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The effect of diagnostic and interactive uses of management control systems and managerial coaching on reflection in teams

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Abstract

Purpose – The goal of this study was to investigate the effects of managerial coaching, as well as interactive and diagnostic uses of management control systems (MCS), on reflection and critical reflection, which are important for team learning.

Design/methodology/approach – Data were collected using a questionnaire survey. Hierarchical regression analyses were performed to test hypotheses using data from 235 employees in 50 teams from a Japanese automotive supplier.

Findings – The results indicated that: (1) MCS used interactively have a positive influence on critical reflection in teams; (2) MCS used diagnostically have no significant effect on reflection or critical reflection in teams; and (3) managerial coaching has a positive influence on team reflection.

Research limitations/implications – These findings suggest that the interactive use of MCS should be combined with managerial coaching in promoting reflection and critical reflection within teams. Because this study used data from employees of a Japanese automotive supplier, the results may have been influenced by the Japanese management style.

Practical implications – Organizations need to implement interactive MCS at the team level, while coaching programs should be provided for managers to enhance team learning.

Originality/value – This study extends the existing literature by examining the effect of MCS at the team level, and identifying that managerial coaching plays a complementary role, supporting the interactive use of MCS in promoting reflection within a team.

Key words: management control, reflection, critical reflection, managerial coaching

Paper type: Research paper

Introduction

Management control system (MCS) application in relation to traditional budgetary practices focuses on new ways of using MCS to promote entrepreneurship, innovation, and product

development (Akroyd and Maguire, 2011; Bisbe and Malagueño, 2015; Davila et al., 2009; Henri, 2006; Østergren and Stensaker, 2011) and to enhance cooperation among individuals or organizational units (Langfield-Smith, 1997). Simons (1991; 1994; 1995) has classified this operation as an ‘interactive use of a MCS’, which encourages surveillance, dialogue, and debate through an interactive process, which allows new strategies to emerge, and promotes generative learning (Bisbe & Otley, 2004; Kloot, 1997; Simons, 1995). In contrast, a ‘diagnostic use of a MCS’ centers on more traditional practices like monitoring organizational outcomes and correcting deviations from previously stipulated standards of performance (Langfield-Smith, 2007; Simons, 1995). Widener (2007) suggested that both types of MCS can enhance learning and attract managerial attention.

Although most of the prior research investigated effects of MCS at the corporate or inter-organizational level (Bisbe and Malagueno, 2009; Henri, 2006; Meria, Kartalis, Tsamenyi, and Cullen, 2010; Vosselman and Van der Meer-Kooistra, 2006), a few studies have applied diagnostic or interactive uses of MCS to teams or management units, including project management teams (Rezania, Baker and Burga, 2016; Sakka et al., 2013), biotech teams (Chong and Mahama, 2014), and middle management (Marginson, 2002). Mundy (2010) suggested that the interactive use of MCS consists of formal two-way communication processes between managers and subordinates at different levels of the organization. Therefore, it is important to examine the role of MCS at the team level because team learning serves as a fundamental building block of organizational learning (Crossan, Lane, and White, 1999; Roloff, Woolley, and Edmondson, 2011). Considering their nature, MCS can be effective tools to identify problems and generate solutions that enhance team learning (Naranjo-Gil and Hartmann, 2006). However, there is little empirical research on how middle-level managers promote team-learning processes

using MCS. A major goal of this study was to examine how the two types of MCS, combined with a manager's coaching, enhance learning in teams.

In examining the influence of MCS on learning-related variables at the team level, we focused on three factors: team reflection, critical team reflection, and managerial coaching. First, reflection is important to facilitate learning in the workplace because learning is achieved through the contemplation of personal experiences (Boud et al., 2006; Kolb, 1984; Schön, 1983; Raelin, 2016). In particular, critical reflection has been regarded as a crucial leadership competency (Tomkins and Ulus, 2015), and often leads to double-loop learning by facilitating the examination of presupposed values or assumptions (Cunliffe, 2004; Reynolds, 1998). Because MCS can be used as reflective tools through which problems can be identified and solutions generated, in this study, we focused on the effects of MCS on reflection and critical reflection in teams.

