This is the published version:


Available from Deakin Research Online:

http://hdl.handle.net/10536/DRO/DU:30029811

Every reasonable effort has been made to ensure that permission has been obtained for items included in Deakin Research Online. If you believe that your rights have been infringed by this repository, please contact drosupport@deakin.edu.au

Copyright: 2007, ICFAI University Press
Knowledge Specificity in Management Control System Design
A Case Study Evidence

V G Sridharan

This paper builds a theoretic model to explain why and how knowledge specificity impacts firms' Management Control Systems (MCS), based on Transaction Cost Economics (TCE). The model concludes that managers organize MCS on an individualized basis when knowledge specificity in a transaction is low, and involve worker teams when the specificity is high. Using the Product Variety Strategy (PVS) as a proxy for knowledge specificity, the model is examined in four New Zealand case units. The evidence is largely consistent with the theory, where for low specificity, decision management rights are centralized but the execution right is delegated to individual workers. The performance of individual workers is evaluated through task standards, and the incentive compensation is partly traced to individual performance. For high specificity, decision management rights are shared by manager with workers as one team, and the performance of the team is evaluated with reference to the job plan measures. Incentive compensation is traced to the whole firm, wherever inter-team involvement exists.

Introduction

In practice, Management Control Systems (MCS) such as decision rights, performance evaluation and incentive compensation vary both within and across the firms. A majority of management accounting studies employ contingency theory to examine why MCS vary (Chenhall, 2003 and Fisher, 1995). Contingency theory is based on the premise that the appropriateness of an MCS design for a firm is determined by the circumstances (e.g., environment or technology) that impact the firm (Otley, 1999). Further, the theory examines variations in one or more MCS elements and not the overall design (Spekle, 2001). Spekle contendsthat the use of contingency theory does not offer a generalized and pervasive answer for why MCS vary.

A few prior management accounting studies (Spicer and Ballew, 1983; Tiessen and Waterhouse, 1983) identify the potential for using Transaction Cost Economics (TCE) theory to examine the MCS of a firm. These studies state that the attributes of a transaction can determine the design of a firm's MCS. Van der Meer Kooistra (1994) Van der Meer Kooistra (1994) and Colbert and Spicer (1995) develop TCE-based models, and empirically, examine the MCS that underlie firms' internal transfer pricing processes. However, the models are specific to firms' transfer pricing transactions, and not other internal transactions.

*Lecturer, Department of Accounting and Business Information Systems, The University of Melbourne, Victoria, Australia. E-mail: vgs@unimelb.edu.au

© 2007 The Icfai University Press. All Rights Reserved.
Spekle (2001) is one of the very few who builds a more general TCE model of MCS, which states that when a firm executes an asset specific transaction, the MCSs are more likely to involve greater information sharing and decision participation among the employees. Asset specificity refers to a firm’s investment that is exclusively used to conduct a transaction whose value in alternate transactions is little. An example of a specific asset is a mold that is built to produce a specific product. However, Spekle does not examine his TCE model of MCS empirically and also admits that the constructs used in the model can be difficult though not impossible to measure in practice.

The author addresses the gaps in Spekle (2001) in the paper by building a different but still a general TCE model of MCS, and empirically, analyzing the model. The association between three overall and interrelated elements of MCS (i.e., decision rights, performance evaluation and incentive compensation) and one type of asset specificity, namely knowledge is examined. The research question relates to how knowledge specificity impacts MCS design within firms. Knowledge is a critical specific asset in a firm’s internal transactions (Alchian and Demsetz, 1972; Williamson, 1981a). Klein et al. (1978, p. 302) argue that an “employee could effectively cheat the owner of the asset with his specialized knowledge”. Jensen and Meckling (1992) suggest that firms adapt their control systems (or MCS) to manage such problems. However, few papers document why and how firms adapt their MCS design to suit different levels of knowledge specificity. The documentation is useful for practitioners in designing appropriate MCS for a firm, which faces different levels of knowledge specificity.

Categorizing the internal transactions of firms into low and high knowledge specificity, different MCS features for the two categories in the TCE model of MCS are identified. The low knowledge specificity is related to Jensen and Meckling’s (1992) concept of general knowledge, which refers to skills that are easy to transfer and available for replication for other future transactions. There is less need for the manager to deprive decision management rights to the workers. The manager achieves efficiency by centralizing most of the rights and delegating merely the execution right to the workers. The manager uses task standards to evaluate how his workers have performed their execution right and motivates better performance by tracing incentive compensation to the individual workers’ tasks.

In contrast, high knowledge specificity implies the presence of specific knowledge, which according to Jensen and Meckling (1992) is dispersed in bits among individuals, and costly to transfer. To enable the workers to collate the dispersed bits of knowledge and then conduct the transaction, the manager first decentralizes the decision management rights to worker teams, and evaluates only the overall team performance against specific job plans. The resources required vary for each job, and thus, specific task standards are less likely to exist. The manager motivates the teams in achieving the job plans by tracing incentive compensation to the teams. Team rewards may prompt some workers to act opportunistically by ‘free-riding’ on their coworkers. The manager, therefore, uses subjective evaluations of individual workers as a basis for allocating the team rewards. To reduce the problems of a manager, favoring preferred workers with higher subjective scores, CEOs direct managers to obtain coworkers’ peer scores as part of individual workers’ subjective evaluation (Brickley et al., 2001).

Once built, a theoretical model must be empirically examined to enhance its explanatory value (Hamel et al., 1993). The author uses the Product Variety Strategy (PVS) as a context
and proxy to measure the qualitative independent variable, knowledge specificity. Drawing support from the PVS literature (Goldhar and Lei, 1995; Bouwens and Abernethy, 2000; and Salvador et al., 2002), firm-specified and customer-specified PVS to low and high knowledge specificity are related, respectively. To empirically examine the TCE model in four manufacturing units based in New Zealand, appropriate case study method is employed, because the TCE model, which considers firms’ in-depth internal processes, can be refined through detailed analyses of a few case studies.

The author adopts Yin’s (1994) scientific principles to enhance internal and external validity especially in a case study setting. Yin contends that the goal of the case study method is to generalize the findings to the theory as against the population. Theoretical (also called analytic) generalization refers to identifying how and why a relation (e.g., A causes B) may exist between two variables, rather than finding with a specified level of confidence that the stated relation exists between two variables. This distinction offers a new dimension to the traditional view, which holds that case findings cannot be generalized to the population.

