the discussion remains an intellectual pursuit at best, yielding little really meaningful practical implications to ordinary companies (Bell, den Ouden, & Ziggers, 2006; Caswill & Wensley, 2007).

The VRIO framework discussed earlier suggests that only unique and non-imitable organizational resources constitute SCA. The very characteristics of exclusivity and inimitability of the required resources dictate that SCA cannot be a widespread phenomenon in any industry. For industry leaders that have exceptional resources, their success becomes the benchmark for other firms to emulate and learn. Thus, industry leaders will not benefit much from the research that demystifies what those distinctive organizational assets are. As critics argue that quantitative methodology by default cannot discover idiosyncratic firm assets (Jacobson, 1992), qualitative method may be more appropriate for the task (Rouse & Daellenbach, 1999, 2002). In any event, average or mediocre firms are more likely to benefit from RBV research than industry leaders because they can learn from the best practices in the field. However, even if critical resources peculiar to successful firms are spotted and analyzed, they may render little help to average firms after all because those resources should be non-imitable as per the doctrine of RBV. In other words, average firms will not be able to mimic the success resulting from the unique resources that industry leaders possess. Thus, neither industry leaders nor average firms will gain any actionable insights from the research.

As RBV calls for pursuit of unrivaled and non-imitable organizational resources that are requisite to superior performance, perhaps average firms may not want to mimic the unique assets from industry leaders. Barring firm specific assets are inimitable, average firms progress into a copycat through development or acquisition of unique resources identical or similar to those of industry leaders. As soon as unique resources degrade into common assets that most firms own, no firm will have any competitive advantage over others. The quest for SCA starts all over again. Such being the case, average companies may have more motivation and inspiration to carve out a niche by cultivating their own peerless resources that hopefully will bring them SCA (Ahuja & Katila, 2004).

Common sense says that risk and reward go hand in hand. To achieve SCA that leads to superb performance requires extraordinary measures. High reward of sustainable superior performance is indicative of potential treacherous path in the pursuit of exclusive resources. According to Hawawini, Subramanian, and Verdin (2003), idiosyncratic assets have much more impact on firm performance than industry factors for only a few companies in any given industry, among which they are either industry leaders or laggards. That is, to develop or obtain distinctive organizational resources, or being different from the crowd will make companies either very successful or unsuccessful, nothing in between. Firm specific assets intended for the creation of competitive advantages also impeded the firm's ability to borrow funds because it is difficult to determine the value of those unique assets as collateral (Balakrishnan & Fox, 1993). Given the two possible outcomes resulting from defying industry conventions, (above average, or superior performance, and below average, or mediocre performance), average firms may ascend to be the industry leaders or descend to be dawdlers from pursuing their own unparalleled strategic assets.

Considering the tiny number of elites that can be labeled as leaders, if not limited by being number one in any industry, average firms are more likely to stumble into being a straggler rather than rise to being a leader from pursuing uniqueness that is supposed to bring them superior performance.

Does Academic Research Help Businesses Achieve SCA?

As alluded to earlier, SCA and its collateral sustainable superior performance are elusive concepts at best and indeed a unique phenomenon. It is one thing to use the terms in a liberal or loose fashion, but it is another to apply them in such a strict or narrowly constructed way that the length (five or ten years) of competitive advantage and superior normal performance that exists and degree of superiority (top 1 percent or 5 percent in the industry or just above the industry average) are clearly defined (Aharoni, 1993). As such, research on SCA using cross sectional data will be an example of treating the concept loosely. As every firm is encouraged to pursue SCA, the direct and necessary result is a disappointment. An analogy would be that extensive research is conducted on the characteristics and attributes of NBA players and guidelines are compiled and distributed on how young people can succeed in this ultra-competitive area by becoming a member of this highly sought-after elite class. Since the number of NBA players is very small, roughly 400 in North America, becoming an NBA player is a unique phenomenon by definition given the fact that there are millions (if not tens of millions) of young athletes from the world wishing to join the league. No matter how reliable and accurate the research guidelines are, the amount of disappointment will not lessen a bit at the end of the day, as most hopefuls will not make the cut.

Because most research is positive in nature, empirical regularities and uniformity are derived from what has occurred in the past. As research unravels the sources of SCA, it would be a loss for those companies with SCA and a gain for others without SCA as the have-nots can learn from the haves. In the learning process, the have-nots improve themselves, but they will not acquire SCA if they simply mimic what the haves do. If the haves possess unique assets required of RBV, the have-nots probably could not even do much about it. As secrecy of SCA is unveiled by research, the haves cannot possibly benefit much from it to further strengthen their positions. In short, research will not help any firm achieve SCA. If the uniqueness of the resources is held up very well per request of RBV, the haves will not lose much either; otherwise, the haves will lose SCA sooner or later.

Discussion

Although the precise connotation of superior performance needs to be defined, it is well understood by managers that their objective should be to achieve superior performance for their companies (Merchant, 2007). If superior performance is the best performance achieved in a given industry, it must be a unique phenomenon by its very nature (Starbuck, 1993). Furthermore, sustainable superior performance must be a much rarer feat. Understanding the anxiety and excitement among managers in their

quest for excellence, researchers offer help with cutting edge knowledge and sophisticated theories. Unfortunately, the bar for superior performance, let alone sustainable superior performance, is too high for most managers to reach. As a result, theory looks far more savvy or sensible than it actually is. Thus, I suggest that survivable performance, performance that keeps the company alive and then some, may be more realistic, thus a better goal, for most companies to focus on than superior performance. Because bankrupt firms are not included in many of the studies, research results likely have survivability bias. In fact, a great deal of start-ups do not last for long. The dot-com bubble burst is still fresh in our memory (Guo, 2002). Even older or established firms of varying sizes go under as evidenced by scores of airline companies announcing bankruptcy (*Economist*, 2006). The fiasco of Enron is a dose of reality. Thus, it might be necessary to redefine the key terms to make them more meaningful or more intoned with actuality.

As already discussed, business scholars associate competitive advantage with superior performance and connect sustainable competitive advantage with sustainable superior performance. Because superior performance is a unique phenomenon (Starbuck, 1992, 1993), we should use more generalized terms as the dependent variable, such as the aforementioned survivable performance. Thus, I propose to redefine competitive advantage in such a way that it leads to survivable performance or even growth performance, but not superior performance. Accordingly, sustainable competitive advantage leads to long term survivability and perhaps prosperity. Consequently, research may yield more practical implications. For instance, hundreds of PC software companies should focus on the kind of competitive advantage that enables them to survive and grow in the ultra dynamic field, instead of making them Microsoft number two.

Conclusion

In spite of the growing criticisms against RBV (Priem & Butler, 2001) and calls for alternative theory for firm competition and performance (Johnson, Melin, & Whittington, 2003), there is no sign of slowing down in RBV research. Part of the reason could be that important concepts from RBV, such as competitive advantage, have practical values to the business community, notwithstanding their logical frailty (Powell, 2001). If practicality is the sole basis for the existence of the noble theory, the question arises as to why there is an increasing outcry among managers complaining about academia losing its relevance to practice (Spender, 2007; Starkey & Madan, 2001). My research indicates that scholastic work tends to meet managers' expectations in their quest for the Holy Grail, the source of sustainable superior performance, but the Holy Grail as a forbidden apple, so to speak, is beyond ordinary managers' reach. Theory lacks widespread applicability to reality. In a way, the problem is one of our own making.

To satisfy managers' need for pursuing competitive advantage, especially sustainable competitive advantage, RBV proposes the VRIO framework for resources acquisition and development. Unfortunately, unique assets and their ensuing result, superior performance, are exceptional cases in any given industry (Starbuck, 1993).

Due to the very nature of uniqueness and rareness, average firms will have difficulty copying the critical resources that the industry leaders possess. Thus, the value of RBV and the VRIO framework is in doubt for the majority of firms for which the research is designed to serve.

As theory points out, sustainable competitive advantage leads to sustainable superior performance. As glamorous and exalted as it is, managers are called to develop SCA, and consequently reap superior performance for years to come. The reality is that few firms can ever achieve superb performance, especially for an extended period of time (Wiggins & Ruefli, 2002, 2005). While unique resources are necessary to produce extraordinary performance, it is important to be mindful that unique resources can also bring catastrophic performance. Unfortunately, academic research will not and cannot reveal the highly sought-after information on what the “good” unique resources are and how to acquire them.

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A Strong Inference Test of the Effects of Strategic Interdependence on the JV Control-Performance Relationship

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Managing joint ventures (JV) both efficiently and effectively is a major challenge for many organizations. Drawing from agency and learning theories we conduct a strong inference test to examine two opposing factors, strategic interdependence and experience, believed to influence the JV control-performance relationship. Results suggest that not only do formal control and experience have an interactive effect on performance but also that informal control, experience, and strategic interdependence interactively influence performance (e.g., performance is greater for experienced parents that use more informal controls with interdependent ventures). Findings contribute to existing research by providing a clear yet more comprehensive perspective on JV governance and success.

The unprecedented rate in which joint ventures (JVs) have formed over the past two decades shows that organizations are increasingly embracing JVs as a means to growth, expansion, and competitive advantage. While much has been gained from studies on the formation, cooperation, management, and performance of JVs, the literature has yet to conclusively identify why the likelihood of JV success is at best,

typically 50% (Anand & Khanna, 2000).

Given the complexities of managing inter-firm relationships it is frequently suggested that the design and implementation of an appropriate control structure is critical to JV performance (Geringer & Hebert, 1989; Killing, 1983; Schaan, 1983). Yet the equivocal nature of extant research suggests that the control-performance relationship is not necessarily direct (Franko, 1971) and may in fact be quite complex and non-linear (Hebert, 1994; Yan & Gray, 1994). Namely, where some studies provide compelling evidence supporting the assertion that control and performance are related (e.g., Ding, 1997; Hebert & Beamish, 1997; Killing, 1983; Mjoen & Tallman, 1997) others fail to demonstrate either a direct or a consistently significant relationship (Calantone & Zhao, 2000; Child, Yan & Lu, 1997; Faulkner, 2000; Kogut, 1988). Furthermore, among the studies where support has been found the conclusions drawn are inconsistent; any one of a number of control strategies are reported to lead to higher JV performance including shared control (Beamish, 1993; Hebert & Beamish, 1997), dominant control (Ding, 1997; Killing, 1983; Mjoen & Tallman, 1997), split control (Choi & Beamish, 2004), and laissez-faire control – i.e., the autonomous JV (Blumenthal, 1988; Tomlinson, 1970).

To shed light on these conflicting views, contextual differences inherent in competing studies have been noted. Among the litany of ventures that have been examined, some are domestic while others are international. Relatedly, some are between partners from developed countries, others between partners from developing countries, and yet others from a mixture of the two. The benefit of highlighting such differences is that it demonstrates that any number of factors – environmental, inter-organizational, or intra-organizational – increase the complexity of JV management (e.g., Pearce, 2001; Yan & Zeng, 1999).

Investigating contingencies is likewise an important element to building cumulative theory; particularly when extant research provides inconsistent results. Studies in which control has been considered in conjunction with characteristics such as JV size, goal commonality, commitment, and conflict (e.g., Osland & Cavusgil, 1996; Pangarkar & Klein, 2004; Yan & Gray, 1994) have no doubt, provided beneficial insights. Nevertheless, to advance our knowledge on issues relevant to JV management continued attention is needed to identify other important moderators.

Two variables considered to be of influential value in this study are strategic interdependence and JV experience. These factors were selected for two reasons. First, each can have significant explanatory power on inter-firm relationships and the design of the JV's governance structure – a structure meant to modify agent behavior, coordinate activities, allocate resources, and achieve JV objectives. The second reason for our selection of variables is based on the belief that to truly understand the nature of a contingent control-performance relationship, research must investigate opposing perspectives and rule out competing conclusions that result from select interactions. Through such strong inference tests (Platt, 1964) a more robust understanding of JVs can be achieved and used as a practical guide for future research.

To elaborate on the point above consider the fragmented approach previously taken with the four variables of interest in this study. Scholars have explored the relationship between strategic interdependence and control mechanisms (Kumar & Seth, 1998),

between experience and control (Gray & Yan, 1992; Johnson, Cullen, Sakano & Bronson, 2001; Lyles 1988), and between experience and performance (e.g., Anand & Khanna, 2000; Makino & Delios, 1996). While each of these studies addressed critical JV issues, a study examining all four variables in a comprehensive fashion has yet to be conducted. This is a significant limitation when strategic interdependence and prior experience can have opposing effects on the design of the JV governance structure. On the one hand, incentives exist to institute more controls when a wide array of important resources are shared with other parties (Kumar & Seth, 1998). On the other hand, there is less need for numerous controls when parents have prior governance experience and can apply acquired know-how to current ventures (Gray & Yan, 1992; Johnson et al., 2001; Lyles, 1988).

The aforementioned research has also led to the implied conclusion that both the positive relationship between interdependence and control as well as the negative relationship between experience and control are beneficial to performance. This belief, however, has yet to be empirically established; reaffirming once again that tests of multiple variables in one comprehensive model is an existing gap in the literature (Yan & Gray, 2001) - one that this paper attempts to fill. Our research therefore adds to a body of literature that has frequently taken a descriptive approach to JV management without examining the performance consequences of governance decisions or the impact of divergent moderators on the control-performance relationship. Our study also provides the opportunity to consider whether JV experience should be viewed as a substitute or complement to control efforts.

To develop this more inclusive framework on the relationship among JV control, strategic interdependence, experience, and performance we rely on a number of well-accepted theories regularly used to explain unique aspects of JV activities. More specifically, agency theory (Jensen & Meckling, 1976), transaction cost economics (Williamson, 1979), and organizational learning theory (Argyris & Schon, 1978; Fiol & Lyles, 1985; Levitt & March, 1988) are adopted to substantiate relationships among variables. All three perspectives are essential in that while transaction cost economics understandably justifies control initiatives (assuming opportunism between partners) and efficiency concerns, it slights interpersonal issues occurring within the JV - the focus of our analysis. When JV managers are of interest, an agency perspective is often a more functional theory for explaining efficient and effective governance.