We also examined the role of managerial coaching in enhancing team reflection because managerial coaching, or coaching by team leaders, is one of the alternative measures for facilitating reflection within a team, through listening and critical inquiry (Hooijberg & Lane, 2009). In that sense, managerial coaching may play a complementary role, supporting MCS in promoting reflection and learning. According to Malmi and Brown (2008), managerial coaching can be regarded as the practice of administrative control. Similarly, some studies reported that MCS packages were designed based on cultural and administrative systems (Heinicke, Guenther, and Widener, 2016; Merchant and Otley, 2007; O'Grady and Akroyd, 2016). Thus, to identify the actual influence of MCS on reflection, managerial coaching should be incorporated into the research model to examine reflection within teams. The use of MCS and coaching by middle

managers may be a significant element with regard to fostering dynamic capabilities, which refers to the organization's ability to sense and seize opportunities (Augier and Teece, 2009). The purpose of this study was to clarify the relative effects of MCS and managerial coaching on reflection and critical reflection in teams.

The article is organized as follows. First, the literature on reflection, MCS, and managerial coaching is reviewed in depth. We then propose our hypotheses based on the literature review. Next, the methodological approach used to test the hypotheses is described. Finally, our findings are presented and discussed from both a theoretical and practical perspective.

Theoretical Background and Hypotheses

Reflection and critical reflection

Reflection, defined as the practice of 'periodically stepping back to ponder the meaning of what has recently transpired to us and to others in our immediate environment' (Raelin, 2002, p. 66), plays a key role in fostering learning and occupational outcomes (Boud, Cressery, & Docherty, 2006). According to Kolb's (1984) experiential learning model, individuals acquire knowledge and skills through reflecting on their personal experiences. Specifically, reflective activities are crucial for converting tacit experience into explicit knowledge (DeFillippi, 2001). Raelin (2016) argued that work-based learning, which requires participants to reflect on their experience to expand and create knowledge, is the most advantageous method for leadership development.

Alternatively, Edmondson (1999) conceptualized ‘team learning behavior’ as an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions. This suggests that learning and reflection are inseparable from one another. West (1996) claimed that team reflection refers to the extent to which group members overtly reflect upon the group’s objectives, strategies and processes, and adapt them to current or anticipated endogenous or environmental circumstances (p. 559). Conceivably, reflection at the team level is important, as a team’s ever-changing environment requires constant contemplation to select the best course of action (Hoegl & Parboteeah, 2006). Therefore, team reflection may be deemed an essential element of an organization’s dynamic capabilities, or the ability to identify and capture new strategic opportunities with regard to developing new organizational forms and business models (Augier and Teece, 2009).

It is important to recognize that reflection differs from critical reflection. The former focuses on the immediate details of a task or problem, whereas the latter examines preconceived assumptions with the goal of increasing receptiveness to alternative ways of reasoning and behavior (Gray, 2007; Raelin, 2001; Reynolds, 1998). Mezirow (1991) also argued that reflection involves critiquing assumptions on the content or process of ‘problem solving,’ while critical reflection involves the critique of presuppositions regarding ‘problem posing’ that can make a taken-for-granted situation problematic. Cunliffe (2004) argued that reflection is equivalent to single-loop learning, which involves problem solving, as well as identifying and correcting errors, while critical reflection corresponds to double-loop learning, which involves deeper critical thinking about behavior, including questioning assumptions, values, and espoused theories (Argyris, 1991). Similarly, Mezirow (1990, 1997) stated that critical reflection can lead

to transformative learning, defined as the process of effecting change in a frame of reference, or the structures of assumptions through which experiences are understood. Table 1 shows major differences between reflection and critical reflection. To facilitate learning in the workplace, it is important for managers to enhance both reflection and critical reflection.

Table 1. Main differences between reflection and critical reflection

| | Reflection | Critical reflection |
|-----------------------|--|--------------------------|
| Purpose | Problem solving | Problem posing |
| Focus | Immediate details of a task or problem | Preconceived assumptions |
| Related learning mode | Single-loop learning | Double-loop learning |

Diagnostic/interactive use of MCS

MCS are the formalized routines and procedures that draw upon information to maintain or alter patterns in organizational activity (Simons, 1991). Pant and Yuthas (2001) argued that a firm's MCS can have a significant influence on strategy development, and that it may help firms strengthen their dynamic capabilities. In this study, we examined the diagnostic and interactive uses of MCS proposed by Simons (1994, 1995) in his levers of control (LOC) framework, which has gained a prominent position in management control literature (Kruis, Speklé, and Widener, 2015). Diagnostic MCS include formal feedback mechanisms used to monitor organizational outcomes and correct deviations from predefined standards articulated in business plans, whereas interactive MCS refer to formal systems whereby top managers regularly and personally involve themselves in the decision-making processes of their subordinates (Simons, 1994).

