

Moderating Role of Management Accounting Systems on Group Diversity and Outcome Relationship

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Management accounting system (hereafter MAS) provides information that enhances decision-making processes and the quality of managerial decisions in organizations. Despite this assertion, our understanding of the role of MAS information in group decision making processes is incomplete at best. This study examines the role of management accounting system on the relationship between group diversity faultline, satisfaction, and group decision quality. To test the research question, I use an experimental methodology that uses a 2 X 2 (Active/Inactive Faultline X Broad Scope/Narrow Scope MAS) factorial design. The experiment involves 34 four-person teams in a decision-making task. The data from the experiment provide results that are consistent with MAS having a positive effect in reducing conflict in faultline groups. Additionally, MAS information was determined to have its mitigating effect on faultline through perceived procedural justice. This result has implications for management accounting theory, organizational theory, and methodology. Opportunities for future research are also considered.

1. Introduction

Prior research in management accounting asserts that MAS provide information that improves the quality of managerial decisions in organizations (Cheng et al. 2003; Sprinkle 2003). However, there is little empirical evidence to support this argument as it relates to decision-making in groups (Sprinkle 2003). It is important to study this assertion at the group level because decision-making at the individual level differs from decision-making at the group level (Sprinkle 2003). One difference between individual and group decision is the prevalence of conflict in organizational groups. Organizational behavior literatures suggest that conflict in organizational groups can lead to losses in group processes and outcomes (De Dreu and Weingart 2003; Jehn 1995; Lau and Murnighan 2005; van Knippenberg et al. 2004).

Prior studies have used the faultline theory to explain the negative effects of conflict (e.g. Lau and Murnighan 1998). Faultlines are hypothetical dividing lines that may split a group into subgroups based on multiple attributes of members (Lau and Murnighan 1998). Consequently, recent research efforts are moving to finding ways of mitigating the effects of faultline-induced conflicts in organizational groups (e.g. Homan et. al. 2007). This study contributes to this effort by examining whether, and how MAS information mitigates the negative effects of faultlines in decision-making groups.

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quality. To investigate the research question, this study uses an experimental design that considers how MAS information interacts with faultline in heterogeneous decision-making groups. I use a 2 X 2 (Active/Inactive Faultline X Broad Scope/Narrow Scope MAS) factorial design. The experiment involves 34 four-person teams in a decision-making task. The result of the experiment supports the overall hypothesis that MAS moderates the effect of group diversity faultline on satisfaction and decision quality. The differences in satisfaction and decision quality between the active and inactive faultline groups become less significant only under the Broad Scope MAS conditions.

Specifically, this study contributes to theory by considering the role of MAS in group decision-making processes and outcomes using a faultline theory approach. In addition, this study responds to management accounting research that calls for more research using a contingency approach that is concerned with the effect of MAS on other organizational factors (Chenhall 2003). Furthermore, this study extends group decision and diversity theory by incorporating the role of organizational information structure in the form of MAS in the group faultline and outcomes relationship model. On a practical level, the result of this study will benefit organizations implementing new MAS (such as the value based management, activity based costing, and the balanced score card approaches) in its various forms, in understanding when a new MAS will or will not provide significant incremental benefits. It will also provide empirical evidence on the extent to which organizations can extend the new MAS approaches to decision making at the unit level to align performance measurement across different levels of management.

The organization of the remainder of this paper is as follows: Section 2 provides the literature review and motivation for the hypotheses. Section 3 provides a description of the methodology. Section 4 provides a discussion of the results. Section 5 gives a summarized conclusion and directions for future research.

2. Literature Review

This section provides a review of relevant literature and develops the main hypotheses of this study. Notably, this study relies on MAS research, group diversity research, and faultline theories, to develop and explore a research model that extends our understanding of how MAS could mitigate the negative effects of diversity.

Management accounting literature asserts that the purpose of MAS is to provide information that facilitates decision-making consistent with an organization's strategic goals (Cheng et al. 2003; Sprinkle 2003). These studies using a contingency approach, provide evidence that show how MAS facilitate managerial decision-making (e.g. Chenhall 2003; Naranjo Gil and Hartmann 2007). Consistent with the above assertions, Sprinkle (2003) suggests that management accounting information is supposed to facilitate the quality of managerial decisions, and consensus in decision-making groups. Despite this suggestion, Sprinkle (2003, 306) points out that:

“... research in managerial accounting has not fully explored the multiperson and multiperiod nature characterizing many managerial accounting settings.