The findings suggest that in firm-specified PVS, decision management is centralized except the execution right. Performance is evaluated on individual task standards for throughput and team-based standards for safety and quality. The incentive compensation is traced to the individual performance in throughput and team performance in safety and quality, but offered only if the firm achieves its budgeted profits. In customer-specified PVS, the manager shares decision management rights and forms teams together with his workers. The overall performance of the team is evaluated with reference to job plans, but incentive compensation is traced to the whole firm wherever inter-team involvement exists. The underlying reasons are consistent with the theory, where the MCS vary with knowledge specificity.

TCE Model of MCS

Justifying the Need for the Model

In general, TCE model proposes that the choice of a governance structure such as the market or a firm to govern a transaction depends on the attributes, i.e., asset specificity, uncertainty and frequency of the transaction. Asset specificity refers to the uniqueness of an asset involved in a transaction. Investment in a specific asset can increase dependence and scope for opportunism (contracting problems) among the parties. Uncertainty captures the unpredictable nature of the tasks and behavior of the transacting parties. Frequency refers to the recurrence of the transactions. Among the transaction attributes, Williamson (1981b) considers asset specificity as the important attribute, because the other two merely serve to increase the effects of asset specificity.

When asset specificity intensifies, TCE model predicts that parties organize their transactions through firms rather than the market, because firms have better administrative controls which help in economizing their overall transaction costs. Even in the market, the parties can have access to adjudication processes such as courts but the process is time-consuming and costly. The model has been traditionally applied to decide between the market and the firm structures (Shelanski and Klein, 1995). However, even within a firm structure, Williamson (1996, pp. 43-44) suggests that the choices among “alternate firm designs” (e.g., MCS) also depend on the transaction cost economizing properties of the designs.
Spicer and Ballew (1983) and Tiessen and Waterhouse (1983) are among the early management accounting papers that describe the role of TCE in relation to MCS. Considering MCS as a governance structure, they argue that TCE holds the potential to explain how firms design their MCS because of TCE’s ability to interpret different choices in terms of transaction cost economizing principle. Van der Meer-Kooistra and Vosselman (2000) examine the MCS implications of outsourcing transactions among firms. Van der Meer-Kooistra (1994) and Colbert and Spicer (1995) develop TCE-based models, and also empirically, examine how and why MCS that underlie firms’ transfer pricing policies differ. However, these models are specific to transfer pricing transactions.

Spekle (2001) fills this gap by developing a general TCE model of MCS. Drawing MCS constructs from the management accounting literature, Spekle builds his model to explain that the choice of a particular MCS design is dependent on the intensity of asset specificity. If the intensity generates contracting problems that can be mitigated by a specific design, say, decentralization, then firms facing such problems will likely decentralize than centralize. However, Spekle does not examine his TCE model empirically. Spekle (p. 439) admits that the MCS constructs in his model (arms-length, boundary, exploratory and machine controls) “may help to recognize general tendencies but... may not be descriptively accurate”.

The above limitations are addressed by building a general TCE model which draws MCS constructs from other organizational economic frameworks (Fama and Jensen, 1983; Jensen and Meckling, 1992; Brickley et al., 2001). The MCS constructs used in my model are more easily observable in practice. Further, the model unifies ideas from related frameworks in organizational economics literature.

Defining Knowledge Specificity and MCS

Knowledge in the form of information, experience and skills is a critical form of asset specificity that exists within firms (Williamson, 1981b). The author distinguishes knowledge specificity into low and high categories, which are related to Jensen and Meckling’s (1992) general and specific knowledge constructs, respectively. Low knowledge specificity implies that the transaction requires general knowledge which is available ex ante with the firm. The manager knows what he expects from his workers, and the workers are aware of their responsibilities. The parties are less dependent on each other, and thus, the scope for opportunism is low. Neither the workers nor the manager can hide information to gain unfair personal wealth. High knowledge specificity implies that the transaction requires specific knowledge, which is less applicable for other transactions. The manager does not know what to expect of his workers (though he may have overall expectations) and the workers hold bits of dispersed knowledge. The parties are more dependent on each other to collate bits of knowledge ex post and make them usable for the transaction in hand. The increased dependence is associated with contracting problems, which is explained as:

TCE suggests that contracting problems arise with two main assumptions: opportunism and bounded rationality. If scope exists, the parties may seek to pursue their self-interest at the cost of the other party. Further, the parties possess limited mental abilities to foresee all future contingencies. The combination of these two assumptions makes each party fear that the other one may seize an unfair advantage. To protect their interests, the parties in a firm build adequate safeguards.
The author now defines the MCS variables used in the model. The management accounting literature covers a wide range of MCS variables such as: (1) styles or characteristics of MCS such as Hopwood's (1972) budget-constrained, profit-conscious and non-accounting controls, Merchant's (1981) action, results and personnel controls, Ouchi's (1979) input, output and behavior controls, Ouchi's (1980) clan, bureaucracy and market controls, and Simon's (1991) diagnostic and interactive controls; (2) systems of MCS such as standard costing, variance analysis, master and flexible budgets, and responsibility centers by Argyris (1952), Anthony (1965), Otley (1994); and (3) elements of MCS such as decision rights, performance evaluation and incentive compensation by Vancil (1979), Flamholtz (1983) and Otley (2001, 2003).

The organizational economics literature (Brickley et al., 2001 and Jensen and Meckling, 1992) focuses mainly on the last set of variables, i.e., the elements of MCS. While the management accounting literature does not analyze the interactions among the different MCS elements (Otley, 1999, p. 369), the organizational economics literature examines the interactions in terms of how a change in one element leads to changes in the other two (Zimmerman, 1997). Since the TCE model examines potential links among MCS elements, the organizational economics literature is followed to define the MCS variables which are decision rights, performance evaluation and incentive compensation. Further, when the MCS definition is based on organizational economics literature, the economic role of MCS in firms can be stated as:

The price system in the market ensures that assets are acquired by parties who value them the most. Further, the party puts the asset to a proper use and maintenance in order to earn high returns. Thus, the price system in the market automatically allocates appropriate decision rights, enables high performance and motivation for the parties (Jensen and Meckling, 1992 and Williamson, 1981b). As firms do not have such automatic advantages, firms need MCS to determine appropriate decision rights to workers, measure their performance and incentivize them. In the following section, I place the manager-worker transactions within low and high knowledge specificity categories and explain how firms could design MCS for each of them.