Although the LOC framework is primarily for senior management, it can be applied to team management because leaders can use performance indicators to monitor progress and outcomes of their team, and to involve themselves in the decision-making processes of their subordinates. In particular, MCS can be effective tools for reflecting on work processes and objectives within teams. Because this study investigated MCS at the team level, the two types of MCS were operationalized as the extent to which managers used performance measures for diagnostic or interactive purposes.

Widener (2007) conducted a survey and reported that diagnostic MCS had a positive influence on organizational learning. She argued that diagnostic MCS are related to single-loop learning (Argyris, 1991) as they provide managers with information on outcomes that fail to meet expectations. Because the main purpose of diagnostic MCS is to assess whether plans or objectives are being achieved, such MCS may be effective for single-loop learning, which involves regular reflection within a team. Thus, we proposed the following hypothesis.

Hypothesis 1: Diagnostic use of MCS positively influences team reflection.

Alternatively, interactive MCS is used to resolve strategic uncertainties and stimulate dialogue throughout the organization (Artto et al., 2011). This form of MCS gives managers the opportunity to debate and challenge underlying assumptions and action plans in various business units, and to facilitate organizational learning and strategy formation (Simons, 1995; 2000). Therefore, interactive MCS may effectively promote critical reflection in teams, which is

required to stimulate double-loop learning. Taking these theories into account, we propose the following hypothesis.

Hypothesis 2: Interactive use of MCS positively influences critical reflection in teams.

Managerial coaching

Malmi and Brown (2008) conceptualized MCS as a package that included planning, cybernetics, reward and compensation, and administrative and cultural controls. We chose to focus on the role of managerial coaching because it can be regarded as an administrative control system that directs, monitors, and specifies employee behavior (Malmi and Brown, 2008).

Managerial coaching occurs in the workplace as part of the day-to-day interactions between employees and supervisors (Elmadag et al., 2008), where supervisors can promote the employee's reflection using coaching techniques, such as listening and questioning (Hooijberg & Lane, 2009). In particular, managerial coaching helps employees reflect on their work by facilitating skills, or helping employees analyze and explore different possibilities to enhance their performance (Heslin et al., 2006). According to Hui, Sue-Chan, and Wood (2013), 'facilitation coaching' helps employees evaluate their tasks, develop approaches to find an appropriate response, and improve their overall performance.

Most empirical studies to date have investigated the influence of managerial coaching on individual-level factors, such as subordinates' attitudes, behaviors, and performance (e.g., Agarwal et al., 2009; Ellinger et al., 2003; Elmadag et al., 2008; Liu & Batt, 2011), while other studies have focused on team-level factors. For example, Wageman (2001) found that leaders'

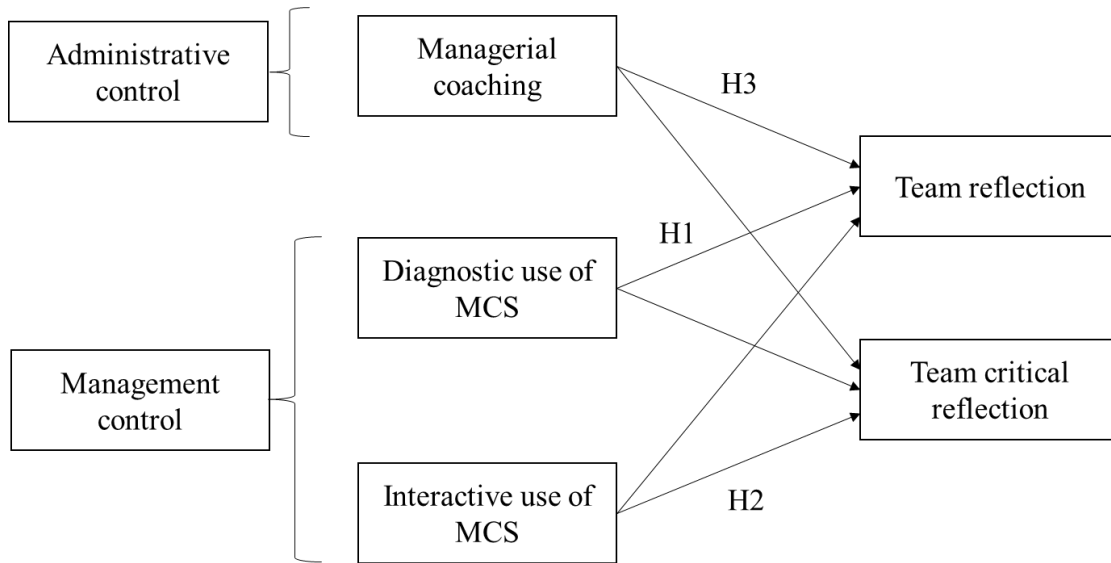
coaching influenced teams' self-management practices and the quality of members' relationships with one another. Hagen and Aguilar (2012) also found that coaching had a positive impact on team learning outcomes. Thus, managerial coaching may influence reflective activities within a team.