Agency theory, however, is not immune from criticism. By taking a rather static view of the principal-agent relationship it is assumed that principals should always be suspicious of agents' motivation and thus, consistently and aggressively monitor agents and offer them incentives to keep interests aligned. No allowances are made for the fact that principals can, with intentional effort, learn how to effectively govern agents and their activities. We therefore draw from the organizational learning perspective to explain and account for experiential learning.

Theory Development and Hypotheses

Control

Organizations view control differently based on their values and beliefs. In this

paper, control is defined as a purposeful and goal-oriented process (Green & Welsh, 1988) by which one party influences the behavior and output of another (Ouchi, 1977). According to agency theory, control is a necessity. Assuming that risk-neutral principals and risk-averse agents are boundedly rational utility maximizers (Eisenhardt, 1989; Jensen & Meckling, 1976), difficulty arises when there is information asymmetry and goal conflict between parties (Eisenhardt, 1989). Principals therefore must incur significant monitoring and bonding costs to prevent agents from putting forth suboptimal effort or making self-interested decisions.

Applying these ideas to a JV, it is apparent that when managers are expected to run operations in a distinctly created third entity with its own mission, objectives, strategies, and at times, culture (Johnson et al., 2001), the challenge is one of keeping JV managers' interests aligned with parental interests. To address this challenge, parents rely on various control mechanisms that facilitate exercising managerial control of JV activities (Geringer & Hebert, 1989). That is, it is through the use of control mechanisms that parents are able to influence JV decision processes as well as achieve predictability and confidence in behavior such that the risk of opportunism is minimized and returns are maximized (Fryxell, Dooley, & Vryza, 2002).

Control mechanisms have been characterized in numerous ways, including positive and negative (Schaan, 1983), formal and informal (Fryxell et al., 2002), objective and normative (Leifer & Mills, 1996), and outcome, behavioral, and social (Ouchi, 1979). While diverse in terminology, there is a great deal of conceptual overlap among these characterizations. For instance, reliance on the JV board of directors to monitor JV performance is a negative, formal, objective, or output control mechanism and offering executive development programs is a positive, informal, normative, or social control mechanism.

Of interest in this study are six commonly identified mechanisms - board role, board structure, management staffing, incentive plans, integrative mechanisms, and socialization. The first four of these mechanisms are characteristically referred to as formal and the last two as informal. While previous research has examined these and other mechanisms individually to better understand which type is effective under certain conditions (e.g., Johnson et al., 2001; Kumar & Seth, 1998; Schaan, 1983) our perspective is more collective in nature in that we consider the breadth of control that JV managers encounter. However, we avoid over-aggregation of control to understand better and in more detail how control is related to performance by considering two distinct governance structures – one containing formal mechanisms and the other the informal mechanisms.

JV Performance

Performance is of critical importance to strategic management. Scholars and practitioners alike are interested in the potential outcome of strategies they endorse for results can impact the ultimate survival of a firm. While performance can take on a variety of dimensions, we define it in terms of JV goal achievement. Goal achievement in this sense refers to objectives set forth in the JV agreement and collectively communicated to JV managers as their responsibility to achieve and upon which their performance is evaluated.

While most agree that JV control is an important issue, the effect of control on JV performance is ambiguous and inconsistent (Geringer & Hebert, 1989). As suggested earlier and detailed in the following sections, we propose that strategic interdependence and alliance experience are two variables that can help reconcile such inconsistent findings.

Strategic Interdependence

Strategic interdependence is defined as the extent and importance of resources shared between organizations (Kumar & Seth, 1998). Similar to the concept of interfirm embeddedness, where mutual dependence and connectedness exists among exchange parties (Provan, 1993), the more resources (tangible or intangible) that are shared and the more critical each resource is to competitive success, the stronger the interdependency.

The key to successful JV operations, however, is not just contributing or combining resources. Success requires effective management of those resources. With added interdependence, day-to-day interaction increases (Contractor & Lorange, 1988) as more issues and decisions are coordinated between parents and JV managers (Kumar & Seth, 1998). Proponents of agency theory suggest that the more extensive and critical the resources shared within the JV, the more parents have to lose should resources be misappropriated by JV management. Similarly, research suggests that firm-specific investments in legally separate organizations make parents more permeable and therefore more vulnerable to asset misappropriation (Fryxell et al., 2002; Johnson, Cullen, Sakano, & Takenouchi, 1996). As stated by Johnson and colleagues, a JV “creates a situation fraught with the potential for opportunism, uncertainty, and risk for the parent firm. The nature of the parent firm’s assets dedicated to the JV and the uncertainty surrounding the JV suggests a need to safeguard the investment” (2001, p. 37).

To align interests agency theory advocates monitoring and regulating the activities of JV managers with a variety of control mechanisms. In support, Gulati and Singh (1998) found that the greater the interdependence between parents (pooled, sequential, and reciprocal) the more formal controls were used to organize the alliance. Kumar and Seth (1998) also demonstrated that more control mechanisms (formal and informal) are used when parents and the JV are highly interdependent. Finally, Johnson et al (2001) found support for the hypothesis that control increases when a JV is strategically important to a parent.

What the aforementioned studies lack, however, is an analysis of how the ensuing control structure affects performance. It is implicitly assumed that the association is positive. When viewed from an agency perspective it is expected that the greater the interdependence the more likely that an intense control structure (i.e., one containing numerous control mechanisms) should protect parental interests, safeguard against opportunistic tendencies, and subsequently promote JV goal attainment (i.e., high performance). When less extensive and critical resources are contributed to the venture the same control design would do more harm than good. Excessive control mechanisms not only waste resources (Coles, McWilliams, & Sen, 2001) but they can also create tension (Zeng & Chen, 2003) and beget negative feelings between the

controllers and the controllees, which then influences performance related behaviors (e.g., commitment toward goal achievement). Sundaramurthy and Lewis (2003) similarly advise that exclusive control, as suggested by agency theory, often leads to a short-term emphasis, distrust, and reduced commitment. As strategic interdependence decreases, such control consequences should be especially harmful to JV performance. We therefore propose the following:

- H1: Strategic interdependence moderates the relationship between a.) the formal control structure and JV performance and b.) the informal control structure and JV performance such that the control-performance relationship is stronger with higher levels of strategic interdependence and weaker with lower levels of strategic interdependence.

Experience

Experience is a prime source of learning (Penrose, 1959). The key to moving along the learning curve and improving performance comes from a firm's ability to internalize lessons from experience (Inkpen & Crossan, 1995), translate that knowledge into behavior that is replicable (Argyris & Schon, 1978), and transfer it to new situations (Cohen & Bacdayan, 1994; Levitt & March, 1988).

Though definitely useful in explaining why parents do not permit or desire complete JV autonomy, agency theory's pessimistic view results in an excessive and relentless application of controls that support monitoring and incentive alignment. Acknowledgement that parents, through experience, may develop control-based competencies is nonexistent. We contend, however, that determining how much control to exert is best achieved through experience and learning how to design effective control structures. Since knowledge gained from experience can be applied to future alliances (e.g., Anand & Khanna, 2000; Child & Yan, 2003) it is reasonable to conclude that experienced parents should be more selective in their choice of controls, often times using fewer mechanisms to protect and preserve the principal-agent relationship.

Consistent with transaction cost economics and stewardship theory, experience may also reveal that excessive controls work against the return maximization objective of control, negates the value-creating benefits of the JV (Lorange, 1997), and limits JV managers from effectively fulfilling their duties and responsibilities (Donaldson & Davis, 1991). Indeed, research has demonstrated that experiential knowledge increases the likelihood of venture success. Lyles (1988) found that firms with prior collaborative experience altered their approach to current collaborations by incorporating prior know-how into the focal relationship. Johnson et al. (2001) discovered that not only does experience facilitate creating the right JV initially but it also reduces the need for direct control in existing inter-firm relationships. Similarly, Reuer, Zollo, and Singh (2002) and Zollo, Reuer, and Singh (2002) examined various trajectories of experience with results highlighting how experiential knowledge altered subsequent alliance governance choices as well as post-formation governance modifications. Thus, we hypothesize:

- H2: JV experience moderates the relationship between a.) the formal control structure and JV performance and b.) the informal control structure and JV performance such that the control-performance relationship is weaker with higher levels of experience and stronger with lower levels of experience.

Control-Performance Multiple Contingency Relationship

A major JV decision is determining not only what behaviors to control but also how to control those behaviors such that goal attainment is possible. The discussion thus far suggests that the control-performance relationship is either strengthened with strategic interdependence or weakened with experience. These opposing forces suggest the need to move beyond a simplified model that considers only one contingency factor at a time to one that investigates multiple situational variables interacting simultaneously. The benefit of this configurational approach, beyond its acknowledgement of system interactions (Colbert, 2004), is that it recognizes that “fit” is situationally specific (Delery & Doty, 1996). Based on this perspective we offer the following initial hypotheses:

- H3: Strategic interdependence and JV experience moderate the relationship between a.) the JV's formal control structure and performance and b.) the JV's informal control structure and performance.

The remaining four hypotheses originate from the preceding hypothesis but are more explicit in that each considers a specific contextual configuration of strategic interdependence and experience. This rather detailed approach provides a useful means to more thoroughly investigate our model of issues relevant to JV control.

The first configuration concerns a context where interdependence is high and parents have prior JV experience. This relationship is of particular interest because of the opposing impact each contextual factor has on the design of JV control structures. As noted earlier, agency assumptions and related research imply that the greater the strategic interdependence the more likely JV goals will be achieved with extensive (multi-mechanism) control structures. In contrast, fewer controls should be necessary to achieve a desired level of influence over goal-enabling decisions and behaviors when parents have prior governance experience. Platt (1964) argued that when conflicting conclusions exist, strong inference tests that examine multiple hypotheses simultaneously rather than sequentially are useful to advance knowledge on a phenomenon.

When considered together, it is unlikely that strategic interdependence and experience have an equal impact on the design of JV control structures. Studies on decision-making suggest that when confronted with a new or uncertain situation that individuals consider how the current situation relates to previous experiences. When similarities exist, these decision makers respond by using practices that are easily accessible and/or that have been successfully used in the past (Cyert & March, 1963; Huber, 1991). Given the value of experiential learning and the corresponding ability to apply lessons learned to new situations (e.g., Anand & Khanna, 2000; Child & Yan,

2003; Johnson et al., 2001; Lyles, 1988) we therefore expect experience to have a greater impact on the overall design of the control structure than interdependence; and correspondingly, that fit should be better when parents use fewer rather than more control mechanisms to manage behaviors and activities within the strategically interdependent JV. Stated differently and following the aforementioned behavioral rule, experienced parents should search for information on JV governance in their repertoire of prior experiences and existing knowledge, and emulate a control structure that worked well in the past.

Those experienced parents that learned from prior JVs also have an intangible knowledge-based asset that is valuable, rare, and not necessarily something competitors possess or can easily imitate. Indeed, studies have repeatedly shown the advantages resulting from experience-derived governance capabilities. For example, Makino and Delios (1996) found that experience in operating international JVs enhanced a parent's JV capabilities and overcame foreigner disadvantages, which resulted in higher performance. Simonin (1997) noted that the application of learned skills, including managing inter-firm relationships, led to both tangible and intangible benefits. Gupta and Misra (2000) found that markets reward both country-based experience and JV experience in general. Take these various benefits of experience and combine it with high strategic interdependence and the JV will subsequently become quite complex. Ultimately, this could produce a sustainable competitive advantage if competitors have difficulty disentangling and imitating the venture's unique and ambiguous linkages (Barney, 1991).

Finally, given that use of informal controls reduces the need for costly formal controls (Fryxell et al., 2002) it is also feasible that experienced parents recognize that the most effective means to protecting strategically interdependent resources from misuse and achieving performance expectations occurs when greater reliance is placed on informal mechanisms of control. Activities such as socialization and integrative mechanisms that not only induce shared values, beliefs, and preferences but also facilitate communication, cooperation, and mutual commitment should lead JV managers to process information, react to the environment, and make decisions in a manner consistent with how parents would respond (Trice & Beyer, 1993), thereby lessening the need for more formal or negative sources of control.

Another reason to expect higher performance for JVs subjected to fewer formal mechanisms has to do with, as just alluded to, the costs associated with formal control. Research suggests that monitoring and incentive systems are costly (i.e., time, focus, effort, and money) and those costs can rapidly exceed their benefits (Geringer & Hebert, 1989; Kumar & Seth, 1998). Thus, while control is undeniably necessary to effectively coordinate and integrate critical resources as well as curb agent shirking and self-interested behavior, instituting only a few formal mechanisms can be just as effective if not more so than implementing many. Of particular importance is the devastating impact that pervasive control efforts can have on interpersonal relationships. Referred to as the Pygmalion effect, efforts directed toward managing agents can, in reality, incite the unwanted behavior they were meant to prevent by signaling that parents neither perceive JV managers as trustworthy nor expect principal-beneficial decision making to occur within the JV (Ghoshal & Moran, 1996).

This would consequently hinder adaptability and trust-building as well as slow if not prevent JV goal attainment (Fryxell et al., 2002).

Consistent with learning theory and extant research, we therefore suggest that a majority of experienced parents not only recognize the aforementioned cost/benefit relationship but also consider the economic efficiency and relationship effects of various control structure designs and as a result, are apt to be more selective in their choice of controls. Those experienced parents that fail to incorporate lessons from the past or design control structures consistent solely with strategic interdependent, agency driven recommendations will be at a performance disadvantage.

H4a: With high strategic interdependence, experienced parents who use fewer formal controls, relying on more informal controls, have higher performance than those that use more formal controls and fewer informal controls.

When interdependence is high and parents lack experience fit should be evident for those using more control mechanisms. Prior research suggests that parents lacking governance experience are justified in believing that more mechanisms are better given the scale of interdependence (Kumar & Seth, 1998). Further, because significant interdependence makes a JV more complex, inexperienced parents may be uncertain which mechanisms are most effective and therefore, use an all-encompassing governance structure to improve the likelihood that one or more controls are in place to protect against the misallocation and unintended use of the many important resources contributed to the JV. Finally, while using more rather than fewer mechanisms to manage interdependence is not necessarily efficient, it does minimize risk of opportunism while principals gain experience in JV governance and develop a solid relationship among JV participants. In this context, control benefits should exceed control costs.