**Hypothesis 1: Low Knowledge Specificity and MCS**

When knowledge specificity is low, knowledge can be used for several recurrent transactions. Consider that a manager transacts with his workers to make some products specified in the technical brochures. The workers follow the steps listed in the procedure manuals and complete the production. As manuals are 'assembled' general knowledge that exists ex ante, the specificity of the knowledge to any particular transaction is low. The parties (managers and workers) thus have less scope to misuse knowledge to enhance their utility at the cost of each other. The contracting problems are likely to be less. The design of MCS for low knowledge specificity is now examined beginning with decision rights.

In decision rights, two broad groups exist: decision management and control (Fama and Jensen, 1983). While decision management covers initiation and execution of a project, decision

---

1 Wruck and Jensen (1994) and Christie et al. (2003) adopt three broad hierarchical levels among employees: (1) CEOs, (2) managers, and (3) workers. This paper examines transactions arising between second and third levels, i.e., managers and workers.
control includes approving decisions and monitoring of performance. In Fama and Jensen's classification, 'planning' is inherent in both decision management activities of initiation and execution. However, planning is a separate decision management right because it may be carried out by different parties under low and high levels of knowledge specificity. Decision control is generally retained by the manager, when s/he transacts with workers. This paper focuses on decision management rights (initiation, planning and execution), which are more likely to change.

To mediate low knowledge specificity, the manager retains both initiation and planning rights, and merely, allocates the execution right to workers to perform stipulated tasks. This is because the initiation and planning activities have already been documented for future reference. The organizational economics literature treats such an allocation as centralized and relates it with cost centers (Brickley et al., 2001; Milgrom and Roberts, 1992; Williamson, 1975; and Vancil, 1979). Cost centers emphasize on operational efficiencies, i.e., maximize output for a given cost or minimize costs for a given output (Brickley et al., 2001). Further, cost centers do not determine sales prices or volume.

Decision management and performance evaluation are associated to each other. As workers exercise only their execution rights, the manager needs only simple standards for different tasks to evaluate the workers' performance. Examples of task standards include number of units produced, defective units and production time. These measures verify if workers have achieved the manager's ex ante expectations.

The mere delegation of execution right and identification of task standards may not help a firm to achieve its objectives, unless the workers are motivated to perform (Brickley et al., 2001). A simple way to motivate workers in low knowledge specific transactions is to relate incentive compensation to the achievement of task standards. As workers' efficiencies are verifiable, the incentive compensation is directly traceable to individual workers. Note that low knowledge specificity is managed by individual oriented MCS. Further, the three MCS variables are interrelated.

The above arguments summarize Hypothesis 1 as: Where knowledge specificity in a transaction is low, the manager is likely to centralize all decision management rights other than the execution right, which is delegated to the individual workers, adopt task standards to evaluate the individual workers' performance and trace incentive compensation to the individual workers.

**Hypothesis 2: High Knowledge Specificity and MCS**

When a firm receives a customer order for which there is little prior knowledge, the manager directs workers to collate dispersed bits of knowledge available among them. Workers pool their knowledge bits ex post to gather new knowledge that is enough to conduct the transaction, as a whole. The pooled new knowledge is specific to the current transaction and not other transactions. The manager and the workers become dependent on each other, which in turn, gives rise to contracting problems (Williamson, 1981a). For instance, a worker may hide his or her inefficiencies and blame a coworker for the low product quality. The manager may not be able to clearly trace, who is responsible for the problem. The paper then analyzes how MCS are designed for managing transactions of high specificity.
On decision management, the manager delegates all the rights (initiation, planning and execution) to a ‘team’ of workers, whose members hold the specific knowledge in diverse bits. The organizational economics literature (Brickley et al., 2001; Milgrom and Roberts, 1992; and Williamson, 1975) recognizes that partitioning all the decision management rights characterizes a ‘decentralized’ structure. Also called profit centers, the decentralized units emphasize maximization of profits by increasing both operational efficiencies and sales value. Profit centers hold decision rights relating to costs, sales volume and price.

The delegation of decision management rights is related to performance evaluation. As worker teams initiate and plan the tasks for each job ex post, task standards cannot be set at the beginning of a year. As teams determine the job plans, the manager evaluates merely the overall team output (e.g., whether the job is completed according to the job plans) to evaluate performance. The workers may engage in opportunism (such as hiding inefficiencies) since they are aware that task standards do not exist to evaluate their individual performance. To reduce such behavior, the manager uses subjective measures such as aptitude to work and team spirit to evaluate individual workers (Brickley et al., 2001). However, subjective information is difficult to observe, and hence, managers may also resort to opportunism such as favoring their preferred workers. To ensure equity, CEOs direct managers to use coworkers’ reviews as one way to collect subjective information on workers (Brickley et al.).

As only the worker team’s performance is verifiable, the incentive compensation is traced to the whole team, which is then allocated among the workers. The basis of allocation may vary on either equal amounts or in proportion to the individual pay scales. If any specific worker engages in opportunistic behavior, the manager uses the subjective evaluation to reduce the amount of incentive compensation that is allocated to the defaulting worker. The subjective indices are balanced by peer workers’ reviews to reduce the possibility of managerial opportunism. In summary, the MCS design is sufficiently complex to manage the contracting problems that arise with high knowledge specificity.

The above arguments summarize Hypothesis 2 as: When the knowledge specificity in a transaction is high, the manager is likely to decentralize all decision management rights to worker teams, adopt job plans to evaluate team performance and trace incentive compensation to the teams before allocating the compensation to individual workers.

The Context and Research Method

The Context

The author uses the Product Variety Strategy (PVS) as a proxy and a context to examine knowledge specificity, because the latter can then be observed in practice. The term product variety is defined in different levels (as models or options) in the PVS literature. For instance, bicycles constitute one product line within the two-wheeler industry. Within this product line, different models that cater to different markets such as mountain and racing bikes exist. Within every model, various options on pedals, seats and wheels are offered. Further, PVS may arise from either firm or customer specifications (Kekre and Srinivasan, 1990 and MacDuffie et al., 1996). While firm specifications reflect various models and options designed and manufactured by the
firm, customer specifications cover models and options that are conceived by individual customers. This paper defines product variety as constituting both models and options within a particular product line that are specified by either the firm or the customers, and relates firm-specified PVS to low knowledge specificity and customer-specified PVS to high specificity.