Although facilitative coaching may help employees reflect on their experiences, it focuses primarily on problem solving in subordinates' daily tasks or work processes. For example, Heslin et al. (2006) classified managerial coaching into three dimensions: facilitation (helping employees to analyze and explore ways to solve problems and enhance their performance), guidance (communication of clear performance expectations and constructive feedback regarding performance outcomes, as well as how to improve), and inspiration (challenging employees to realize and develop their potential). These coaching behaviors may be effective for improving the problem-solving skills of subordinates. Because it is assumed that only general team reflection will emerge as a positive effect of coaching, the following hypothesis was proposed.

Hypothesis 3: Managerial coaching positively influences team reflection.

Figure 1 shows the research model, based on the discussion above. This model assumes that diagnostic and interactive uses of MCS and managerial coaching affect reflection and critical reflection within teams.

Figure 1 Research Model



Methodology

Participants and procedure

Data for this study were collected from a large-scale automotive supplier in Japan. This firm was selected as a research site because managers use MCS to supervise their teams. This allowed us to explore the relationship between MCS and reflection within teams. The teams in this firm were considered stable work groups, meaning that each employee exclusively belonged to only one team. All teams were supervised by middle-level managers under one unit, and multiple units formed one department as a chain of command. Two of the functional departments, administrative and R&D, were chosen. All team leaders were middle-level managers responsible

for only one team. The target sample consisted of 300 employees in 51 teams. Since it was impossible to collect data from all teams under two selective departments, the organization's Human Resource (HR) Department selectively chose the 51 teams to reflect the overall characteristics of the administrative and R&D departments. Of this target sample, 249 respondents completed the questionnaire (response rate = 83.0%). The respondents were team members; no team leaders were included in the survey. The surveys were administered through the HR Department using the Internet. In total, 235 responses from 50 teams were considered admissible after removing the answers from employees who had just moved to the teams. The final response rate was 78.3%. The average number of respondents per team was 4.70 (standard deviation (SD) = 1.24). The sample was 89.8% male, and the breakdown was 38.0% and 62.0% for administrative and R&D, respectively. The distribution of participants' ages was as follows: 29 years and younger (19.6%); 30–39 years (44.3%); 40–49 years (22.1%); and 50 years and older (14.0%).

Measures

Validated scales were used to measure the constructs. In order to minimize discrepancies between the original and the translated versions of the questionnaires, back translation was conducted. English versions of the scales were translated into Japanese by the author, and then they were back translated into English from Japanese by a bilingual language professional. If the back-translated version did not correspond to the original version, the items in the translated Japanese version were revised.

Managerial coaching: Managerial coaching was measured by asking the respondent to evaluate their team leader's coaching behavior using a 10-question scale developed by Heslin et al. (2006). Survey items included: 'Provides guidance regarding performance expectations'; 'Offers useful suggestions regarding how you can improve your performance'; 'Encourages you to explore and try out new alternatives'; 'Supports you in taking on new challenges'; 'Helps you to analyze your performance'; 'Provides constructive feedback regarding areas for improvement'; 'Acts as a sounding board for you to develop your ideas'; 'Facilitates creative thinking to help solve problems'; 'Expresses confidence that you can develop and improve'; and 'Encourages you to develop and improve continuously'. Items were rated on a five-point scale (1 = strongly disagree, 5 = strongly agree) at $\alpha = 0.96$.

Diagnostic MCS: Diagnostic MCS usage was measured using a four-item scale developed by Henri (2006). Respondents were asked to rate the extent to which their managers use performance measures to: 'Track progress towards goals'; 'Monitor results'; 'Compare outcomes to expectations'; and 'Review key measures'. Items were rated on a five-point scale (1 = strongly disagree, 5 = strongly agree) at $\alpha = 0.87$.