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.... several interesting issues regarding the decision-facilitating use of managerial accounting information in these settings warrant exploration.”

Further, Sprinkle (2003) indicates that decision-making at the group level differs significantly from decision-making at the individual level, suggesting that one of the differences is the likelihood of conflict in groups. Research in organizational behavior indicates that conflict in decision-making groups may have negative effects on group processes and decision quality (Jehn 1997). Thus, it is important to examine the assertion that MAS improves decision quality in a conflicting group setting (Sprinkle 2003). Before exploring how MAS can facilitate decision-making in conflicting groups, it is important to review literature that discuss the dynamics of group level decision-making and the effect of conflict.

Decision-making groups in organizations are fundamental tools in the organizational structure necessary for achieving strategic objectives (van Knippenberg et al. 2004). Recently, organizational groups are becoming more diverse because of changes in the compositional diversity of organizations (Lau and Murnighan 2005; Towry 2003; van Knippenberg et al. 2004). Furthermore, the literature suggests that diverse groups may be more advantageous for decision-making tasks (Jackson et al. 2003; Lau and Murnighan 2005; Naranjo-Gil and Hartmann 2007; Van Knippenberg et al. 2004; William and O'Reilly 1998). Thus, diversity in decision-making groups should help in problem solving and decision making through collaborative work that involves the exchange of knowledge and ideas across the diverse groups of individuals. Unfortunately, reviews of prior psychology and management studies show that, contrary to this expectation, diversity can also have negative effects on group processes and outcomes through conflicts (Jehn 1997; Lau and Murnighan 1998; 2005; Thatcher et al. 2003; van Knippenberg and Schippers 2007; Williams and O'Reilly 1998).

Lau and Murnighan (1998; 2005) explain the phenomenon of group conflict in terms of faultline. Faultlines occur when group members align along two or more task relevant attributes creating the potential for a group to split into homogeneous sub-groups (Lau and Murnighan 1998; Thatcher et al. 2003). Lau and Murnighan (1998) argue that faultlines can form around combinations of attributes, including demographic, functional affiliation, ideology, skills, personality, and values. Lau and Murnighan (2005) assume that group heterogeneity together with a trigger produce an active faultline that increases the likelihood of between-subgroup conflict, and procedural problems. Recent research provide evidence suggesting that an activated faultline causes groups to splinter into conflicting sub-groups, and leads to low satisfaction and lower decision quality (Lau and Murnighan 2005; Rico et al. 2007). In order to ensure that my approach provides results that are consistent with existing studies, I first propose the following hypothesis:

H1: Compared to the inactive faultline groups, the active faultline groups will experience more conflict, less satisfaction, and report lower decision quality.

Hitherto, accounting studies using a contingency approach have suggested that the scope of MAS information is a significant characteristic of MAS that can facilitate decision making in groups (Bouwens and Abernethy 2000; Sprinkle 2003). These studies argue that broad scope MAS (BSM) can enhance decision-making by

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providing more information that achieves reduction in ex-ante uncertainty, induces belief revision, and helps with problem solving (Sprinkle 2003). This argument implies that, compared to traditional narrow scope MAS (NSM), BSM can provide information that adds structure to the decision task, and can make it easy for groups to reach a consensus. Thus the use of BSM, is supposed to provide organizations with an alternative information structure that overcomes the deficiencies associated with the NSM (Naranjo-Gil and Hartmann 2007).

Following this argument, and consistent with other prior studies that adopt a contingency approach to the study of MAS (e.g. Chenhall 2003; Sprinkle 2003), I propose a framework that suggests the potential moderating role of MAS in the context of conflict in decision-making groups. This research framework relies on the argument that MAS will introduce greater structure in the group processes that will mitigate the negative effects of faultline. The thesis of this study also relies on the contingency theory of management accounting, which argues that different MAS information will have different effects on organizational decision making due to differences in their information characteristic of scope (Naranjo Gil and Hartmann 2007). To test the overall research question suggested by the foregoing discussion, I propose the following hypothesis:

H2: The management accounting system (MAS) will interact with faultline conditions such that groups using the Broad Scope MAS report when compared to groups using the Narrow Scope MAS report will experience lower conflict, more satisfaction, and better decision quality.