The choice of the proxy to capture the underlying theoretical construct (low and high knowledge specificity) is supported in both management accounting and PVS literatures. Bouwens and Abernethy (2000) examine how MCS changes when firms increase the levels of product customization. They find that increased customization increases interdependence among firms' employees, which in turn, increases the need for MCS information to be integrated, aggregated and timely. The interdependence occurs because of increasing knowledge specialization that is dispersed among different parties.

Goldhar and Lei (1995, p. 79) also identify that as firms move towards customized product variety, new forms of knowledge such as the "ability to process and transfer information and skills among its subunits, suppliers and customers" become critical. In transacting with external suppliers, Salvador et al., (2002) identify that for products with standard features, firms retain decision rights while for non-standard features, firms form joint ventures. Salvador et al., (2000) suggest that knowledge is dispersed and specialized in relation to making customized products.

**Research Method**

To examine the TCE model which explains that firms design individual-oriented MCS to manage low knowledge specificity (proxied by firm-specified PVS) and team-oriented MCS to manage high knowledge specificity (proxied by customer-specified PVS), case study research method is used. This method is appropriate for empirically examining a new theoretical model, particularly, when the model predicts the underlying reasons for a context (Hamel et al., 1993 and Yin, 1994). Case study method enables the researcher to verify the model through multiple in-depth interviews, which can be triangulated by interviews from other sources along with documents and direct observations (Yin, 1994).

Yin (1994, pp. 9-10) states that the case study method has been a subject of disdain for two reasons: (1) the method has been adopted with a lack of rigor in a "sloppy manner that allows equivocal evidence to influence the direction of the findings"; and (2) the lack of a basis for generalizing one or a few case unit findings to the population. For the first criticism, Yin suggests that the case study researcher must identify specific solutions for all the method-related problems in a scientific research just as one does under survey or experimental methods. For the second criticism, Yin proposes that case units offer multiple evidences to find the reasons for a theoretical model, and the findings are analytically generalized back to the theory. The analytic generalization concept is explained in detail in the later section. For both criticisms, Yin argues that a case study researcher must adopt the principles of science from the first step (theoretical model) till the last (analytic generalization).

---

2 Note that there can be variations within firm- and customer-specified PVS. For instance, a firm-specified PVS may cover only model and no option variety (e.g., soft drinks). Similarly, a customer-specified PVS can design and offer new options, but only within the existing model variety (e.g., mobile phones). On a relative basis, the knowledge specificity varies between the two.
Science holds its roots in pragmatic problems of real life. A scientific research is a “systematic,
controlled, empirical and critical investigation of natural phenomena guided by theory and
hypotheses about the presumed relations among such phenomena” (Kerlinger and Lee, 1999,
p. 15). The paper adopts the TCE theory to guide hypotheses, which examines the phenomena of
MCS variations across firms. These phenomena are examined using case study method and Yin’s
(1994) scientific approach. The approach identifies different ways to enhance reliability and
validity, which are unique to a case study setting.

The author uses a 2*2 design with two case units for each of the two opposite contexts of
firm-specified and customer-specified PVS, as indicated in Table 1.

<table>
<thead>
<tr>
<th>Table 1: A 2*2 Case Study Research Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical Construct</td>
</tr>
<tr>
<td>Low Knowledge Specificity</td>
</tr>
<tr>
<td>Case Units</td>
</tr>
<tr>
<td>3. Fruehauf</td>
</tr>
<tr>
<td>Theoretical Replication</td>
</tr>
<tr>
<td>Literal Replication</td>
</tr>
<tr>
<td>(similar results expected)</td>
</tr>
</tbody>
</table>

The case units 1 and 2 examine how MCS is designed for firm-specified and
customer-specified PVS, respectively. These two case units belong to the same firm, Skope
Industries, while the other two case units (Fruehauf and Adept) are two independent firms.
The second set of case units, namely units 3 and 4 replicate the study carried out in case
units 1 and 2, respectively. Yin (1994, p. 46) calls the 2*2 design as a multi-case study design
that yields ‘theoretical’ replication, when the study expects contrasting results within each set
of case units and ‘literal’ replication, when the study expects similar results across two units
from different sets, for reasons predicted by the theory (i.e., case units 1 and 2 will be opposite;
and so will be 3 and 4. But case units 1 and 3 will be similar; and so will be 2 and 4). Yin indicates that the replication logic in a case study method is analogous to experiments. If
one experiment examines two opposite constructs with contrasting results, then a second
experiment done to replicate the first one will be expected to produce contrasting results,
similar to the first one.

The case units are non-randomly chosen such that some pursue firm-specified and others
customer-specified PVS “to fill theoretical categories and provide examples of the polar (extreme)
types” (Eisenhardt, 1989, p. 537). The first case unit, Skope Refrigeration (Skope), is the main
division of Skope Industries in Christchurch, which produces heating and cooling equipments.
Skope makes different models and options within commercial refrigerators to customers in
New Zealand, Middle East and Australia. Skope designs its models and informs their technical
and cost details to customers through a technical brochure. Within Skope Industries, a small
department (Skope Custom, the second case unit for my study) specializes in making customized refrigerators. When Skope Custom receives a customer order, it develops the complete product design and then proceeds to manufacture the order. The output is planned only after receiving the order and not stated ex ante in a brochure. While Skope designs and specifies the available product variety for customers to make their choices, Skope Custom is wholly customer-driven. Skope adopts firm-specified PVS in general except for Skope Custom, which pursues customer-specified PVS.

The third case unit, Fruehauf Pacific Limited based in Feilding, manufactures heavy trailers for goods transporters and livestock carriers. Fruehauf begins its operations by getting a product specification sheet filled in by the potential customer, which lists the different options available for every model and expects customers to mark their specific requirements. Finally, the fourth case unit (Adept Limited) is an independent Auckland-based firm that builds molds and produces high-value plastic products for other firms. The design is developed wholly from customers’ ideas or prototypes and then used by the molding department to build molds. While Fruehauf indicates its product variety, Adept builds on customers’ ideas to offer product variety and does not have ex ante knowledge of their preferences. Fruehauf adopts firm-specified and Adept pursues customer-specified PVS. Table 2 presents the details of the four case units.