H4b: With high strategic interdependence, inexperienced parents who use more controls (formal and/or informal) have higher performance than those that use fewer controls.

When interdependence is low the JV strategy is less intricate and ambiguous. While decreased complexity should make control easier and transaction costs lower it also makes the strategy susceptible to greater imitability and competitive advantage much less sustainable (Barney, 1991; Tallman, 2000). Nonetheless, theory suggests that fewer controls are needed when a JV is characterized as less interdependent because transactions, for instance, are more arms-length and risk is lower. Consistent with our assertion that experience has a greater influence on the design of JV control structures, we propose that many experienced parents base their control decisions on similar reasoning and limit their selection of controls so that JV goals are achieved both efficiently and effectively.

In contrast, experienced parents who elect to use numerous mechanisms should find the control structure counterproductive to JV success (i.e., misfit) because of the

inefficient use of resources and the animosity that can occur when power is perceived as significantly asymmetrical (Johnson et al., 2001). In fact, lacking considerable interdependence parents will not have as much power as likely assumed when implementing their numerous controls. Absent significant power, JV management is in a better position to disregard controls, which may not only fuel animosity among parties but also be counterproductive toward goal achievement efforts.

H4c: With low strategic interdependence, experienced parents who use fewer controls (formal and/or informal), have higher performance than those that use more controls.

The final configuration concerns a context where interdependence is low and parents lack prior JV experience. This relationship is interesting because different hypotheses could be offered depending upon whether attention is centered on control structure design or on performance.

Given that experience is absent in this contextual configuration, parents control structure decisions should be driven by the fact that important (albeit less extensive) resources are being contributed to the JV - and these resources deserve protection. Although low interdependence calls for fewer controls (Kumar & Seth, 1998), inexperienced parents may not recognize or understand that fewer controls achieve the same objectives (i.e., aligns interests and facilitates goal achievement). In support, Johnson et al. (2001) found that parents with limited experience tend to use more control. Even if inexperienced parents reason that fewer mechanisms are needed under conditions of limited strategic interdependence, inexperience should lead to uncertainty about which mechanisms offer the best protection against misallocation of the resources that are contributed. Consistent with this assertion Schaan (1988) found that lacking experience, firms had difficulty deciding not only what to control but also how to control a JV.

Although research provides evidence that inexperienced parents use more control, studies have also shown that one outcome of excessive and overt decision-making control is conflict between parents and the JV (Johnson et al., 2001). Conflict consequently diverts resources, energy, and attention away from strategic objectives and can lead to decreased trust, commitment, motivation to learn, and willingness to perform necessary goal enabling tasks (Johnson et al., 1996).

Finally, while inexperienced parents should be apt to use more control mechanisms in less interdependent JVs, it is quite likely that performance will be lower than it would be for similar ventures subjected to fewer controls. JVs in the later situation should have a performance advantage over the former because situational fit is achieved and thus, more attention can be devoted to the major objectives of the JV. Likewise, lacking a great deal of interdependence, parents may find JV management disregarding or circumventing various control efforts. Since our overarching goal is to better understand the performance implications of control design decisions, we offer the following hypothesis:

H4d: With low strategic interdependence, inexperienced parents who use fewer controls (formal and/or informal) have higher performance than those that use more controls.

Methodology

Data and Research Sample

Taking the JV entity as the unit of analysis, data for this study was collected through a nationwide questionnaire mail survey designed and administered based on the methods offered by Dillman (2000). To ensure content validity, three strategic management scholars conversant with JV literature reviewed the initial questionnaire and provided input for revision. The questionnaire was then pretested on a small group of managers prior to final mailing.

Three secondary sources were used to develop the mailing list of eligible two-parent JVs: *Directory of Corporate Affiliations* (1999), *Ward's Business Directory* (1999), and Lexus Nexis. Our goal was to obtain ventures encompassing a wide range of industries. Hence, any for-profit equity JV was eligible. Including only equity JVs was considered appropriate because the structure of equity JVs tends to be well-defined and standardized. This more homogenous sample helped avert confounding interpretation and comparability of findings (Contractor & Lorange, 1988; Park & Russo, 1996). Second, we only included ventures where the JV entity itself (not necessarily its parents) was located within the United States, thereby controlling for country-specific differences in business and political conditions (Kogut, 1988). Ultimately we generated a list of 680 JVs in both manufacturing and service industries.

Once the JVs were identified, a six-page questionnaire along with a personalized cover letter explaining the nature of the study was sent to joint venture CEOs. Executives were asked to consider the JV they were currently managing and to answer all questions from the perspective of the JV; not their own personal perspective (i.e., organizational not individual point of view). In exchange for participation and to provide motivation and accurate responses each JV CEO was assured of anonymity and given the opportunity to receive a summary report of our findings. Eighty-four of the initially sent surveys were returned because of nonexistent addresses or a JV's inability/unwillingness to participate. These ventures were subsequently excluded from the postcard follow-up mailing. In the end, a total of 71 responses were received for a response rate of 12%. After eliminating responses that had a significant amount of missing information or contained influential outliers, the analysis proceeded with a final n of 62.

While low responses are not unusual for studies at the organizational level of analysis (e.g., Cycyota & Harrison, 2002; Hoskisson & Hitt, 1988), secondary data on various JV attributes allowed us to compare and test for systematic response bias and to establish the representativeness of our sample. Following the procedures suggested by Armstrong and Overton (1977), t -tests were performed comparing respondents and nonrespondents on annual sales and number of full time employees. No significant differences between the two groups were found for either dimension.

Variables

All measures used in the study came from previously published research. The survey instrument is available from the first author.

Dependent variable. Our study used Mjoen and Tallman's (1997) perceptual measure of performance that defines performance in terms of goal achievement. Hatfield, Pearce, Sleeth, and Pitts (1998) contend that goal achievement is appropriate because it is not only a major contributor explaining JV performance but it also avoids contamination by nonperformance factors while maintaining breadth of coverage. That is, defining JV performance subjectively in terms of goal attainment goes beyond mere financial gain or survival (Child & Yan, 2003) to contain a range of additional items including knowledge acquisition and learning; asset, human resource, and market access; technological development; as well as improved understanding of governmental behavior, national policies, foreign cultures, and market characteristics.

The three indicators of goal achievement measured on a 5-point Likert scale were: 1.) we are satisfied with the performance of the JV; 2.) the JV has met the objectives for which it was established; and 3.) the JV has been a profitable investment. A composite score was calculated as the average response to the three performance questions. Cronbach's alpha was .88.

Measuring performance from the perspective of the JV can be a contentious issue for some. However, asking for performance information from one key stakeholder in a three-sided relationship is consistent with previous research (e.g., Ding, 1997) and is supported by empirical demonstration of a significant positive correlation among parents and JV management's assessment of and satisfaction with the JV's performance (Geringer & Hebert, 1991; Glaister, Husan, & Buckley, 2004). Also, there is reason to believe that common method bias, if it indeed is a problem, is not so great as to invalidate results. Given the highly specialized expertise associated with informants it was not unreasonable to expect that the JV CEO had the most detailed knowledge, including both the control mechanisms utilized within the JV and whether JV management had the opportunity and ability to meet its strategic goals (Killing, 1983; Schaan, 1983).

Independent variables. The study's independent variables were breadth of formal and informal control, degree of strategic interdependence, and existence of prior JV experience. To appropriately depict the JV's control structure in terms of few to many mechanisms we combined the standardized scores of six control mechanisms into two formative measures, breadth of formal control (board role, board structure, management staffing, and incentive plans) and breadth of informal control (integrative mechanisms and socialization).

To measure the first formal structure component, *role of the JV board*, CEOs rated the degree that JV parents participate in strategic planning, budget approval and short-term planning, monitoring operating performance, and coordinating JV and parent actions (Kumar & Seth, 1998). Answers ranged from 1 = none to 5 = very great.

The second formal mechanism, *JV board structure*, was assessed by asking the size of the JV board and of the total, how many represent each parent respectively. Responses from the second question were divided by the first to determine the proportion of members from parental headquarters (Kumar & Seth, 1998).

Following Kumar and Seth (1998) the third formal mechanism, *incentive compensation*, was assessed by asking CEOs what percentage of the JV top management bonus plan is based upon the performance of the JV alone rather than contingent upon a combination of JV plus parent performance (reverse coded).

The final formal control mechanism, *staffing JV management positions*, was operationalized by asking JV CEOs the following: 1.) what proportion of JV top management positions are occupied by members from each parent? and 2.) does the JV CEO originate from one of the parents? (Kumar & Seth, 1998).

To measure the first informal structure component, *integrative mechanisms*, JV CEOs were asked to rate the frequency that four different communication mechanisms (direct contact, liaison personnel, temporary task forces, and permanent committees) are used to coordinate JV management decisions with those of its parents (1 = rarely to 5 = very frequently). Consistent with Kumar and Seth (1998) frequency of use was then weighted based on the relative complexity of each type of mechanism with direct contact viewed as least complex (1), permanent committees as the most complex (4), and liaison personnel and temporary task forces lying in between (2 and 3 respectively) (Gupta & Govindarajan, 1991).

The other informal mechanism, *socialization*, was measured by asking CEOs to answer either yes (1) or no (0) to each of the following: 1.) is there planned rotation of the JV CEO back to the parent? 2.) does either parent have planned rotation of JV top managers to and from duty with this JV? and 3.) do JV top managers attend executive development programs and seminars conducted by either parent? (Kumar & Seth, 1998).

Using Kumar and Seth's (1998) instrument, we measured *degree of strategic interdependence*, by asking CEOs to rate separately on a five-point scale, 1.) the importance of thirteen resources to the operation and success of the JV and 2.) the extent to which each of those resources is shared between parties. Resources included items such as capital, raw materials, facilities, strategic planning, brand names, and functional area experience (Harrigan, 1985). A composite score was calculated by weighting each shared resource by its perceived importance.

Experience was measured using a portion of an instrument developed by Johnson et al. (2001) that asked CEOs whether parents had prior JV experience besides the JV of which they were currently managing. Responses were coded (1) if one or both parents had previous JV experience and (0) if neither parent had prior experience.

Three variables that have the potential to confound results include the age of the JV, the nationality of the *JV parents*, and *JV industry*. Age was operationalized in terms of months. Nationality was based on the country of each parent's headquarters. JVs with both parents originating from the US were coded (1). Those with at least one parent from another country were coded (0). JV industry was measured using the JVs two digit SIC code, which was then divided into two industry groups, service (42%) and manufacturing (58%). We felt it necessary to combine firms into two distinct groups because of the ten possible SIC divisions eight were represented in our sample (absent were Divisions A and J). Of those, numerous two-digit SIC codes were represented with no more than five but on average only two companies representing any one two-digit segment thereby making it difficult to determine if a specific industry had an influential effect.

We did not control for percentage of ownership in concurrence with Kumar and Seth (1998) who state that if the majority of the sample has a 50/50 or 49/51 ownership structure, as is the case with our sample, it is not necessary to include it as a control variable as it is implicitly controlled. We also did not include equity ownership as a control mechanism because equity ownership provides only a limited amount of control (Mjoen & Tallman, 1997) and as defined, is not equivalent to managerial control (Geringer & Hebert, 1989; Yan & Gray, 1994). Further, using equity as a control mechanism is more conducive to controlling partner behavior than JV management behavior.

All independent variables measured with multi-item scales were *formative* rather than *reflective* in nature and therefore, could not be subjected to reliability or factor analytic approaches typically used for reflective measures (Bollen & Lennox, 1991). Rather than being affected by or a manifestation of the underlying construct, as is the case with the reflective measures of performance, each item in a formative scale consists of single attributes of the variable that together define or cause the composite construct. Formative indicators are multidimensional “checklists” wherein each item contributes to the total and because of this, are not expected to be internally consistent or unidimensional - they may be positively, negatively, or uncorrelated with each other (Bollen & Lennox, 1991). For instance, the literature suggests that strategic interdependence is best measured by tapping into the resources and skills shared between firms’ value chains (Harrigan, 1985). Given that each resource covers different facets of interdependence, it is not expected that manufacturing expertise would be highly correlated with marketing expertise or that a change in the former necessarily leads to a change in the later. Rather, it is by summing the weighted resources and skills that we determine the degree of interdependence. The same logic holds for the breadth of control. Each control mechanism contributes to and defines the JV’s control structure.

With formative variables, validation relies largely on the precision and thoroughness in which the measures’ domain is established and tapped (Johnson et al., 2001). Thus, content validity was achieved by grounding the items in the literature and having three strategic management scholars visually inspect the items to ensure that they adequately embodied the domain of interest.

Prior to running regression analyses, variance inflation factors (VIF) were examined to determine if the independent variables were orthogonal. Since VIF values were under 10, multicollinearity was determined not to be a problem (Neter, Kutner, Nachtsheim, & Wasserman, 1996).

Results

Table 1 reports the descriptive statistics and the matrix of correlations among all variables. Tables 2 and 3 provide regression results testing the impact of JV characteristics on the relationship between the formal and informal control structure and performance respectively. Following the procedures recommended by Cohen and Cohen (1983) we tested our hypotheses by considering the significance of the standardized regression coefficient for the interaction terms as provided in models three and four of each table.