3. Methodology

To test the hypotheses proposed in the preceding section, I conducted an experiment consisting of a 2 X 2 (Active/Inactive Faultline X Broad Scope/Narrow Scope MAS) between-group factorial design with 34 groups of four participants each nested within the treatment conditions. The experiment exposed participants to a group decision-making task in which faultlines are either active or inactive and the scope of the management accounting system information is either broad scope (BSM) or narrow scope (NSM).

All groups, regardless of treatment condition, are heterogeneous and have potential for faultlines. By co-manipulating gender and physical seating arrangement along with the university college affiliation, the faultline manipulation provides a strong potential for active faultlines. Research shows that arranging group member attributes in this way results in high within-subgroup similarity and high between-subgroup differences, thus creating strong faultline potential (Homan et al. 2007; Towry 2003; van Knippenberg et al. 2004). The faultline manipulation is also consistent with Towry's (2003) manipulation of team-identity and self-categorization using colors. In the inactive-faultline groups, neither gender, nor physical seating, nor college affiliations are co-manipulated. In addition, the inactive-faultline groups have mixed gender within a college arranged in a crossed pattern with one male and one female of different units seated together. The inactive faultline groups provide control for testing the interactive effect of MAS on group conflict, satisfaction, and decision quality.

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Consistent with Naranjo-Gil and Hartmann (2007), the experimental task manipulates two MAS report formats (BSM versus NSM) that vary in their scope and degree of transparency with respect to the project selection task. While the NSM report provides information that relates only to the cost components of the projects, the BSM report provides information that relates to both cost and revenue components of the projects.

All dependent measures for this study are perceptions of individual participants and are elicited using multiple questions adapted from the existing literature where possible. Individual questions are measured on five-point Likert scales anchored on 1 = completely disagree to 5 = completely agree. The mean response across the multiple questions for each measure constitutes its value for the analysis.

To measure conflict, I use a modified version of the multi-item intra-group conflict scale developed by Jehn (1995). The conflict questionnaire includes those items that ask for individual participants' perceptions of the level of disagreement between group members.

The satisfaction measure is from Keyton's (1991) global satisfaction indices, and Wall and Nolan's (1986) satisfaction questionnaires. Only those items suited for ad-hoc, one-time groups are included (e.g., I dropped the item "Everyone attends each group meeting"). In addition, I include a global question, "I am satisfied with the way my group carried out its decision," to assess research participants' overall satisfaction with their group interaction.

I measured perceived decision quality with multi-item questionnaire that includes the following: "I am confident that the final decision that my group came up with is the best decision," "I feel that the quality of my group's decision would have positive effects on the University," and "Overall, it is my opinion that my group's final decision is of high quality."

The experiment consists of three phases. In phase I, individual participants have 15 minutes to read over the case materials and to rank the projects by selecting one of six possible rank orders with the assumption that only the two highest ranked projects would receive funding. This ensures that every participant is familiar with the task before entering the group phase of the study. In phase II, the participants work in randomized groups as described earlier where they interact and come to a group decision about how to rank the projects. This phase lasted a maximum of 45 minutes and all groups reached a decision within this time. In Phase III, the groups disband and participants have 15 minutes to provide individual responses on the conflict, satisfaction, and decision quality dependent measures and to complete the post experiment questionnaire (i.e. manipulation checks and demographic information). Undergraduate business majors at a large southeastern university, enrolled in a managerial accounting course, participated in the study. This choice of participants is consistent with prior studies published in top accounting and management journals that use undergraduate students in similar contexts (see Rico et al. 2007; Towry 2004). Overall 98% of the students participated in the experiment. However, only 34 four-person groups with 136 participants (68 female and 68 male) were included in the analysis. The mean age of the participants is 20 years.

4. Results and Analysis

I performed confirmatory factor analysis (CFA) to examine the validity of the questionnaire items used to test the hypotheses using a four-factor model that forced each of the questionnaire items to load only on its intended factor. The fit statistics, root mean square error of approximation (RMSEA) of 0.088, comparative fit index (CFI) of 0.93, standardized root mean square residual (SRMR) of 0.098, and Chi-square (χ^2) of 419.74 ($df = 205$, $p < 0.00$) suggest a good fit and indicates good reliability and discriminant validity between the constructs. Table 1 presents the descriptive statistics, correlations, and reliability coefficients for these constructs.