Note that the two case units are divisions of a firm while the other two are separate firms. The unit of analysis is thus any activity center that performs all functions such as design, production and sales. In each case unit, the production managers and workers are the main respondents. In addition, the design, purchase, finance, marketing and human resource managers are contacted to verify the responses. Semi-structured questionnaires form the basis for expanding the discussions during interviews. In general, the interview data is cross-verified with evidence from documents and observations, which together, reduce the observer’s bias. To understand the processes better, multiple visits are made.

As Yin (1994) suggests, a protocol record of questions and a database of observations (documents and interview digital files) is maintained for each case unit to enhance reliability. The case study reports are also attested by the key respondents in each case firm, which is perhaps a unique feature available in case study research. Internal validity relates to the ability of a study to attribute causation. Yin (p. 33) suggests three methods for enhancing internal validity in the case study method: (a) pattern-matching, (b) explanation building, and (c) time-series.

Pattern-matching refers to obtaining the expected pattern of relations for each set of dependent variables in the case study. Brownell (1995, p. 62) states that if the actual results match the predictions for not just one but all the dependent variables in the group, “there is a stronger base for causal inference than if any one dependent variable alone were to constitute the criterion”. The three MCS variables are the dependent variables while knowledge specification (proxied by PVS) is the independent variable in this study. The actual results must match the theoretical prediction for not just decision management, but also for performance evaluation and incentive compensation to post a stronger internal validity.

Explanation building is unique to the case study method, wherein a researcher collects systematic evidence from the case sites to build logical explanations for each dependent variable.
Table 2: Details of the Case Unit Sites and the Duration of the Visits

<table>
<thead>
<tr>
<th>Status</th>
<th>Fruehauf Pacific</th>
<th>Skope Refrigeration</th>
<th>Skope Custom</th>
<th>Adept Molding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Fielding, NZ</td>
<td>Christchurch, NZ</td>
<td>Christchurch, NZ</td>
<td>Auckland, NZ</td>
</tr>
<tr>
<td>Product Line</td>
<td>Heavy Transport Trailers</td>
<td>Commercial Refrigerators</td>
<td>Commercial Refrigerators</td>
<td>High Value Molds</td>
</tr>
<tr>
<td>Product Models (e.g.,)</td>
<td>Livestock, Curtain-sided and B-train Models</td>
<td>Backbar, Counter Chillers and Speed-lane Models</td>
<td>Not Specified (CFO Claims: Offer What Customers Ask)</td>
<td>Not Specified (Design Manager: Customers Specify)</td>
</tr>
<tr>
<td>Product Options (e.g.,)</td>
<td>Lights, Axles and Paint</td>
<td>Doors, Handles and Finish</td>
<td>Not Specified</td>
<td>Not Specified</td>
</tr>
<tr>
<td>Information on PVS</td>
<td>Product Specification Sheet</td>
<td>Technical Note: Cool Book</td>
<td>Quotation for Every Job</td>
<td>Design Brief for Every Job</td>
</tr>
<tr>
<td>Nature of PVS</td>
<td>Firm-specified PVS</td>
<td>Firm-specified PVS</td>
<td>Customer-specified PVS</td>
<td>Customer-specified PVS</td>
</tr>
<tr>
<td>Sales (for 2003 in US$)</td>
<td>7 mn</td>
<td>28 mn</td>
<td>0.3 mn</td>
<td>6.5 mn</td>
</tr>
<tr>
<td>Number of Employers</td>
<td>63</td>
<td>300</td>
<td>10</td>
<td>85</td>
</tr>
<tr>
<td>Interviews (Main for the Study)</td>
<td>Operations Manager, Supervisors, Design Manager</td>
<td>Operations Manager, Team Leaders, Chief Operations Officer</td>
<td>Operations Manager, Plant President, Head Worker</td>
<td>Molding Manager, Design Manager, General Manager</td>
</tr>
<tr>
<td>Other Interviewees (for Support Information)</td>
<td>Chief Executive Officer, Commercial Manager, Sales Engineer, Sales Consultant</td>
<td>Head Worker, Chief Executive Officer, Human Resource Manager, Design Manager, Maintenance Manager, Chief Finance Officer</td>
<td>Molding Programmer, Production Manager, Shift Manager, Project Controller, Human Resource Manager, Business Development Manager</td>
<td></td>
</tr>
<tr>
<td>Number of Site Visits</td>
<td>Four</td>
<td>Four</td>
<td>Part of the Visits to Unit B</td>
<td>Four</td>
</tr>
<tr>
<td>Total Duration of Visits</td>
<td>11 Full Days</td>
<td>15 Full Days</td>
<td>N/A</td>
<td>Nine Full Days</td>
</tr>
</tbody>
</table>
The purpose is to see how far the reasons underlying the theoretical predictions hold in actual observations. This paper holds that MCS is a function of knowledge specificity. The MCS literature also suggests other variables such as size (Merchant, 1981) and technology (Waterhouse and Tiessen, 1978). Explanation building is used to examine the alternate or omitted explanations to the dependent variable. Time-series evaluates a case unit on a longitudinal basis to examine how changes occurred. As the study examines firms at a point of time, it does not discuss the time-series method any further.

Finally, the results of the four case units are analyzed and generalized back to the theory. Multiple evidences are collected from each case unit to understand the MCS and inquire into the reasons that underlie their design. The specific reasons are generalized to a larger analytical situation, namely, the theory, just the same way as sample results are generalized to a larger representation, namely, the population.

Empirical Observations and Analyses

Case Units Adopting Firm-specified PVS

When a customer order arrives, the operations managers at Skope and Fruehauf identify the process flow and sequence before scheduling the manufacture of the order. Thereafter, the assistant managers (called ‘team leaders’ in Skope and ‘supervisors’ in Fruehauf) from different processes identify the micro-level tasks to be performed within their respective processes and then schedule such tasks. Once scheduled, the headworkers (called ‘process leaders’ in Skope and ‘leading hands’ in Fruehauf) and their group of workers execute the tasks according to the schedules. The workers execute the tasks by referring to the manual (called ‘Quality System’ in Skope and ‘Labor Manual’ in Fruehauf) and/or by relying on their own experience in having carried out the same tasks on prior occasions.

The production processes in Fruehauf and in Skope exhibit the features of cost centers. The individual processes are responsible only for achieving task efficiencies and not for fixing prices and increasing sales volume. The workers in these processes hold only execution rights and not initiation and planning rights, which are retained by the managers. Further, the entire work flows in a step-by-step sequence from the operations manager to the assistant managers, and finally, to the workers.