Table 1: Descriptive Statistics and Correlations^a

Variable	Mean	s.d.	1.	2.	3.	4.	5.	6.	7.	8.
1. Performance	4.20	0.76	1.00							
2. Age	120.89	157.74	0.14	1.00						
3. Industry ^b	0.60	0.50	-0.09	0.16	1.00					
4. Nationality ^b	0.63	0.49	-0.08	0.14	-0.29*	1.00				
5. Formal Controls	0.00	2.30	0.12	0.11	0.26*	-0.20	1.00			
6. Informal Controls	0.00	1.64	0.06	-0.01	0.16	-0.28*	0.56**	1.00		
7. Strategic Interdependence	1.92	0.96	0.02	-0.09	-0.00	-0.01	0.35**	0.50**	1.00	
8. Experience ^b	0.87	0.34	0.21	0.10	0.08	0.20	-0.01	0.01	-0.26*	1.00

^aN = 62
^bDummy Variable
* $p < 0.05$
** $p < 0.01$

Table 2: Hierarchical Regression Analyses with the Formal Control Structure

Variables	Model 1	Model 2	Model 3	Model 4	
Age	0.19	1.73	0.19	0.20	
Industry	-0.16	-0.22	-0.11	-0.07	
Nationality	-0.15	-0.20	-0.27*	-0.30*	
Formal Control Structure		0.09	1.78**	-1.12	
Interdependence		0.07	0.22	0.01	
Experience		0.27†	0.47	0.48	
Formal Control x Interdependence			-0.24	2.07	
Formal Control x Experience			-1.55**	1.33	
Interdependence x Experience			-0.27	-0.03	
Formal Control x Interdependence x Experience				-2.27	
	R ²	0.05	0.13	0.31	0.34
	F	1.07	1.33	2.59*	2.64**
	ΔR ²		0.07	0.18**	0.03

Standardized beta coefficients are reported
N = 62
† $p < 0.10$
* $p < 0.05$
** $p < 0.01$

Hypotheses 1a and 1b predict that strategic interdependence moderates the relationship between the formal control structure and performance as well as the informal control structure and performance. Model 3 in Tables 2 and 3 failed to support these hypotheses. Neither the interaction between the formal control structure and interdependence nor the interaction between the informal control structure and interdependence were significant.

Table 3: Hierarchical Regression Analyses with the Informal Control Structure

<u>Variables</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	
Age	0.19	0.19	0.16	0.18	
Industry	-0.16	-0.20	-0.15	-0.10	
Nationality	-0.15	-0.23	-0.21	-0.22	
Informal Control Structure		-0.04	-1.41	-2.96*	
Interdependence		0.13	1.08**	0.87*	
Experience		0.28*	1.27**	1.24**	
Informal Control x Interdependence			0.26	2.02†	
Informal Control x Experience			1.15	2.83*	
Interdependence x Experience			-1.21*	-0.99*	
Informal Control x Interdependence x Experience				-1.88†	
	R ²	0.05	0.12	0.24	0.28
	F	1.07	1.27	1.80†	2.00*
	ΔR ²		0.07	0.12†	0.05†

Standardized beta coefficients are reported
N = 62
† $p < 0.10$
* $p < 0.05$
** $p < 0.01$

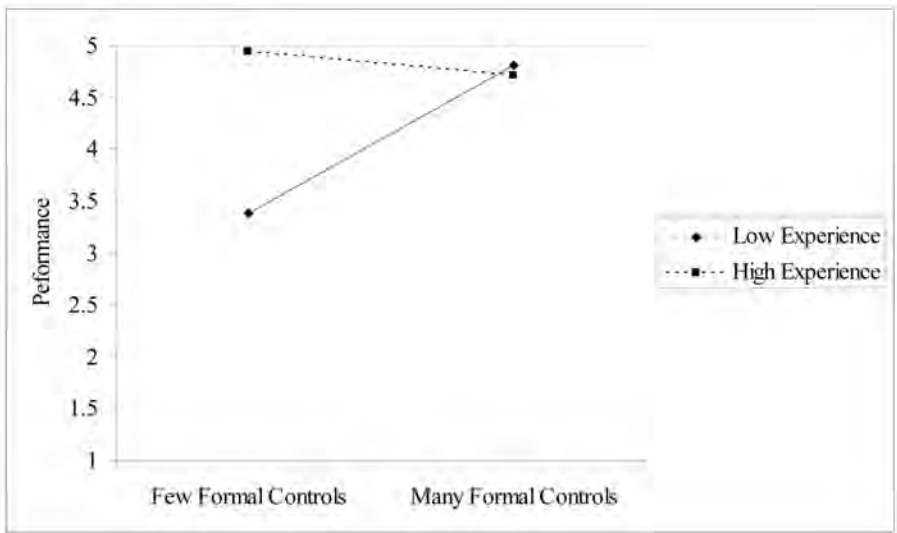
Hypotheses 2a and 2b predict that experience moderates the relationship between the formal control structure and performance as well as the informal control structure and performance. Results in Table 2 support hypothesis 2a, which demonstrates that formal control and experience interact to influence performance ($\beta = -1.55$, $p < .01$). The nature of this interaction is depicted in Figure 1. As seen in Table 3, the interaction between informal control and experience was not significant. Hypothesis 2b therefore, was not supported.

Model 4 in Tables 2 and 3 include the hypothesized three-way interactions. Results depicted in Table 2 failed to support hypothesis 3a. The relationship among formal controls, strategic interdependence, and experience was not significant. In contrast, support was found for hypothesis 3b. Interdependence and experience interact with informal controls to have bearing on performance ($\beta = -1.88$, $p = .07$). We recognize that a p-value greater than .05 is often considered marginal; however, Cohen and Cohen (1983) recommend using a less stringent p-value for higher level interactions. Had the 3-way interactions not been considered there was also a 93% chance that we would violate the assumption of additivity.

Cohen and Cohen (1983) further contend that the coefficients for the multiplicative terms and their component variables' main effects contain information needed to interpret significant N-way interactions. Given that support was found for hypothesis 3b but not 3a, we limited our analysis of hypotheses 4a-d to the relationship between contextual configurations and informal controls on performance

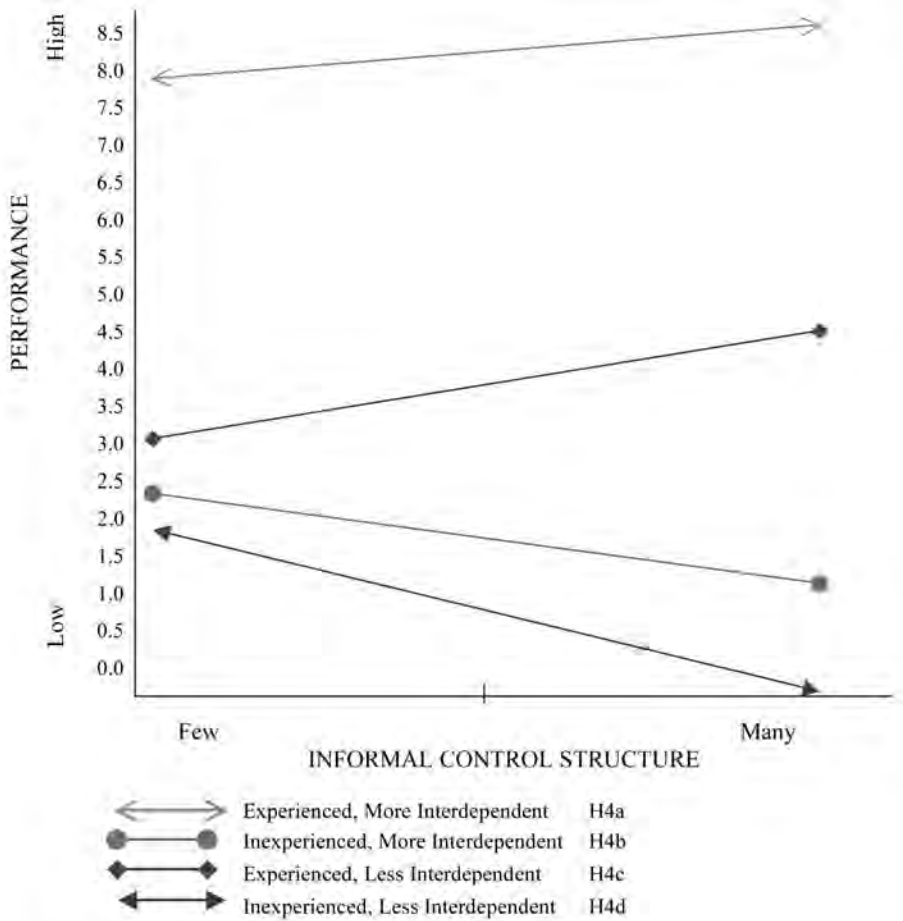
(i.e., how various configurations influence the formal control-performance relationship were not considered). Following the procedures outlined by Cohen and Cohen (1983), the hypotheses were analyzed by means of graphing the relationship between performance and the informal control structure at high and low levels of experience and interdependence (see Figure 2). To determine the slopes of the lines select values (one standard deviation above and below the mean) of the moderator variables were substituted into the unstandardized regression equation. Through this procedure, product terms were eliminated with results showing the performance effects of more or less informal control structures.

Figure 1: *Interaction between a Formal Control Structure and Experience*



Hypothesis 4a predicted that performance will be higher for experienced parents that rely on informal controls when strategic interdependence is high. Results depicted in Figure 2 support this portion of the hypothesis. Opposite to what was predicted in hypothesis 4b, when interdependence was high, inexperienced parents who implemented fewer informal control mechanisms had higher performance than those that implemented more informal controls. Performance was also the reverse for the control-contextual configuration proposed in hypothesis 4c. When strategic interdependence was low, experienced parents who relied on more informal controls had higher performance than those that place less emphasis on informal mechanisms. Finally, with low interdependence, inexperienced parents who used fewer informal controls had higher performance than those that used more informal control mechanisms. This finding therefore supports the informal control facet of hypothesis 4d.

Figure 2: *Effect of Informal Controls on Performance for Four Configurations*



Discussion and Conclusions

A recurring premise in the literature is that control is a critical factor in JV success. Extant research, however, has not investigated the performance implications of the JV control structure in sufficient detail, especially in light of the opposing effect different contextual variables can have on the control-performance relationship. Drawing from both agency and learning theories we describe why research must take a more comprehensive look at issues surrounding JV control and performance. Mechanisms meant to safeguard against agent shirking and resource misappropriation may not always have a beneficial effect on JV goal attainment.

Our synthesis of the literature and findings suggests that interdependence and experience are two important issues affecting control structure decisions and performance outcomes. Results reveal an antagonistic interaction (Neter et al., 1996) between formal control and experience such that an increase in performance due to

increased use of formal control mechanisms becomes smaller as parents gain JV experience. That is, when parents have experience managing JVs, increasing the breadth of the formal control hurts performance. When parents lack experience, the time, effort, and resources devoted to protecting parental interests are a justifiable means of directing JV behavior toward goal attainment.

A significant three-way interaction between informal control, interdependence, and experience brings to light the complex nature of control-performance relationships where interdependence and experience work in combination to influence the design of the JV's informal governance structure. Certain configurations of these variables enhance a JV's ability to achieve its stated goals efficiently and effectively; others do not.

As predicted, performance was greater for experienced parents who used more informal control mechanisms to align interests in a highly interdependent JV. Kumar and Seth (1998) established the individual importance of integrative mechanisms and socialization when interdependence increases between parents and the JV. Our study, which combined these two mechanisms to form the JV's informal control structure, supports their findings and extends their research by considering the simultaneous importance of JV experience.

Interestingly, while performance was higher for inexperienced parents who used fewer informal controls when interdependence was low, we did not find performance to be higher for inexperienced parents who used more informal controls as interdependence increased. We offer two plausible explanations for the latter configuration; however, each indicates the need for additional research into the process of implementing JV control structures.

First, while informal mechanisms can be quite beneficial to JV governance, they are uncertain and ambiguous (Inkpen & Currall, 2004), thereby making execution more challenging than with more explicit formal control structures. Likewise, parents do not necessarily achieve effective control just because control mechanisms are implemented (Das & Teng, 1998). Informal mechanisms in particular will not effectively regulate behavior if concerns of agent opportunism are not overcome (Fryxell et al., 2002). Considering that experience also interacted with the formal control structure it is possible that JV managers struggled to interpret inexperienced parents' control motives (e.g., were many diverse controls selected because parents lacked an understanding of how to manage a JV or do executives from parental headquarters have different perceptions of the trustworthiness of JV managers?). In either case inferior performance would follow because of the economic and social costs incurred in designing and implementing a suboptimal governance system (i.e., one that emphasizes both formal and informal controls) and/or because of the penalties incurred when misunderstandings and resentment arising from inconsistent signals interfere with day-to-day functioning and integration (Guidice & Mero, 2007). Left unattended and unresolved such conflict can lead to reduced commitment and cooperation (Cullen, Johnson, & Sakano, 1995; Pearce, 2001), inefficient operations (Madhok, 1995), and inadequate performance (Ding, 1997; Killing, 1983).

Second, it is important to recognize that while informal controls are more economical in the long run (Fryxell et al., 2002), creating shared values and

commitment takes time and resources, and is difficult to achieve (especially when parental behavior suggests that structural decisions may be driven by opportunistic assumptions). Related research suggests that trust is a determinate of control mechanism choices and that chosen controls influence trust (Inkpen & Currall, 2004). It is also argued that trust and informal control overlap significantly (Fryxell et al., 2002), that extensive use of formal controls slows the development of trust (Inkpen & Currall, 2004), and that successful implementation of informal controls is less likely to occur if trust between parties is negligible (Fryxell et al., 2002). Thus, where a shift from formal to informal controls should occur as the JV ages, this did not seem to happen as easily with the inexperienced parents in our study. Parents may have been preoccupied with formal controls because trust was negligible or perhaps because the JV had yet to reach the point where informal control costs were less than the costs associated with formal mechanisms and performance reflected these costs.

Consistent with learning theory our findings provide evidence that experienced parents can become knowledgeable in JV management and when applicable, use that information in a beneficial manner in subsequent relationships. This conclusion was drawn after comparing multiple pairs of configurations. For example, performance was consistently higher for experienced parents when comparing conditions where interdependence was the same (both either high or low). Performance remained higher for experienced versus inexperienced parents when the configurations being compared contained one high and one low interdependent condition. As seen in Figure 2, the best performers were experienced parents that used more informal controls under conditions of both high and low interdependence.

Given the importance of experience, it can be similarly inferred that experience influences other JV decisions. For instance, the level of interdependence chosen to unite parties may also be partially based on prior experience and learning what skills and resources can safely be shared without creating viable competitors or losing the foundation upon which a competitive position rests. Although an explicit hypothesis was not offered, results in Table 3 show a significant interaction between experience and interdependence ($\beta = -1.21, p < 0.05$).