**Table 1:
Descriptive Statistics**

Variable	Means	SD	A	MAS	FL	DECQLT	CONFLT	SATISF
MAS	0.00	1.00	-	1				
FL	0.06	1.00	-	0.00	1			
DECQLT	0.54	0.32	0.90	0.41**	-0.81*	1		
CONFLT	2.69	0.90	0.88	-0.20*	0.33**	-0.23**	1	
SATISF	4.13	0.71	0.92	0.37**	-0.38**	0.53**	-0.15	1
PROJUS	3.97	0.59	0.82	0.24**	0.05	0.25**	-0.10	0.24**

* $p < 0.05$. ** $p < 0.01$

Note: N=136. SD= standard deviations; α = coefficient alpha; DECQLT = decision quality measured on (1 – 5) scale; PROJUS = Procedural Justice measured on (1 – 5) scale; CONFLT = conflict measured on (1 – 5) scale; SATISF = satisfaction measured on (1 – 5) scale; MAS = management accounting system (Narrow Scope = -1, Broad scope = 1); FL = faultline (Inactive = -1, Aactive = 1)

To ascertain the inter-item reliability of the scales for the factors, the study subjected the individual factors to a test of reliability using coefficient alphas. The results indicate a significant alpha for Satisfaction $\alpha = 0.92$; Decision Quality $\alpha = 0.90$; Conflict $\alpha = 0.88$. Thus, the measurement scales exhibit acceptable inter-item reliability.

In this study, I measured the dependent variables at the individual level, but because the participants were embedded in four-person committees, their responses may not be independent within group (Bliese and Ployhart 2000). I compute intra-class correlations (ICC) to assess the proportion of variance in the dependent variables that is due to group membership. Results suggest that a substantial proportion of the total variance in satisfaction (ICC = 0.25) and perceived decision quality (ICC = 0.31) is explained by group membership. Thus, tests of hypotheses include group as a nested factor within each experimental condition.

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H1 predicts that active faultlines lead to more conflict, less satisfaction, and lower perceived decision quality. Table 2 shows means (standard deviations) for the measured variables by treatment condition and Table 3 shows an omnibus test of H1 using MANOVA.

**Table 2:
Means
(Standard Deviations)**

<u>Variable</u>	<u>Inactive Faultline</u>			<u>Active Faultline</u>		
	<u>NSM N=32</u>	<u>BSM N=32</u>	<u>Mean N=64</u>	<u>NSM N=36</u>	<u>NSM N=36</u>	<u>Mean N=72</u>
Conflict	2.44 (0.91)	2.31 (0.59)	2.38 (0.77)	3.26 (0.59)	2.68 (1.09)	2.97 (0.92)
Procedural Justice	3.72 (0.53)	4.17 (0.52)	3.94 (0.57)	3.94 (0.59)	4.07 (0.62)	4.00 (0.60)
Satisfaction	4.31 (0.64)	4.52 (0.63)	4.41 (0.64)	3.47 (0.50)	4.28 (0.57)	3.87 (0.67)
Decision Quality	4.21 (0.63)	4.58 (0.39)	4.40 (0.55)	3.83 (0.66)	4.51 (0.54)	4.17 (0.69)

Note NSM = Narrow Scope MAS Information; BSM = Broad Scope MAS Information

As shown in Table 3, the effect of faultline is highly significant ($F < 0.0001$) in support of H1. This result indicates that within the active faultline condition, mean Conflict is higher (Overall mean of 2.97) than in the inactive faultline condition (Overall mean of 2.38) as predicted. In addition, as predicted, the means for Satisfaction and Decision Quality (Overall means 3.87 and 4.17) are lower in the active faultline conditions than in the inactive faultline condition (Overall means 4.41 and 4.40).

**Table 3:
MANOVA Results**

<u>Variable</u>	<u>Num df</u>	<u>Den df</u>	<u>F</u>	<u>p > F</u>
MAS	5	98	12.97	< 0.0001
Faultline	5	98	20.08	< 0.0001
Group (MAS * Faultline)	155	490.09	2.83	< 0.0001

Note: MAS = management accounting system

Table 4 reports the results of univariate ANOVAs. Consistent with H1, the effect of faultline is significant for Conflict, Satisfaction, and perceived Decision Quality (all p -values < 0.001). The effect of Faultline on Procedural Justice is not significant ($p = 0.496$).