The decision rights allocation is linked to the way performance is evaluated in both firms. The operations managers evaluate the assistant managers’ task schedules only on exceptions, because the assistant managers are experienced in their work that has changed only a little over time. The workers’ tasks are governed by standards, which are recorded in the manual or any other work process plans.

The operations manager at Skope evaluates three main performance areas: safety, quality and productivity. For each of the three areas, the operations manager identifies measures such

---

1 The job descriptions state that team leaders/supervisors must do managerial (planning and coordination) activities while process leaders/leading hands must carry out daily production, along with the coordination of their worker teams. Further, the interview responses confirm that while process leaders/leading hands do get overtime pay, the team leaders/supervisors do not. Note that overtime pay is given only to workers and not to managers. Yin (1994, p. 34) suggests that case study data must build such a ‘chain of evidence’ to increase construct validity.
as Lost Time Injuries (LTIs) for safety, Cost of Quality (CoQ) for quality and either output (units finished) or time-based (hours consumed) measures for productivity. LTIs refer to the number of times a worker drops work due to injuries. The lower the LTIs, the better the worker’s safety performance. CoQ is captured by the value added, which is lost when units are scrapped due to low quality. The maximum number of units that can be scrapped in a period is set once every six months. The standard for CoQ is the total budgeted cost of the allowed scrap units up to the point, where the units are scrapped.

The operations manager and the supervisors in Fruehauf adopt task standards based on labor hours set in the Labor Manual for evaluating individual workers’ productivity. The operations manager admits that there are no quality-related standards for each task at present. However, material usage and rework are evaluated on an overall basis both on weekly meetings and on the completion of every customer order. Safety concerns are evaluated on an overall basis as and when needs arise.

The observations in both firm-specified case units reveal that performance measures are based on standards for individual tasks. The reasons cited for using task standards converge toward low knowledge specificity, i.e., the managers and workers know ex ante what is expected of each other. As each task is measurable, individual workers can be held accountable for the tasks that they perform. An exception arises here. Though task standards are traceable to individual workers, the operations managers in Skope and Fruehauf trace the safety and quality-related performance to teams (rather than to individuals) because team-based evaluation enables workers to reduce opportunism. Opportunism arises here when a worker is indifferent to a coworker’s loss of safety or quality. The objective of the operations managers is to curb incentives to workers to enhance their own utility by reducing the overall value of the firm. The author now turns towards the design of incentive compensation in Skope and Fruehauf.

In Skope, the first condition for incentive compensation is that the company must achieve its budgeted profits. The workers are entitled to receive incentive compensation (called ‘incentives’ in Skope) provided that they meet the task standards set for a six-month period. The first condition is based on the logic of the theory of constraints: if goods remain unsold even if the workers produce efficiently, there is no purpose in providing incentives. Once the condition is met, the underlying theme is that the workers must be able to control what they get as incentives.

In Fruehauf, the workers are entitled to their incentive compensation (known as ‘bonus’ in Fruehauf) if the company saves on the standard labor hours for all the completed customer orders. The savings are placed in a bonus pool which, in turn, is distributed to the workers based on their individual contributions measured in terms of productive hours worked. Productive hours are the total hours contributed by the workers including work-in-process but excludes house-keeping time. The operations manager holds that scheme motivates individual workers to find ways to improve performance. If a worker increases his/her productive hours, he/she can increase the amount of bonus. As the bonus scheme is new, the CEO holds that it has scope for improvement. For instance, if the non-productive hours include rework, then workers can be motivated to find ways to reduce rework as well. Table 3 works out hypothetical numbers under the incentive compensation schemes of both the firm-specified case units.
Table 3: Incentive Compensation in the Case Units Adopting Firm-specified PVS

### Fruehauf Pacific

Assume the following. Completed orders in a period: ten; Standard time allowed for the ten orders: 6000 hours; Actual time taken: 5000 hours. Rate: $25 per hour. Total productive hours consumed by all the workers in the period (including on work-in-process): 8000 hours. Productive hours include actual time spent by a worker on an order minus any housekeeping time. Worker 'A' provides 200 productive hours.

<table>
<thead>
<tr>
<th>Basis of Computation</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1  Determining the bonus pool:</td>
<td>(6000-5000) * $25</td>
</tr>
<tr>
<td>Standard labor hours saved for all the completed orders during a period * rate per hour</td>
<td>$25000</td>
</tr>
<tr>
<td>Stage 2  Distribution to individual workers:</td>
<td>(200/8000) * 25,000</td>
</tr>
<tr>
<td>Individual workers’ productive hours/total contribution of all the workers</td>
<td>= $625</td>
</tr>
</tbody>
</table>

Note: If worker 'A' increases his productive time to 220 hours, given other factors constant, the bonus increases to $685

### Skope Refrigeration

Number of process leaders who are entitled to receive incentive compensation are ten. Maximum amount available to all the process leaders are $15,000. The amount paid depends on the three measures: LTIs, CoQ and units produced. The targets for the measures are as follows: three LTIs for the entire factory; $500 CoQ for say, the folding process; 350 units to be folded. The weights are 20% for LTIs; 30% for CoQ and 50% for the number of units processed. Consider the actual performance to be four LTIs, $500 in CoQ and 315 folds processed.

<table>
<thead>
<tr>
<th>Basis of Computation</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Determining the bonus pool: The firm must first achieve its budgeted profits, If so, the amount is: maximum amount for all the process leaders/number of process leaders</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Determining actual weights: LTIs: standard allowed/actual achieved * 20% COQ: standard cost/actual cost * 30% Units: actual units/standard units * 50% Actual weight</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Distributing to a process leader (say, A): Actual weight * maximum amount</td>
</tr>
</tbody>
</table>
In summary, the MCS design is largely similar when the Skope study is replicated in Fruehauf. In both firm-specified PVS case units, managers use existing general knowledge to conduct transactions with their workers. The case units provide evidence consistent with Hypothesis 1 in respect of decision management rights. The evidence is inconsistent with Hypothesis 1 in relation to performance evaluation and incentive compensation, where:

- The task standards used in both case units are used to evaluate individual performance in respect of throughput and team performance for safety and quality;
- The incentive compensation in Skope is dependent on the firm achieving its budgeted profit and on team performance in the areas of safety and quality and individual performance in throughput, and the incentive compensation is currently paid to the headworker (and not yet offered to other workers); and
- The incentive compensation in Fruehauf is first traced to teams through a bonus pool and then allocated to the workers based on each worker’s contribution to the team in terms of productive hours.