While results undeniably support the value of experience we would caution that experience alone does not guarantee a successful control-performance outcome. Not all parents will learn from prior experience to the extent that behavior changes (Fiol & Lyles, 1985). Some experienced parents may also incorrectly assume that their current JV is similar to a prior JV and inappropriately replicate the earlier governance structure (Finkelstein & Halebian, 2002).

Finally, prior research has suggested that JV experience could be viewed as a complement to control or as a substitute for control. Our findings support both positions depending upon the control structure considered. It appears that experience complements informal control initiatives (more informal control mechanisms were an effective and efficient means to achieving JV goals for experienced parents) while it substitutes for formal control efforts (i.e., experienced parents use fewer formal controls). With the negative relationship between experience and formal control it is important to note that mechanisms like the board of directors can be used for purposes other than monitoring per se; boards also have advisory and resource acquisition roles.

It therefore may not be correct to conclude that absolute substitution is inevitable (i.e., as parents gain more and more experience they will necessarily use fewer and fewer formal controls such that at some level of experience, no formal controls will be used). What experienced parents learn is how much, what types, and for what purpose control mechanisms are best suited.

Implications

Firms are finding it increasingly necessary to build long-term partnerships to accomplish value-creating goals. Despite widespread interest in JVs there is limited understanding of how this organizational form produces a competitive advantage and superior performance. Our study points to the need for scholars to examine the performance implications of their research inquiries. Prior to this study it was implicitly assumed that more controls aided in JV goal attainment. We provide empirical evidence that this assumption may not always be accurate. Findings suggest that when formal controls are considered, less is better for experienced parents. Results also suggest that when the informal control structure is of interest, performance suffers if informal controls, interdependence, and experience are not properly aligned.

Managers in turn, can benefit from understanding that there is no one sure element, even if applied properly that is the key to JV success. We advance knowledge on this issue by providing an explanation for how goals are best achieved under specific contexts using a configuration of various formal and informal control mechanisms. To be sure, this study only tapped into one set of configurations. Other elements are likely to modify the control-performance relationship.

Limitations and Future Research

The ability to generalize our findings or draw comprehensive conclusions is limited in a number of ways that merit discussion. First, given the mean age of the JVs in our sample and fairly high performance ratings, the study may be biased toward, and thus most applicable to, older successful ventures. We would however emphasize that our focus was on trying to understand factors that lead to beneficial JV relationships and it is precisely those older and thriving ventures that offer many insights. Likewise, it takes time for an organization to achieve many of its goals (Hatfield et al., 1998) and older ventures capture this better than newly formed JVs still making progress toward goal attainment.

Second, we develop our arguments based on the supposition that the JV parents make similar assumptions about agent motivation, and thus, agree on the design of the JV governance structure. This may not occur in every relationship and future research should delve deeper into this issue to determine if and how JV governance and performance are affected by parents' philosophical beliefs.

Third, our paper, like other control-performance inquiries, assumes a linear relationship between variables. However, it is possible that a curvilinear relationship exists such that there is a threshold point where the control-performance relationship

shifts from positive to negative or visa versa. This possibility suggests that conclusions drawn in our study may only hold within a specific range.

Fourth, our measure of experience is fairly limited. Experience was considered to exist and guide control design decisions if either one or both parents had engaged in prior JVs. Our dichotomous measure also prevented us from determining whether the knowledge gained from managing one prior JV is comparable to the knowledge gained managing multiple JVs. Future studies would benefit from taking a more in-depth look at experience to determine how quickly a parent moves along the learning curve and whether a parent's knowledge indeed plays a dominant role in the design of the JV control structure when its partner lacks similar experience.

Our final caveat concerns sample size. It is generally acknowledged that obtaining data is often one of the biggest obstacles in JV research (Kogut, 1988). On the positive side, even with low statistical power, we found significant effects for a number of our proposed interactions suggesting strong effect sizes. Had the sample been larger it is possible that we would have detected additional interactions and strengthened other marginally significant effects (Jaccard, Turrisi, & Wan, 1990). Importantly, the availability of secondary data allowed us to compare our limited sample to the population on several dimensions where we found no significant differences.

Other studies have increased their sample size by having executives complete two questionnaires (one for each parent). This, however, is inappropriate. First, JV management is subject to a control mechanism whether implemented by one or both parents. Second, if both parents institute the same mechanism then there is double representation when describing the JV's governance structure. Unless these mechanisms were implemented for reasons other than control there is unwanted repetition in analyses, calling into question the validity of any significant findings.

Beyond the suggestions offered above, future research should extend the ideas offered in the present study to other samples, particularly at an international level. With companies increasing their global presence, additional investigation is required to determine if country-level factors, such as cultural distance influence the nature of JV management.

In conclusion, it is only through further refinements and extensions to this and other inter-organizational research that we will gain a comprehensive understanding of the complex issues inherent in JV relationships.

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Image Norms: A Model of Formation and Operation

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This paper presents a model describing the formation and operation of image norms. Image norms are discussed from both the individual and the organizational perspective. This is followed by a discussion of the implications of image norms for individuals' career choice decisions. The implications of image norms for organizations are also presented. Suggestions for future research on image norms are provided.

This paper will discuss the formation and operation of image norms. Image norms are the belief that individuals must present an image that is consistent with occupational, organizational, or industry standards in order to be hired or promoted (Giannantonio & Hurley-Hanson, 1996). An understanding of the role that image norms play in individuals' careers and organizational decisions begins with an examination and understanding of the effects of physical attractiveness on employment decisions.

Physical attractiveness has been associated with more favorable educational (Ritts, Patterson & Tubbs, 1992), occupational (Dipboye, Fromkin & Wiback, 1975; Quereshi & Kay, 1986; Cairn, Siegfried & Pearce, 1981; Gilmore, Beehr & Love, 1986; Morrow, McElroy, Stampe & Wilson, 1990; Frieze, Olson & Russell, 1991; Roszell, Kennedy & Grabb, 1989), and life (Adams, 1977) outcomes. A meta-analysis (Hosoda, Stone-Romero & Coats, 2003, p. 436) suggests that "although attractiveness may not be the most important determinant of personnel decisions, it may be the deciding factor when decision makers are faced with difficult choices among job applicants or incumbents who possess similar levels of qualifications or performance". Research on physical attractiveness has focused on individual physical characteristics such as hair color, height, and disability (Miller, 1986; Colella, DeNisi & Varma,

1997). These specific dimensions of attractiveness have been found to affect organizational employment decisions and individuals' career outcomes.

While the role of physical attractiveness in employment decisions has received fairly strong research support, the role of image has received limited academic attention. One reason for this may be that few definitions of image exist. Giannantonio and Hurley-Hanson (2006) define image as the totality of an individual's personal appearance, one's persona, or the way one is seen. Image is a broader, more general construct than physical attractiveness (Dollinger, 2000), and it may encompass several dimensions of attractiveness.

Understanding the effects of image may increase our understanding of the distinction between the role of image and the role of appearance on hiring and promotion employment decisions. Separating out the influence of image may help to explain situations where an individual, although physically attractive, is not hired or promoted because their image is not appropriate for a certain job or a specific company. One purpose of this paper is explore how employment decisions may be based on a more general assessment of an individual's image, rather than an evaluation of any one specific physical characteristic. For example, while recruiters would not be expected to say "You are not pretty enough to work here.", their evaluations of candidates may be influenced by their desire to hire applicants whose physical appearance is consistent with their company's image.

Applicants, as well as organizational members, form perceptions about the importance of image in the workplace. While these perceptions may reflect occupational and organizational stereotypes (Giannantonio & Hurley-Hanson, 2006), they also become the basis for image norms. This paper will examine the formation and operation of image norms from both the individual and organizational perspective. This is followed by a discussion of the implications of image norms for individuals and organizations.

Formation

The Individual's Perspective

While the formation of image norms has been carefully detailed in past research (Giannantonio & Hurley-Hanson, 2006) this section of the paper will briefly describe the formation of image norms from the individual's perspective. A model of image norms is shown in Figure 1 which describes three sets of perceptions individuals form about image norms. The first set of perceptions individuals form focus on their own image. This includes perceptions of their personal appearance and their level of physical attractiveness. Perceptions of one's own image may operate as expectancies, influencing an individual's beliefs about the likelihood of their success in different occupations.

The second set of perceptions individuals develop involve the importance of image in various occupations. These perceptions may form based on occupational stereotypes and one's own experiences in occupational exploration (Giannantonio & Hurley-Hanson, 2006). Individuals' perceptions of the image norm requirements for specific occupations may influence their decision to pursue or to avoid certain

occupations. While these perceptions are likely developed in the exploration stage of career development (Cron, 1984), such beliefs may be reinforced in later stages of career development as well (Giannantonio & Hurley-Hanson, 2006).

Occupational image norms may be influenced by societal mores and cultural traditions. A recent study found that parents and schools have a large impact on student's career expectations (Diemer, 2007). Research has found that women's career choices are influenced by many factors including gender stereotypes, societal messages, and family expectations (Hopkins, 2006). Culture may also influence the development of image norms. In Ireland, IT work is seen as "clean" work (Quesenberry, Trauth, & Morgan, 2006). In China, it is a compliment to refer to a woman who works in information technology (IT) as a geek.

Image norms that reflect society's perceptions of the gender appropriateness of an occupation may actually influence the sex composition of various jobs. The decrease in the percentage of female IT workers in the United States from 1996 to 2004 is widely believed to be a result of the stereotype of IT workers being male (Hopkins, 2006).

Image norms also reflect the prestige attributed to certain occupations. In the United States, a widely accepted norm suggests that as families move from the middle class to the upper class, the occupational choices of their children will be from the higher end of the occupational prestige continuum (e.g. medicine, law, and the social sciences). Interestingly, in the United States, engineering is no longer viewed as a glamorous or prestigious profession. This is in contrast to China where, the brightest students are encouraged to go into engineering and the sciences.

The role of the media in influencing occupational image norms cannot be underestimated. A study of African American junior high students found that the younger they were, the more likely they were to be influenced by role models on television in terms of their anticipated career choices (King & Multan, 1996). Research has found that many children have decided against careers in science and math by the time they are 14 (Carnes, 1999). This decision may be influenced "by television shows and movies that portray technical professionals as either "mad geniuses" or unfashionably dressed, socially inept "geeks" or "nerds"." (Carnes, 1999). When researchers asked students in grades 3 through 12 to draw technology workers, their drawings reflected image norms such as those portrayed in the media. The students drew characters with "high-water pants, pocket protectors, bow ties and beanie hats. Also, the images were predominantly white and male." (Carnes, 1999).

A recent article (Murray, 2005) found that the profession of engineering had the "worst of all cultural images: uncoolness." The US Air Force is attempting to influence Hollywood's portrayal of engineering in a positive light by funding screenwriting classes for engineers and scientists. The individuals responsible for this funding feel that "popular culture is lacking not only in positive scientist portrayals but also in technical accuracy. Movies such as *Falling Down*, *Mosquito Coast*, and even last year's *The Aviator*, feed the popular perception of engineers as eccentric at best and anti-social at worst, they say." (Murray, 2005).

Other professions' images are portrayed more positively in today's media, resulting in more positive occupational image norms. For example, forensic science has been positively portrayed in television shows such as the numerous CSI series (Robertson,

Blain & Cowan, 2005). This is an example of how an occupation's image has been dramatically changed because of the way it is portrayed in the media. The dramatic increase in the number of individuals interested in forensic science has been termed The CSI Effect. One college's forensics program saw its number of graduates rise from 4 to 400 in 4 years, and many universities are beginning to offer degrees in forensic science. In an attempt to provide a more realistic image of the work, forensic scientists note that many of the images of forensic scientists portrayed in television shows are inaccurate. Students learn quickly that they will not be wearing glamorous clothes and fabulous hairstyles while working in the lab and in the field. Instead they are told to wear aprons and hairnets (Maquire, 2005).

The final set of perceptions individuals develop involve the importance of image in different companies. These perceptions may arise from individuals' beliefs about an organization's image. Given the uncertainty inherent in the job search and choice process, job applicants may be attracted to companies with favorable organizational images (Barber, 1998). Several dimensions may comprise an individual's perception of an organization's image (Dutton & Dukerich, 1994), including perceptions about the types of people who work for a company. These perceptions include beliefs about the image of the people who work for a company, the company's desire to hire a workforce with a specific image, and the role of personal appearance in advancing one's career in that organization.

The Organization's Perspective

This section of the paper explores the ways that image norms form from the organization's perspective. Organizations contribute to the formation of image norms in a number of ways. First, companies may send direct messages to candidates about the importance of projecting a certain image in hiring and promotion decisions. Explicit comments about the "appropriateness" of a candidate's appearance are likely to be more common in some industries than others. Organizations may outline appearance requirements in employee handbooks or during employee orientation sessions. Dress codes and company uniforms provide employees more explicit directions regarding image norms within a company (Aramark, 2008).

Secondly, an organization may indirectly send messages about the importance of image through its choice of recruiters and other organizational representatives. Recruitment research on the signaling hypothesis illustrates the important role of recruiters in shaping applicants' perceptions of hiring organizations (Goltz & Giannantonio, 1995). The recruiter's image may send signals about the company's desire to hire a workforce with a certain image or the role of image in selection decisions. Visual images of other organizational representatives may be found in the company's recruiting materials including brochures, videotapes, CD-ROMs, and Web sites. These visual representations of the company's employees may send signals to applicants about the gender, racial, and age composition of the workforce. They may also reinforce stereotypes about the physical attractiveness of the company's workforce and the company's desired image. Patterns among the individuals who are selected to represent the company send strong signals to outsiders about the company's desired image of its workforce (Hurley-Hanson & Giannantonio, 2006).

Finally, organizations may attempt to create a specific organizational image in the minds of potential applicants and other constituents by engaging in image advertising (Barber, 1998). Image advertising is focused on attracting future applicants to the company itself; it does not necessarily involve advertising for specific job openings. Such advertising could establish a perceived relationship between personal appearance and the company's organizational image, resulting in the creation of image norms.