Table 4:
Univariate ANOVAs

Variable	df	Conflict		Procedural Justice		Satisfaction		Decision Quality	
		<i>F</i>	<i>p</i> > <i>F</i>	<i>F</i>	<i>p</i> > <i>F</i>	<i>F</i>	<i>p</i> > <i>F</i>	<i>F</i>	<i>p</i> > <i>F</i>
MAS	1	11.40	<0.0010	11.10	<0.0012	36.24	< 0.0001	41.67	< 0.0001
Faultline	1	29.85	< 0.0001	0.47	0.4964	37.75	< 0.0001	7.56	< 0.0071
MAS * FL	3	4.21	< 0.0001	2.51	<0.0003	2.69	< 0.0001	2.94	< 0.0001
	1								
R-Square		0.627		0.467		0.607		0.579	

Note: MAS = management accounting system; FL = faultline

H2 predicts that the effects observed in relation to H1 will be smaller when the MAS is BSM than when it is NSM. This prediction is supported by the significant interaction ($F = 2.83$, $p < 0.0001$) between MAS and Faultline in the MANOVA as shown in Table 3 and by the significant interactions (all p -values < 0.001) in the univariate ANOVAs shown in Table 4.

Further, the thesis of this study postulates that the observed effect of faultline is through the group members' perception of procedural justice. The results of this study provide some preliminary support for the significance of perception of procedural fairness in the mitigating role of MAS in faultline groups. As shown by the significant interaction effect ($F = 2.51$, $p < 0.0003$) in the univariate ANOVAs shown in Table 4.

5. Discussion and Conclusion

This study proposed and tested the proposition that the management accounting system can play an important role in determining how group members view the outcome of group decision-making when active faultlines are present. Specifically, this study tests whether the scope of MAS information changes the dysfunctional effects of faultlines on the decision-making behaviors of heterogeneous groups.

The findings of this study support prior research that show direct negative effects of faultline on group processes and outcomes in heterogeneous groups. I obtain strong evidence that the activation of faultlines in groups creates the same negative dynamics and outcomes previously observed.

The central finding in this study is that MAS can reduce the negative effects of faultlines. When members of an active-faultline group receive information using a more transparent BSM approach, they transcend the effects of faultline, conflict, and subgroup boundaries. Further, the results indicate that group members in the faultline condition are more likely to resolve their conflicts and move towards a group consensus because of a perceived procedural justice introduced by the MAS. Decision-making groups arrive at decisions that members believe are of higher quality. When the faultline remains inactive, the type of MAS does not matter. In

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certain contexts, MAS can link benefits to costs and open to view the effects on all entities so that members feel they are treated more fairly, greater satisfaction, and more support for the group outcome. This result is consistent with a contingency approach that predicts the effects of MAS differ between contexts.

This study contributes to both theory and practice. By introducing MAS (a form of structured information) into the decision-making model of groups, the study expands our understanding of the relationships between MAS and other organizational factors. This study extends the literature on group decision-making, the literature on group conflict, and faultline theory by incorporating the MAS in the discussion of how to mitigate faultline effects in decision-making groups (van Knippenberg et al. 2004). Further, it contributes to the ongoing discussion of the multi-person nature of most management accounting settings and their implication for effective decision-making in different organizational contexts (Sprinkle 2003).

The outcome of this study will also contribute to the growing search in the accounting literature for improved understanding of the causal relationships between MAS and other variables in the structure of organizations (e.g. Chenhall 2003; Naranjo-Gil and Hartmann 2007; Rowe et al. 2008; Towry 2003).

A number of factors limit the generalizability of this study. First, the results of this study are limited to conflict, satisfaction, procedural justice, and beliefs about decision quality in small groups. Other group processes and outcome variables could provide results that may differ from those observed here. Second, the use of experimental methods has certain well-known limitations that may include assumptions and control conditions that limit the results. Although student subjects are used in this study (because of the difficulties involved in bringing together large numbers of professionals into a group setting), the experiment was carefully designed to use a task that would be somewhat familiar and for which they had meaningful training. It is my believe that individuals in field settings often have clearly defined roles and strong preexisting ideologies that likely exceed those created within the reasonably short span of a laboratory experiment. Hence, it is likely that faultlines effects and the benefits from MAS information are stronger in the field. I hope this approach will be useful to others in investigating these topics. Future research may consider other organizational variables such as task structure, and multi-period relationships to see if they affect the interaction of MAS and faultline. In addition, new methodologies may be adapted to further test for moderated mediation relationship between MAS faultlines and procedural justice.

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