Though the performance evaluation and incentive compensation elements of the findings are not consistent with Hypothesis 1, the evidence exists that the three MCS elements are interrelated. This is in line with Yin’s (1994) pattern-matching principle. Workers hold only the execution right, for producing good (quality) units efficiently (throughput) without harm (safety). Though safety, quality and throughput can be traced to individual performance, having safety and quality as team-based measures reduces opportunism. The incentive scheme is also linked to whether performance is evaluated on team or individual basis in Skope. Though Fruehauf does not have safety and quality in its incentive scheme, there is no theoretically contradictory signal. The scheme does not say that bonus is traced to individual safety and quality performance, while having these measures evaluated on team basis.

**Case Units Adopting Customer-specified PVS**

In Skope Custom, the presiding officer, operations manager and the headworker (known as ‘process leader’) initiate and plan the overall tasks together as a team. Thereafter, the process leader determines the micro-level tasks and obtains the operations manager’s approval to finalize the tasks. The operations manager uses his experience and the overall plan made by the team as reference points to approve the process leader’s plans. Once approved, the process leader builds price quotations before executing the tasks. Generally, the marketing manager upwardly reviews these prices. The process leader also obtains help in execution from the operations manager, should emergencies (such as design changes) emerge.

The Adept managers follow a similar pattern, i.e., initiate and plan the overall tasks with their workers as teams. Though the workers determine and execute the micro-level tasks, the managers help in execution in times of emergencies. A main difference between the two case units—Skope Custom and Adept—relates to the structuring of the design and production functions. While Skope Custom, being a small case unit, carries out the design and production functions in one department, Adept performs the functions in two separate departments. However, the employees in design and production departments in Adept interact with each other. For instance, the production (called Molding) manager is a part of the Adept’s Design Committee that plans and approves molding designs.
The evidences (interviews, job descriptions and observations) from both customer-specified PVS firms converge to support that managers do not delegate decision management rights to worker teams. All the rights of initiation, planning and execution are inextricably shared among managers and workers. The workers are involved in planning (e.g., building price quotations) while the managers are engaged in execution. The decision management rights do not flow sequentially top-down, but flow reciprocally both ways.

Though knowledge specificity is viewed as the determinant of reciprocal teamwork in both case units, the human resources manager of Adept also states the explanation of ‘small company culture’. She believes that reciprocal sharing of decision management rights which is the culture of a small company continues to exist in Adept though it is growing. The small company culture and knowledge specificity may not be competing explanations as both are endogenous with the nature of customer-specified PVS. The design and manufacture of customer-specified product variety require high knowledge specificity, which is dispersed throughout the firm. This requires reciprocal sharing, which is more naturally present in a small company. Both explanations are possible and likely to operate synchronously.

Regarding performance evaluation, the operations manager and the presiding officer verify if Skope Custom gets throughput (sales value minus direct material costs) of at least 50% of its direct labor. Even if Skope Custom is not fully profitable, the operations manager justifies its existence, because the output of Skope Custom is linked to other customer orders for firm-specified product variety. Further, Skope Custom assumes the role of a research center that subsumes all the complexities of customization. However, in practice, Skope Custom covers all its direct labor costs because the prices are generally hiked upwards from what the process leader quotes. Along with the overall throughput measure, the operations manager also evaluates the number of jobs completed and scheduled completion dates.

In Adept, the managers of design and molding departments evaluate their actual performance against the quotations that they provide to customers. The quotations build a ‘charge out time’, i.e., hours quoted for the job. In a period, the departments may complete most jobs within and a few jobs beyond the charge out time. So long as the total consumed hours are within the charge out time for all completed jobs, the departments contribute to the firm’s profitability.

The specific measures (such as charge-out time) are constructed from out of the detailed tasks for each customer order. However, the two case units do not use the detailed task measures to evaluate individual workers. This is because the performance on these measures reflects the combined efforts in initiation and planning by both managers and workers together and not just the workers who ultimately execute the job. Since the tasks are performed in a reciprocal manner, the detailed task measures are less meaningful as standards unless collated together as an overall measure.

With no standards, individual efficiencies are not clearly observable. This gives scope individuals to engage in opportunism such as free-riding and work slow down. Further, the managers may not know, where performance can be improved. To control such behavior, managers use subjective measures including aptitude to work, team spirit and integrity to evaluate individual performance. For Skope Custom, the operations manager states:
"It is difficult... You cannot say that they (Skope custom employees) have to do 20 units next month; because you can suddenly get one that takes you two weeks. To start to come up with a formula to measure individual performance, you would need a rocket scientist... So, that is where the subjective side of it (helps). It sort of suits that area."

As Skope Custom is a small department, the operations manager knows all his workers. Peer review is the way that Adept follows to obtain subjective information of a worker. Such reviews avoid complaints of managerial bias in subjective evaluations. In summary, the two customer-specified PVS case units use overall measures (profitability and scheduled completion dates) combined with subjective measures to evaluate individual efficiencies.

On incentive compensation in Skope Custom, the operations manager first verifies the criterion that the case unit gets a throughput of at least 50% of its labor costs. If the criterion is met, then the manager incentivizes the headworker on a predetermined rate that varies with the type of products made. Note that the other workers are either new or casual employees who only hold the execution right. If the headworker makes a product similar to a previous order, the rate is lower than when the workers develop brand new prototypes. There is no direct link between the profitability criterion and the incentive compensation. Note that the throughput value is not only influenced by the workers but also by the market forces. Further, the workers also consult with several other functions in completing their jobs. Hence, linking the profitability criterion and incentive compensation is difficult.

In Adept, a portion of the overall profits is distributed as incentive compensation (called as ‘bonus’ in Adept) to all employees either equally or in proportion to salaries. Though there are separate functional departments such as design and production, the departments interact mutually. Thus, it is difficult to set bonus schemes separately for each department. The managers admit that the CEO introduced two schemes in the past, but withdrew both of them due to operational difficulties. At present, the CEO offers bonus on a random basis, i.e., unknown amounts at irregular intervals on an equal or pay-related basis. The managers admit that they hold the discretion to reduce or cancel the bonus payment to any worker if subjective evaluations are not good. The above structure fits into Adept’s complex transactions. This is because the managers believe that if a regular amount were to be paid, the workers would consider the bonus as a part of their salary. In turn, the scheme would cease to offer motivational value to the workers.