Operation

The Individual

Once image norms are formed, they may operate to influence the occupational and organizational choice decisions of individuals throughout their careers (Giannantonio & Hurley-Hanson, 2006). The work of two theorists, Victor Vroom and Donald Super, may provide partial explanations for the effects of image norms on occupational and organizational choice.

Donald Super's (1957) work illustrates how individuals choose an occupation which allows us to play a role that is consistent with our self concept. Our self-concept includes the attributes we believe define us, such as our abilities, personality traits, and values. Abilities may be broadly defined to include both physical and mental characteristics. Individuals perceive themselves to possess a number of physical (e.g. "I am strong.") and mental (e.g. "I am good with numbers.") abilities. Most people also hold perceptions about their own level of physical attractiveness. Irrespective of accuracy, these perceptions may influence (and constrain) the number of occupations that are considered as allowing for the implementation of the self concept (Giannantonio & Hurley-Hanson, 2006).

Expectancy theory (Vroom, 1964) may also explain how image norms operate to influence occupational choice. Perceptions about one's own level of physical attractiveness may operate as expectancy beliefs in Vroom's model. If an individual does not believe that they are attractive enough to succeed in an occupation (and they believe that physical attractiveness is a necessary requirement for entry or advancement in that occupation), then the person is not likely to choose that occupation for their career. Vroom's theory may explain the role of image norms in organizational as well as occupational choice. Significant others in one's social network may share their experiences regarding physical attractiveness norms within specific organizations.

The belief that possessing a specific image is a hiring requirement or is necessary for advancement in certain companies may result in applicant self-selection into or out of those companies. Self-selection may operate because job applicants rely on organizational images as one way of determining their potential fit with specific companies (Gatewood, Gowan & Lautenschlager, 1993).

The Organization

Image norms may operate within organizations to influence the hiring and promotion decisions made by corporate decision-makers. Attractiveness effects have been found in a number of employment decisions including selection, evaluation, and compensation (Hosoda, Stone-Romero & Coats, 2003). The importance of image and

appearance in person perception is not surprising. An individual's appearance is one of the first things we notice about a person (Kenny, 1994). It is also one basis for differentiating people into meaningful categories. Once categorized, a variety of personality and psychological constructs are attributed to individuals falling within the referent category (Pendry & Macrae, 1994). In both work and non-work settings, personal appearance serves as the basis for social evaluations.

Companies may use image as a hiring requirement or as the basis for advancement in their company (Hurley-Hanson & Giannantonio, 2006). How directly or subtly this information is conveyed to applicants and organizational members may be difficult to measure. The importance of image and physical attractiveness in hiring and promotion decisions may be expected in industries that are perceived as glamorous (McDonald, 2003). While image norms are less likely to be expected to influence employment decisions in other industries, any organization may potentially use image norms in their hiring and promotion decisions.

Two theoretical explanations from the physical attractiveness literature may offer additional explanations for how image norms operate in organizations. Implicit personality theory (Ashmore, 1981) offers one explanation for these effects. Once a person is classified as attractive or unattractive, the observer links a variety of personality characteristics to that individual (Pendry & Macrae, 1994). Organizational decision makers may be particularly vulnerable to these effects since most evaluation and judgment tasks in organizations require the processing of a large amount of social information about a candidate or employee, usually under time pressures, and without complete information about each person being evaluated. Since many human resource management decisions occur under these constraints, there is a potentially large role for image norm effects in employment decisions.

The lack of fit model offers another explanation for image norms effects in organizations (Pendry & Macrae, 1994). An examination of physical attractiveness research supports this statement. Physically attractive individuals have received more positive evaluations than unattractive individuals in the areas of hiring (Marshall, Stamps, & Moore, 1998), promotion (Morrow, McElroy, Stamper & Wilson, 1990), and compensation (Frieze, Olson & Russell, 1991). Heilman and Stopeck (1985) apply the lack of fit model to explain this attractiveness bias. They argue that an organizational decision maker forms two sets of perceptions. First, they hold perceptions about the personality characteristics that are associated with different stereotypes (e.g. an attractive vs. an unattractive person). Second, they hold perceptions about the requirements for successfully performing a job. Then, as with any matching model, the evaluator compares their perception of the candidate/job incumbent to their perceptions of the characteristics needed to successfully perform the job. If there is a match, the person is evaluated favorably. If there is not a match, the person receives a negative evaluation.

Image norms are compatible with implicit personality theory in explaining physical attractiveness effects (Ashmore, 1981). Image norms may influence a decision-maker's perceptions about the requirements for successfully performing a job. If evaluators believe that it is necessary to possess a certain level of physical attractiveness to succeed in a job or a company, then attractive individuals may receive more favorable

evaluations than unattractive individuals on a variety of job outcomes.

Implications

Both individuals and organizations need to consider the effects of image norms on employment decisions. Individuals need to consider the effects of image norms on their occupational and organizational choice processes. Individuals' beliefs about their own image, as well as the perceived demands for projecting a specific image in certain occupations, organizations, and industries may influence the decision to pursue or avoid different career paths. Occupations and organizations may not be pursued if the individual believes internal and external messages about the importance of projecting a certain image for entry or advancement into certain jobs and companies (Giannantonio & Hurley-Hanson, 2006). Applicant pools and labor market participation rates may be unnecessarily restricted if candidates self-select out of jobs and companies based on inaccurate image norms or inaccurate perceptions about their own image.

Image norms may also influence individuals' behavior during the job application process. Applicants may engage in numerous impression management techniques to enhance the perception that they meet the image norms required to work in certain jobs. Image norms may also play a role in the occupational and job-choice decisions of individuals at several stages in their career (Giannantonio & Hurley-Hanson, 2006). Individuals should examine the role of image norms throughout their careers. While this is especially important in the exploration stage of career development (Cron, 1984), image effects may also operate in middle and late career stages.

For organizations, the implications include examining how image norms are directly and more subtly communicated during the hiring and promotion process. Image norms may explicitly operate within organizations if physical attractiveness standards are applied to hiring and promotion decisions. Image norms may also operate in a more subtle fashion. Hiring and promotion decisions should be examined for signals about the perceived importance of image for entry and advancement in the organization. In times of labor shortages, it would be unfortunate to lose qualified candidates and valued employees because of misperceptions about hiring and promotion standards. Unlike earlier career system models where individuals hoped to stay with one company for their lifetime of work, newer career system models suggest individuals may see changing careers as important to their career success (Ackah & Heaton, 2003; Baruch, 2004). Because of this, organizations need to be very cognizant of the image they are portraying to potential applicants, as well as to their current employees.

Finally, organizations need to consider the possible legal ramifications associated with image norms. While physical attractiveness is not a recognized Bona Fide Occupational Qualification, it appears that image norms may underlie image discrimination lawsuits. Image norms that are a pretext for engaging in discrimination based on sex, color, race, religion, or national origin seem likely to violate Title VII of the Civil Rights Act of 1964. Image norms may also violate the American with Disabilities Act. While unattractiveness has not been recognized as a disability under the ADA, image norms based on health or fitness may violate the provisions of the Act.

Image norms concerned with youth and vitality may violate the Age Discrimination in Employment Act if candidates feel the work environment would not be comfortable for employees over the age of forty. Applicants may not pursue employment opportunities where they do not feel comfortable fitting in with younger, more attractive employees.

Organizations must consider the legal implications associated with enforcing dress and appearance policies. Policies regarding dress, grooming, jewelry, piercing, and tattoos should be carefully drafted and reviewed by a legal firm to avoid disparate treatment or violate religious freedom. It is extremely important that personal appearance policies are applied to all employees equally. Of course organizations do have rights regarding personal appearance and image where issues of safety are concerned.

Employers may legally enforce a dress and appearance policy to promote their specific company image. However, managers should make every attempt to make reasonable accommodations to avoid the perception and reality of image discrimination. Recent court settlements (e.g. Abercrombie & Fitch, 2004) suggest that image discrimination is an emerging aspect of employment law. Image discrimination occurs when organizations attempt to hire applicants whose physical appearance is consistent with the company's organizational image, product image and/or customer preferences.

In the United States a few jurisdictions have outlawed discrimination based on physical appearance. For example, in Washington D.C. personal appearance is a protected class where personal appearance is defined as "the outward appearance of any person irrespective of sex with regard to bodily condition or characteristics, manner or style of dress, and manner or style of grooming including but not limited to hair styles and beards" (McDonald, 2003, p. 118). While image is not a federally protected characteristic, discrimination on the basis of image or physical appearance has the potential to violate several employment laws including Title VII of the Civil Rights Act of 1964, the Americans with Disabilities Act (ADA) and the Age Discrimination in Employment Act.

A better understanding of the formation and operation of image norms from both the individual and the organizational perspective offers researchers an important avenue for understanding the role of image in organizations.

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Modeling Customer Equity: A Stochastic Modeling Approach for Arrival and Departure of Customers

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Customer Equity (CE) is an important concept for marketers in managing their customers. It allows them to better evaluate the contribution of existing customers and the potential purchases of new customers to their overall value. Such valuation provides better segmentation schemes that eventually lead to better financial performance. Various models in the literature aim at modeling CE with different structural forms and assumptions but most commonly are based on evaluating the value of current, active customers. This paper introduces a different approach for evaluating CE that consider current and future (potential) customers by developing a two-stage model that is based on stochastic and actuarial calculations. In the first stage, we consider the value of current customers and relate it to their remaining potential consumption lifetime. In the second stage, we use stochastic arrival and departure processes to account for potential new customers using stochastic calculations of remaining purchasing lifetime. As a result, the model can better predict current and future value of customers compared with current approaches.

Business executives are well aware of the fundamental role customers play in a company's success. As a result, customer management as a tool to improve company performance has become increasingly common. There has been steady growth in attention to this issue in both the academic world and the business world (e.g., Chang & Wildt, 1994; DeSarbo, Jedidi, & Sinha, 2001). This growing interest has led scholars to seek new models for calculating the value of customers to a company. The current models of Customer Equity (CE) can best be categorized into three types (Jain &

Singh, 2002). The first category is primarily concerned with achieving optimal resource allocation to maximize CE. The second category includes models that estimate the value of customers based on their past purchasing behavior. The third category includes a macro-type approach for CE, to gain deeper insight into policy-related issues.

In their extensive review of current customer life time value (CLV) and CE models, Jain & Singh (2002) examine the various structures of the current models for calculating CE. The comprehensive comparison of the various models in that study allows evaluating their strengths and weaknesses. As a result, several limitations of the current models can be inferred from this review, with regard to the accuracy of estimation and calculation. In particular, current models are based on restrictive assumptions about customer behavior with respect to loyalty, purchasing patterns, and future behavior. These models include only current customers in their calculations and ignore potential customers or the acquisition of new customers. These models also fail to consider the retention of current customers. Furthermore, they ignore the stochastic nature of the purchasing process and assume a particular time structure for future cash flows.

Another important issue that is generally not factored into the assessment of CE is the remaining lifetime of current and future customers. For example, consumers might change their purchasing patterns as they grow older (e.g., regular soft drinks to diet soft drinks, two-door sports car to four-door sedan, etc.). In such cases, there is usually a time frame in which consumers use a certain product type in a particular category and later move to another product type in the same category. In other words, the lifetime of such consumers is limited to a specific time frame in their total consumption lifetime. A consumer that is close to the end of his/her consumption stage of a certain product category is probably worth less to the firm than a consumer that is at the beginning of that stage since the former will remain an active customer for less time than the latter. Thus, consideration of a consumer's potential remaining lifetime is an essential building block in CE assessment.

Therefore, current CE models are static and cannot contend with the dynamic nature and inherent uncertainty of future customer activities. Recently, Kumar, Ramani, & Bohling (2004) introduced a different modeling approach that address the issue of active and non-active consumers by employing a probabilistic approach to identify customers' activity in future time periods. Thus, alleviating some of the limitations mentioned earlier.

In light of these limitations, this paper introduces a different CE model that resolves some of the shortcomings inherent in the current approaches. The proposed model resolves the restrictive nature of current models with respect to the dynamics of customer purchasing behavior. A two-stage model is used to enable differentiation between the value of existing customers and the value of future customers. In the first stage we introduce an actuarial model which takes into account the effect of the remaining lifetime of each consumer (i.e., the probability of current customers to stay active in the next time period) and enabled us to calculate the CE value of a firm. In the second stage we use a stochastic modeling approach that enables us to get a more realistic CE valuation that accounts for future customers' acquisition and retention.

We employed the $M / G / \infty$ model that assumes customers' arrival as a Poisson process, a random level of a firm effort (e.g., marketing communications) to attract a customer that is distributed according to a general distribution, G , and that a firm can accommodate all potential customers immediately at their arrival time. Such modeling approach improves current commonly used approaches by allowing us to evaluate the overall CE at the time of customer departure. Note that at that time the number of all remaining customers and their remaining active lifetimes with the firm is known and, therefore, a close form solution for the model can be obtained. This advantage is attributed to the assumption that the customers' arrivals follow the Markov arrival Poisson process, also termed as Poisson Arrivals See Time Averages (PASTA). The outcome of this modeling approach is the ability to better predict the value of current and future customers compared with current approaches.

Conceptual Background

The concept of customer lifetime value has long been accepted in almost all business literature (e.g., Porter, 1985). The concept entails that a company can gain a competitive advantage over its rivals by creating value for its customers. Using this value, a company can better communicate the benefits to consumers who purchase the product. Once consumers acknowledge the value the company creates for a particular product, the company can assess the long-term benefits in retaining these consumers. That is, the company can estimate the value of its customers at any given time through their purchases, or aggregate it over time to obtain their lifetime value.

CE models have multiple applications in various types of business organizations. These include, for example, models that aid companies in making both strategic and tactical decisions; strategic decisions identifying customers, their characteristics and the customers that should be pursued in the long run. Tactical business decisions might include resource allocation among marketing mix variables, in the short run. CLV models have also been employed in helping companies identify their profitable customers, as opposed to their non-profitable ones. Such an analysis enables companies to better allocate their marketing resources to relevant consumers and market segments. In their extensive review of CLV models and their application, Jain & Singh (2002), present three basic model types.