The incentive compensation schemes of the two customer-specified case units are apparently different. While Skope Custom provides the compensation based on a predetermined rate, there is no such definite rate in Adept. Though the findings do not reflect the expectations regarding the incentive portion of the hypothesis, the schemes are consistent with the TCE theory. First, the schemes are based on overall profits of the case units, which in turn are allocated to the workers based on their individual efforts. Second, the evidences indicate the difficulty in setting up individual-based schemes, when high knowledge specificity exists. Table 4 illustrates the incentive schemes of the two customer-specified case units.

In summary, the decision management rights in both case units are inconsistent with Hypothesis 2 in that the rights are shared by the managers with their workers. The performance evaluation is based on job plan related measures, and thus, it is consistent with Hypothesis 2.
Table 4: Incentive Compensation in the Case Units Adopting Customer-specified PVS

<table>
<thead>
<tr>
<th>Skope Custom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assume the following numbers. Throughput generated in a period is $280,000. Direct labor cost in the case unit is $240,000. Customized orders completed in the period are 180. New or prototype designs are 120 and the balance are the orders with designs similar to those carried out in the previous month. The compensation for prototypes is $50 for every design and for repetition $10 for every design.</td>
</tr>
<tr>
<td>Basis of Computation</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Stage 1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Stage 2</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adept Molding</th>
</tr>
</thead>
<tbody>
<tr>
<td>The case unit's overall performance is greater than expected by the CEO. For instance, the case unit generates record sales of $1 mn per month consistently over the past three months. The CEO then evaluates the employee morale and future potential results and determines the amount of incentive compensation payable to every employee (manager or worker).</td>
</tr>
<tr>
<td>Basis of Computation</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Stage 1</td>
</tr>
<tr>
<td>Stage 2</td>
</tr>
</tbody>
</table>

The incentive compensation in both case units is not consistent with the hypothesis, where:

- In Skope Custom, the incentive compensation is traced only to the headworker and not to the team; and
- In Adept, the compensation is traced to the whole firm as one team rather than to individual teams with the firm.

The analysis reveals that the three MCS elements are interrelated. Note that reciprocally shared decision management rights can best be evaluated through job-plan measures such as overall profitability and scheduled completion. As these measures can lead to opportunism by individuals, firms combine subjective measures and link the allocation of incentive compensation to such subjective measures.
Analytic Generalization and Conclusion

The author generalizes the findings from the case units to the TCE model. This process refers to using a specific context of firm- and customer-specified PVS to generalize to the underlying theoretical construct of low and high knowledge specificity, respectively. Yin (1994, p. 36) cautions that the "generalization is not automatic". The extent to which the author can generalize is limited by how far the chosen context is representative of the underlying theoretical construct and how far the article replicates the findings in a second case study just the same way a second experiment replicates the first. Though the construct validity is high and replication is in the expected direction (similar for literal and opposite for theoretical replication), the specific findings are different from the hypothesized model. In line with the specific findings, the generalized TCE model is as follows.

Manager-worker transactions are examinable in terms of low and high knowledge specificity. As low specificity implies that general knowledge exists ex ante for all transactions, managers do not need to delegate all the decision management rights except the execution right to workers. Decision management rights flow sequentially from managers to workers. Workers need experience only in execution and not in planning. Managers evaluate each individual worker's execution performance by setting task standards for throughput and tracing incentives to individual workers to motivate better performance. However, the task standards and incentives for safety and quality are traced to teams to encourage workers to help each other in distress. The incentives are paid only if the firm achieves its budgeted profits.

High specificity implies that specific knowledge lies dispersed in bits across different individuals. To implement such transactions, managers share all the decision management rights with workers as a team to pool the knowledge bits and create a knowledge base (job plan) ex post that is relevant only for the current transaction. Decision management rights are reciprocal within teams. Workers' experience in planning tasks is essential (and not merely desirable). Managers evaluate the teams' actual performance against job plans. Teamwork offers scope for some members to free ride. To motivate individual contribution to a team, managers first trace incentives to the teams and then allocate to workers based on subjective evaluation of individual contribution. To ensure equity in subjective evaluation, the CEO directs managers to adopt coworkers' peer assessment (along with managers' own assessment), and further, incentivize the managers under a different scheme. However, when teams continually need to interact with other teams, the CEO determines the incentive compensation more on a firm-wide basis.

This study first develops a general TCE model of MCS, which is applied in four specific case units that pursue PVS. Deriving support from construct validity and replication results, the specific PVS findings are generalized to the wider theoretical construct of knowledge specificity. The generalization is that when knowledge is less specific to the transaction in hand, managers plan the tasks and direct workers to adhere to the plans. The workers' throughput performance is evaluated on an individual basis. As knowledge becomes more specific to the transaction in hand, managers and workers plan the tasks reciprocally in teams. Within firms, teamwork becomes critical with increasing knowledge specificity. The model can apply to other business strategies such as quality, lead time and brand equity.
The variations in the case units' sizes and affiliations offer other theoretical contexts to which the model can be applied. Skope Custom, a small customer-specified division of Skope Industries follows an MCS design that is distinct from the rest of the firm. Adept, the other customer-specified case unit, is an independent firm that is larger than Skope Custom. Consistent with the theory, Adept also adopts an MCS design that is largely similar to Skope Custom. The results suggest that the model is still generalizable to different sizes and affiliations.

Acknowledgment: The author would like to thank Maggie Abernethy, Chris Akroyd, Ramji Balakrishnan, Anne Lillis, Shane Moriarity, Vic Naiker, VG Narayanan, Farshid Navissi, Deryl Northcott, Barry Spicer, Jerry Zimmerman, his PhD Supervisors Jilnaught Wong and Norman Wong, and the participants of the Global Management Accounting Research Symposium (GMARS) in Sydney, July 2005 for their encouragement and valuable comments. The author acknowledges the financial support of the New Zealand Institute of Chartered Accountants (NZICA) in conducting the case studies.

Reference # 09J-2007-01-03-01

References

Knowledge Specificity in Management Control System Design: A Case Study Evidence