These types include: A) Models for calculation of CE—this category includes models that are specifically formulated to calculate CE and/or extend the calculation to obtain optimal methods of resource allocation to maximize CE. These are applied models and are more relevant to those who wish to use CE as a basis for making strategic or tactical decisions. B) The second type includes models of customer-based analysis. Such models take into account the past purchase behavior of the entire customer base to calculate probability of purchase in the next time period. These models consider the stochastic behavior of customers in making purchases; therefore, these models look at each customer individually to compute the probability of purchase in the next time period. C) The third type includes normative models of CE. Such models provide valuable insight for policy-making. This category comprises two typical models: a customer equity model and a dynamic pricing model based on CE.

For more information, see Jain & Singh (2002), in which they also identified directions for future research.

As discussed, the current CE models are limited in several respects. To begin with, treatment of consumer retention over time is inadequate. This means it is necessary to better capture the departure of customers over time from the company's list of active customers. In addition, insufficient attention is paid to the attraction of new customers to the company. This refers to the effect of the company's reputation in acquiring new business. Furthermore, the retention of customers over time is dependent not only on the quality of the company's products and services, but also on the remaining lifetime of the customer in a specific product category. That is, consumers might continue to purchase a certain product type for a certain period and move to another product type as they grow older. This change is independent of the company's efforts to retain the customer through its offerings.

Another aspect that might affect the attraction of future customers is the firm's reputation. That is, the strength of a firm's position might increase the inflow of potential future customers and, therefore, might increase potential future cash flows. The two main schools of thought aiming at estimating the worth of this reputation, or goodwill, are accountancy calculations and economic theory. The accountancy approach is based on the idea that the difference between a firm market value and the value of its tangible assets as appeared in its balance sheet represent the value of its intangible assets. One of these intangible assets is the strength of the firm reputation to attract new customers in the future. The other common approach to evaluate this type of firm reputation is based on game theory techniques that are derived from economic theory (e.g., Fudenberg & Kreps, 1987; Fudenberg & Levine, 1989; Kreps, 1990; Kreps, Milgrom, Roberts, & Wilson, 1992; & Hart, 1995). Kreps (1990), for example, used the Folk theorem to develop a theory of a firm as a bearer of reputation and showed that reputation can become a tradable asset.

This paper aims to develop a dynamic stochastic model to evaluate the worth of the future stream of cash flow resulting from future potential customers. Stochastic calculation provides a more realistic means of addressing the issue of customer retention. Under such an approach, the future of a customer with the company is modeled by assigning both a positive probability that the customer will continue to buy the company's product in the next period, and a positive probability that the customer will not. These probabilities are linked to the customer's potential remaining lifetime.

Using these probabilities, we can calculate the present value of the financial stream, namely the creation of CE. Note that the classic deterministic calculations of CE do not take these probabilities into consideration, and assume that the customer will continue to purchase the company's product at a probability of 1. Our calculation, using the stochastic models, makes the value obtained from CE assessment more realistic and in line with the reality of the market.

The Model

In order to resolve the issue of customer acquisition, we introduce a two-stage model. In the first stage, we calculate the value of current customers using actuarial

calculations. This model provides a more realistic approach of calculating current customers' lifetime value, as it accounts for the stochastic nature of customer purchasing patterns. This characteristic of the model affects the discounting of future cash flows through a different time structure. This stage of the model development is similar in nature to the one proposed by Kumar et al. (2004) and Gupta, Lehmann, & Stuart (2004).

The second stage involves an assessment of future acquisition of customers. This is predominantly attributed to the company's brand recognition or goodwill. This second stage consists of consumers' stochastic arrival and departure processes to and from the company, using a stochastic approach of remaining purchasing lifetime. This feature of our modeling approach is a way to evaluate the value of future customers. The summation of the two stages, therefore, provides a more accurate CE. For better illustration, we begin with the current, common model for CE calculation. We then present the first stage and conclude with the second stage.

Basic Structural Model of CE

We start with a basic structural model of CE in the form of:

$$CE = \sum_{k=1}^n \frac{R_k - C_k}{(1+d)^{k-0.5}} \quad (1)$$

where

K – The time period of cash flow from customer transactions;

R_k – The revenue from customer at time period k ;

C_k – The total accrued cost of generating revenue R_k at time period k ;

d – Annual discount rate;

n – Total number of time periods of the projected life time of customers under consideration;

The 0.5 in equation (1) reflects the approximation that all expenditures incurred in the middle of each purchase cycle. In this model, it is assumed that all cash flows take place at the end of a period. It identifies a class of different CE models that are based on the net present value (NPV) of the future cash flows from customers. Such a model is limited. As noted earlier, these limitations include an assumption about a particular time structure of cash flow, consideration for current customers (not future), ignoring acquisition costs, no consideration for the stochastic nature of the purchase process and timing of cash flows, and no provisions for customer variations.

The first stage in our two-stage modeling approach is based on actuarial calculations in which neither the future periods of cash flows nor the probability that current customers will remain active in the future are known. In the second stage, we use a stochastic model based on queuing theory that can address the stochastic nature of the purchasing process and timing of cash flows. In a nutshell, queuing theory is based on theories of random walks and stochastic processes to optimize a queuing system. In the current study, each customer is treated as a single customer that arrives at a random time in the future and remains an active customer in the system for a random time period. Between time periods, there is a probability that a customer will remain in the same state or change his/her behavior (i.e., random walk). The overall

behavior of all customers over time is considered a stochastic process.

The model is based on three components: a Markov process that represents the arrival of new customers at the company, a general process (i.e., an unknown distribution) of the active lifetime of customers (i.e., duration of purchasing the company's products) and no limitation on the number of potential customers that can be served by the company. The Markov process is used because of its property of independence between the arrivals of potential customers. Furthermore, under certain conditions, the Markov process allows the assumption of exponential distribution of the time between customer arrivals. This property allows for the inclusion of previously active customers who are currently non-active and may become active again in the future. We therefore use the notation of $M / G / \infty$, as in queuing theory, to denote the Markov process (i.e., M), the general distribution (i.e., G) and the unlimited number of potential customers (i.e., ∞). In the following section we show how to evaluate the current net worth of future purchasing stream from new customers using the general distribution, G. We also use specific distribution to show the evaluation of such future cash flow stream. Since our model is not restrictive in its structure (i.e., a general G distribution), it can accommodate a wide range of specific distributions as might be needed for specific real-life scenarios.

We assume a Poisson distribution of the Markov arrival process for customers buying company products. With the above assumptions and model components, we give explicit expressions for the future CE resulting from the activities of both current and future customers. Unlike current CE models, the proposed model considers the reputation of the company and its potential to attract new customers. This customer acquisition will lead to several outcomes. To begin with, some customers will develop loyalty and will continue to purchase company products. Some customers, on the other hand, will stop purchasing the company's products in the future (due to changing needs, dissatisfaction, etc.). As all these customers contribute to the NPV of the company, it is important to include them all (i.e., current, future, and inactive customers). The proposed model will account for these types of customers and improve the accuracy of CE calculations. The first stage of our model accounts for the value of current customers; the second stage accounts for the value of future customers.

Stage I – CE of Current Customers

We begin by calculating the value of current customers. The main feature of our model for stage I is the probability, p , that a current customer at time $t=1$ will continue to purchase the company's products during the next time period (i.e., $t=2$), and another probability that this customer will leave the company during the next time period, $(1-p)$. Let ${}_tP_k$ be the conditional probability that a customer who is at stage I in the potential lifetime of a certain product category and bought the company's products during that time period (i.e., k) will continue to buy from the company for t time periods thereafter. That is, we link the purchasing probability from the company's products to the remaining potential lifetime of a customer. Let l_k be the number of customers who are at stage I in the potential lifetime of a certain product category and bought the company's products at the beginning of that period (i.e., k). That is, $l_{k-0.5}$

is the number of customers who buy the company's products during the middle of period k for $k=1, 2, 3, \dots$. From an empirical perspective, the variable l_k can be estimated from the company's past purchasing history for each period k , to represent the number of customers who buy the company's products. Therefore the probability that a customer will continue to purchase in the future is:

$${}_t P_k = \frac{l_{k+t}}{l_k} \quad (2)$$

We assume, without loss of generality, that customers' purchases are made at the middle of each time period. The probability that a customer who bought the company's products during period k will continue to buy from the company for t periods thereafter becomes:

$$({}_{t-0.5} P_k) = \frac{l_{k+t-0.5}}{l_k} \quad (3)$$

We can, therefore, define CE using (3) by:

$$CE = \sum_{k=1}^n \left[({}_t P_k)^{-0.5} \left(\frac{R_t - C_t}{(1+d)^{k-0.5}} \right) \right] \quad (4)$$

where

CE – The NPV of all purchases from period 1 to n ;

R_t – The revenue from each customer during period t ;

C_k – The cost of serving a customer during period t ;

d – The discounting rate.

An important feature of this CE formulation is the consideration in each period of the probability that the customer will buy the company's products. Thus, we account for customer retention over time and resolve the limitation, inherent in most current CE models, of treating customers as active in all periods. Note that if we use ${}_t P_k=1$ (the probability that an active customer during time k will continue to purchase the company's products t time units from time k is equal to 1 in equation (4), we get the result in equation (1) – the basic CE model (i.e., no uncertainty). That is, this result is the one that is primarily used by current models that assume certainty with respect to future purchasing by customers. As can be seen, the current model allows for uncertainty about future purposes.

This model is similar in structure to that proposed by Berger & Nasr (1998). Our model is different, however, in the sense that we use an actuarial approach to determine the probability of a customer remaining active. The Berger-Nasr model uses a Markov chain with transition probabilities of a customer being active in the next period. The actuarial approach allows us to link the probability of a customer being active to his/her potential total consumption life span. For example, when considering future purchasing probabilities for a car, it is more accurate to relate this probability to the buyer's age, since the older the potential customer, the less likely he/she will remain active with the company.

To demonstrate the usefulness of this model, we use a numerical example from the insurance industry.

Numerical Example - Model I

When an insurance company calculates the present value on life annuity of one dollar per year until the death of an insured, it must estimate the person's future lifetime. This is generally done by using demographic methods in which insurance companies track a certain age group, such as age x , in the population and calculate the number of individuals who will survive within the next t periods from age x . Then, by calculating the average number of individuals that will survive each year, it is possible to calculate the probability that individuals from this age group will survive within the next t periods. These calculations for different age groups are called "actuarial life tables" in the insurance industry. We can use these tables to calculate the present value of this life annuity.

We calculate the net present profit from an individual customer based on time periods of three, five, ten and thirty years to illustrate the variations in CE. We use the English lifetime table (Neill, 1977), also known as table A (67-70), which specifies the survival probabilities for each age group. This life table is commonly used in actuarial calculations. In general, for insurance or other business purposes, managers need to estimate the probability that a current active customer will continue to be active in the next time period.

For expository purposes, we assume the customer is 30 years old and that the profit margin, $(R_k - C_k)/R_k$, in this industry is 30 percent (R_k – the revenue from the customer in period k , C_k – the total cost of generating revenue R_k in period k). We also assume a yearly discount rate of 15 percent). This estimate is in line with other marketing studies that used discount rates in the range of 12 percent to 20 percent (e.g., Berger & Nasr 1998; Kim, Mahajan, & Srivastava, 1995).

In Table 1, we present the assessment of the CE resulting from the use of our actuarial model (i.e., equation 4) and the CE of the basic model (i.e., equation 1) using the A(67-70) lifetime table, a monetary value of 1 for revenues, and yearly time periods.

The results of this empirical illustration highlight some of the issues addressed by our model. The CE of the basic model is higher than the stochastic model, as the latter includes a certain probability that the customer will cease to be active. This probability increases as the active lifetime increases and the remaining potential lifetime of the customer decreases. That is, if the active period is 5 (30), the remaining potential period is large (small) and the probability that a customer will survive the next period is larger (smaller). This is reflected by the trend of increasing difference between the CE of the basic model, which is constant and does not take this issue into account, and stochastic CE as the active lifetime increases. These differences increase when the customer enters at a later stage in his life (i.e., 40 years) and the customer lifetime value is smaller compared with the same active time of an earlier entrance (i.e., 30 years).

In summary, the actuarial model accounts for the decreasing probability of a customer remaining active as the active lifetime increases and potential remaining lifetime decreases. Managerial implications that can be drawn from these results are that managers should be cautious in their evaluations of future income as current approaches inflate this value. Thus, an effective managing and monitoring of customer relationship can provide better understanding of the potential decrease in current

customer activities that is independent of the firm activities (e.g., aging of customers). Furthermore, effective customer relationships can find new ways (e.g., offering new more suitable products) to maintain the current purchasing level of current customers in the future.

Table 1: CE of 1 Monetary Unit for Different Ages and Remaining Lifetimes

	Time (years)			
Model Type	3	5	10	30
Basic CE Model	0.79	1.16	1.73	2.27
Stochastic CE Model (30 years)	0.74	1.09	1.62	2.11
Difference (Basic - Stochastic)	6.8%	6.4%	6.8%	7.6%
Stochastic CE Model (40 years)	0.73	1.08	1.61	2.08
Difference (Basic - Stochastic)	6.8%	7.4%	7.5%	9.1%

Key:

Basic CE Model – based on equation 1.

Stochastic CE Model (30 years) – based on equation 4, starting age 30, and an active life span of 3, 5, 10, and 30 time periods.

Stochastic CE Model (40 years) – based on equation 4, starting age 40, and an active life span of 3, 5, 10, and 30 time periods.

Difference (Basic – Stochastic) - the percentage difference between the basic CE model and the stochastic model.

Stage II – CE Model of Future Customers

In the second stage of our model, we capture the value of potential new customers. For instance, potential new customers might be attracted to the company because of its reputation. The better the company's reputation, the higher the arrival rate of new customers. The attraction of new customers can be described by a stochastic arrival process. These new customers, upon purchasing the company's products (i.e., arrival process), may develop loyalty and continue to purchase the company's products in the future, or for various reasons they may cease to be active customers (i.e., departure process). We are interested in modeling the steady state of these arrival and departure processes, since they capture the total value of the company's reputation as reflected in the CE. Recall that the value of the CE is the sum of the two stages we present: Stage I and stage II.

We use the $M/G/\infty$ model described earlier. In this general framework, we use a special feature that results from the Markov arrival Poisson process. Specifically, we use the Poisson Arrivals See Time Averages (PASTA) feature of the Poisson process, which allows us to evaluate overall CE at the time of customer departure. Given that

at this time we know the number of all remaining customers and their remaining active lifetimes with the firm, we can obtain a close form solution for the model. We therefore make the following assumptions:

- (i) Poisson arrival process for new customers who purchase the company's products;
- (ii) The remaining lifetime of the new customers has a general distribution (hence the symbol G after the first slash).

For the sake of simplicity, we consider a continuous formulation for this stage and not a discrete formulation, as in the first stage. We start with the basic structural model of CE (equation 1) and define the model's parameters in a continuous form to generate continuous cash flows (for further information on such a formulation see Berger & Nasr (1998), case 4).

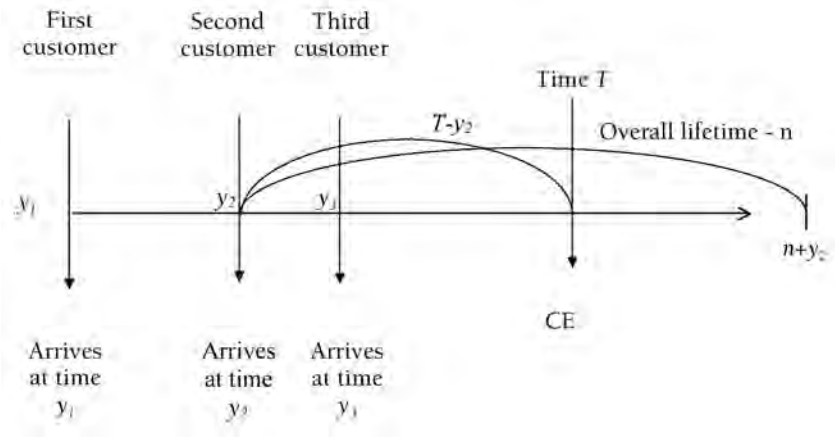
Model Assumptions

- 1) The arrival process $N_1 = \{N_1(t), t \geq 0\}$ is a Poisson process with a λ rate. The parameter λ is the average arrival number of customers purchasing the company's products; it is a deterministic parameter that is determined exogenously. From an empirical perspective, this parameter can be estimated using historical purchase data. Although this parameter can be modeled as a time-dependent variable, $\lambda(t)$, which better captures the average arrival of customers, we use the deterministic formulation for parsimonious reasons.
- 2) The retaining process (i.e., the time span between the arrival and the departure of a potential customer) has a general distribution G , having with a mean expected value of $\frac{1}{\mu}$. The departure process can be defined by $N^2 = \{N_2(t), t \geq 0\}$ (i.e., the number of customers that has left the firm until time t). This is a non-homogeneous Poisson process with an intensity function of $\lambda(t) = \lambda G(t)$, as we do not know the distribution of customer departure, and therefore assumed a general distribution. (see, for example, Ross 1996, pp.78-82). Note that this type of departure process formulation ensures that each customer will remain active with the company for a different period.
- 3) To consider only the lifetime value of potential new customers, we assume that the system is empty at time 0 (i.e., there are no customers who purchase the company's products).

We analyze this stochastic model by enabling the system to start acquiring customers. That is, new customers begin to purchase the company's products and remain active for a random period that is no greater than n periods. One way to view the analysis of such a stochastic model is to consider the case of an inspector that samples the system randomly at time T in the future. This sampling can result in observation of two types of consumers: those who purchased from the company before time T and ceased to be active (i.e., left the company) before the sampling took place, and those who purchased from the company before time T and are still active with the company at time T . Since this stochastic process is used to analyze an established company, we are not interested in the first type of customer (i.e., not active at time T , as they will not contribute to the future cash flow of the company and hence will not contribute to the CE).

As aforementioned, one important feature of the PASTA $M / G / \infty$ model is its ability to evaluate the remaining customer lifetime with the company following the sampling time period. Once this remaining lifetime is established, we can calculate the CE by applying a discount factor to calculate the NPV at time 0. In Figure 1, we illustrate this sampling process and the lifetime duration, or the retention process, of future customers.

Figure 1: Stochastic retention process



Key:

y – Random arrival time of a new customer.

T – Random time of the evaluation of the system (inspection) or equilibrium time.

n – Random remaining lifetime of a customer.

At time T at which the equilibrium is achieved, the second customer, for example, has actively purchased for a time frame of $T - y_2$ out of a total lifetime of n . We can obtain n through the properties of the equilibrium of the system. Recall that if G is the distribution of inter-arrival times, then the asymptotic (equilibrium) distribution of the remaining lifetime G_e is given by:

$$P(X_e \leq x) = G_e^{(x)} = \mu \int_0^x \bar{G}(u) du, t \geq 0. \tag{5}$$

where

$P(X_e \leq x)$ – The cumulative probability distribution that a customer will remain active until time x .

$G_e^{(x)}$ – The general distribution of a customer remaining active in equilibrium until time t .

$\mu = \frac{1}{E(G)}$ – The rate of customer departure

The PASTA model guarantees that when the sampling occurs at time $T=t$, where enough time has passed and equilibrium has been attained, the distribution of the remaining lifetime of a customer sampled randomly is G_e . In other words, when the sampling occurs, the system is in a steady state (i.e., customer shopping behavior) that can either be busy (i.e., purchasing) or idle (i.e., not purchasing). The probability that a specific state will be sampled is equal to the fraction of time for which this process has been in this state. For further explanation, see Wolff (1989, p.78). In summary, the basic premise is that a new customer will remain active for a random lifetime, which resolves some of the limitations inherent in current CE models (i.e., it is based on a more realistic assumption than the use of a deterministic lifetime).

As noted earlier, we use a continuous formulation for CE in this model. We therefore use a continuous discount rate, $e^{-\delta}$, which corresponds to $\frac{1}{1+d}$ in equation 1, and obtain $\delta = \ln(1 + d)$, the instantaneous interest rate (for more details see Berger & Nasr (1998) and Weston & Brigham (1993), p.233).

Let $CE_T y$ denote the conditioned CE of a customer who began to purchase the company's products at time y , calculated at time T . Therefore, based on the above discussion, we can compute the conditioned CE at time $T = t$, for an individual customer who became active at time y (i.e., assessment of CE is done $(t-y)$ time units after the customer has joined the system) by:

$$CE_t y = \left(\int_{z=0}^{n-t+y} (R_z - C_z) e^{-\delta z} \overline{G}_e(z) dz \right), \tag{6}$$

where

R_z – The total revenue from a customer at time z ;

C_z – The total cost of generating the revenue from the customer at time z ;

$e^{-\delta z}$ – The continuous discounting factor;

$\overline{G}_e(z)$ – The general distribution of a customer remaining active in equilibrium beyond time z .

By conditioning on the arrival process and considering that the arrival times given in the arrival process are distributed as the order statistic from a uniform distribution on $(0,t)$ (see Ross, 1996, p.67), we obtain the total financial CE of all the customers in the company's lifetime project:

$$CE_t = \sum_{k=0}^{\infty} \left(k \int_{y=0}^t (CLV_t | y) \frac{1}{t} dy \right) \frac{e^{-\lambda t} (\lambda t)^k}{k!} \\ = \lambda \int_{y=0}^t \left(\int_{z=0}^{n-t+y} (R_z - C_z) e^{-\delta z} \overline{G}_e(z) dz \right) dy \tag{7}$$

where

k – An index that accounts for the current number of customers in the system;

λ – The rate of customer arrival.

This is an aggregate model, which is the outcome of the specific type of stochastic model used here. The model enables us to obtain the CE of all customers. This is somewhat different from current approaches, which sometimes use an individual-level

analysis. The result presented in equation 7 is in the form of the future value of a cash flow stream. That is, it is the CE at a random time T in the future. If, however, interest is in finding the NPV of the future cash flow, the result of equation 7 should be discounted as follows:

$$CE = CLV_T E(e^{-\delta T}) = E(e^{-\delta T}) \lambda \int_{y=0}^t \left(\int_{z=0}^{n-T+y} (R_z - C_z) e^{-\delta z} \overline{G}_e(z) dz \right) dy \quad (8)$$

where E denotes the expected value of a random variable and $E(e^{-\delta T})$ denotes the discount factor from time T to the time of CE assessment.

This model can result in better understanding of the brand equity component in the customer equity conceptual framework proposed by Rust, Zeithaml & Lemon (2000). The distribution of remaining lifetime of future customers, G_e , in equation 5, provides an assessment of the retention rate of customers due to the company's goodwill.

In practice, as e^{-T} converges quickly to zero, one can safely use T of 10 to 30 years as a base for CE assessment and still obtain a good approximation of true CE. In long-term equilibrium in economic theory, during the examination of a company's lifetime, it is sufficient to examine the system (i.e., equilibrium) after 10, 20, or 30 years.

Numerical Example – Model 2

We continue with the numerical example from the life insurance industry. Suppose that R_k is the revenue from a customer in period I , C_k is the total cost of generating this revenue, and that the company has a 30 percent profit margin, similar to the previous numerical example. We do not consider specific acquisition costs here, but rather assume that these costs are reflected in the profit margin through a higher cost level – $C-k$. We also consider three periods for the planning horizon, $T=10$, $T=20$, and $T=30$ in years. The yearly discount rate is again set to 15 percent, and the continuous discount rate is calculated as $e^{-\delta} = 0.13976$, given that $\delta = \ln(1 + d)$. The parameter λ , which is the average annual arrival number of customers who purchase from the company per month, is taken to be $\lambda=2000$ new customers per year; the ages of the customers are thirty, forty, and fifty years old. The potential lifetime of customers is sixty-five, leaving variations in the entrance and the remaining times in the life cycle.

For the sake of convenience, and without loss of generality, suppose that the departure process is a Poisson process with $\mu_{age} = 2.8571 * 10^{-2}$ for all ages, meaning that $G_{e=age} = -2.8571 * 10^{-2z}$ (Yosef, 2005). The CE using the stochastic approach is given in Table 2.

The calculations in Table 2 show the CE of potential new customers with probabilities of entering and leaving the company, and consideration of the entrance time (i.e., age) and the remaining time in the customer's life (i.e., 65). That is, a 30-year-old customer has a potential 35 additional periods in which to be active with the company, whereas a 50-year-old customer has a potential of 15 additional periods. As the potential end of the customer's lifetime grows near, the uncertainty of his retention increases and the value becomes lower than that of the 30-year-old customer. This can be seen in Table 2.

Table 2: *CE of New Customers Using Stochastic Arrival and Departure Processes for Different Entrance and Remaining Times in the Purchasing Cycle*

Age	T=10	T=20	T=30
30	35,387	69,651	97,863
40	34,263	62,476	
50	28,213		

Discussion

The evaluation of CE in marketing is becoming increasingly important. This may be attributed to several factors, including better availability of data due to improvements in information technology, as well as the understanding that the value of a company is directly related to the value of its customers. Thus, there is a clear relationship between effective customer management and a company's financial performance. The literature in this area has attempted to address a variety of related issues that include models of CE calculations. While these models provide both theoretical and practical advancements in better understanding the assessment of CE, they remain somewhat limited. Our model represents a step in resolving some of these limitations. Specifically, we introduce a two-stage model that enables us to calculate the overall value of both current and future customers. The first stage models the value of current customers and allows for customer departure from the company. The second model handles only the value of future customers and allows for random retention rate. That is, we resolve the issue of deterministic lifetime in most current models. Instead of treating a customer as active throughout the planning horizon, we allow for a more realistic structure that considers customers who have ceased to be active. Another feature of our model, which is not fully considered in current models, is the uncertainty associated with the remaining lifetime of current customers. Given that many product types in numerous product categories are manufactured by different companies, and a variety of product types can be used by consumers in the same product category throughout their lives in that category, customers will switch companies because of the availability of a product type and not because of product and service quality. This switching, or non-loyal behavior, will occur due to changing customer needs. These changes will reduce the retention of current customers and produce uncertainty as to the exact time of departure. As the customer approaches some average of the end of such a stage in his/her life, the probability of retention decreases. We use actuarial calculations to account for such decreasing probabilities, resulting in a more realistic model for CE.

We use numerical examples to demonstrate the ease of use of our CE model and compare the results with those of current common CE models. Using this example we

show the usefulness of this model in getting predictions of both current and future CE.

Several managerial implications can be inferred from our model. Marketers can identify the value of customers during various stages of the customer life cycle. This evaluation can serve as a basis for several important strategic marketing decisions. First, segmentation schemes based on the variations in customer value across demographic or psychographic variables can be developed to fully maximize a company's allocation of resources. Second, the company can manage its customer base more effectively throughout the customer life cycle by expecting the customer's departure to a different product type. Third, the company can develop a better understanding of the variety and mix of product types in the product category needed to serve customers throughout their lives. Finally, the company can better prepare for the expected changes in the demand for its product types and avoid surplus or shortage of products. Our model also leads to the realization of the value of young customers to the company. Fourth, the value of current customers evaluated under most of current CE modeling approaches tend to be inflated as these models do not adequately account for the dynamic nature of customer purchasing behavior. Furthermore, ignoring the potential increase in future revenues from new potential customers deflates the CE. Thus, careful considerations need to be made by managers to account for these estimations in order to avoid sub-optimal resource allocations. Managers can also identify those customers that might reach a certain stage in their life cycle with the company where they decrease, or even stop, their purchases. Developing targeted marketing mixes for such customers might rejuvenate their activity with the firm.

The current model can be further developed. We assumed independence between customer arrivals (i.e., no word-of-mouth effect). This issue can be further expanded to allow for such effects by developing a functional form for the average number of customers arriving over time.

Another issue that can be further developed is the common use of a deterministic interest rate in CE models, described in Jain & Singh's (2002) review. Acknowledging that future interest rates are important in long-term calculations and the uncertainty surrounding these rates in world markets will have a significant impact on CE calculations. Allowing for stochastic interest rates in the basic structural CE model can resolve such limitations.

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