Interactive MCS: Interactive MCS practices were measured using a seven-item scale developed by Henri (2006). As this study focused on MCS in teams, the term 'organization' was converted to 'team' in all of the items. Respondents were asked to rate the extent to which their managers used performance measures to: 'Enable discussion in meetings of superiors, subordinates and peers'; 'Enable continual challenge and debate regarding underlying data, assumptions, and action plans'; 'Provide a common view of the team'; 'Tie the team together'; 'Enable the team to focus on common issues'; 'Enable the team to focus on critical success

factors'; and 'Develop a common vocabulary in the team'. Items were rated on a five-point scale (1 = strongly disagree, 5 = strongly agree) at $\alpha = 0.90$.

Team reflection: Team reflection was measured using a four-item scale taken from West (2000), which was also used by Somech (2006). Since two of the items ('In the team, we criticize each other's work in order to improve team effectiveness', and 'In the team, we always look for different interpretations and perspectives to confront a problem') are closely related to critical team reflection, they were eliminated. The items used in the questionnaires were: 'We regularly discuss whether the team is working effectively together'; 'The methods used by the team to get the job done are often discussed'; 'The team often reviews its objectives'; and 'In this team we modify our objectives in light of changing circumstances'. Items were rated on a five-point scale (1 = strongly disagree, 5 = strongly agree) at $\alpha = 0.71$. The average scores of the items were used in the analyses.

Critical team reflection: To measure critical team reflection, a four-item scale developed by Kember, Leung, Jones, Loke, McKay, Sinclair, Tse, Webb, Wong, Wong, & Yeung (2000) for educational programs was used after being modified for the purposes of this study. The scale items read: 'In the team, we often review the way we look at ourselves'; 'In the team, we sometimes challenge some of our firmly held ideas'; 'In the team, we often rethink our normal way of doing things'; and 'In the team, we sometimes discover faults in what we had previously believed to be right'. As explained in the literature review section, critical reflection is different from reflection in that it focuses on firmly held ideas or preconceived assumptions rather than the immediate details of a task or problem. Each item was rated on a five-point Likert scale (1 =

strongly disagree, 5 = strongly agree) at $\alpha = 0.73$. The average scores of the items were used in the analyses.

Previous studies used these same measures regarding employee coaching (e.g., Weer, DiRenzo, and Shipper, 2016), reflection (e.g., Somech, 2006), critical reflection (e.g., Peltier, Hay, and Drago, 2005), and the diagnostic and interactive use of MCS (e.g., Tucker, Thorne, and Gurd, 2013).

Validation of measures and data aggregation

The internal consistency of the constructs was evaluated by the Cronbach α coefficient. As noted above, all scales met the recommended reliability coefficient of 0.70 (Nunnally, 1978). The convergent validity of the model constructs was evaluated by a confirmatory factor analysis (CFA) with five latent-learning constructs (managerial coaching, diagnostic use of MCS, interactive use of MCS, team reflection, and critical team reflection) for a total of 29 items. The results indicate that all items had significant factor loadings on the respective constructs. The goodness-of-fit statistics for the model were: $\chi^2 = 805.10$ ($df = 367$, $p < 0.001$), $\chi^2/df = 2.19$. The comparative fit index (CFI) was 0.90; the root mean square error of approximation (RMSEA) was 0.07; and the root mean square residual (RMR) was 0.04. The fit indices of the model were acceptable. To reduce multicollinearity problems, the independent variables were grand-mean centered in the model (Kreft and De Leeuw, 1998).

To assess the level of within-team agreement, the intra-class correlation coefficients $r_{wg(j)}$ were calculated (James, Demaree, & Wolf, 1984). The $r_{wg(j)}$ averaged 0.92 for managerial

coaching, 0.89 for diagnostic use of MCS, 0.91 for interactive use of MCS, 0.82 for team reflection, and 0.83 for critical team reflection. As the criterion for good within-group inter-rater agreement is 0.70 or above (George, 1990), the scores indicate high inter-rater agreement. Between-unit variance was also significant for managerial coaching ($F = 2.02, p < 0.001$), diagnostic use of MCS ($F = 1.43, p < 0.05$), interactive use of MCS ($F = 1.84, p < 0.01$), team reflection ($F = 1.89, p < 0.001$) and critical team reflection ($F = 1.66, p < 0.01$). The scores suggest that the team members had relatively uniform perceptions of the variables.

Additionally, the interclass correlation coefficients (ICC1 and ICC2) were calculated to evaluate within-team agreement. The ICC1 values were 0.18 for managerial coaching, 0.08 for diagnostic use of MCS, 0.15 for interactive use of MCS, 0.16 for team reflection, and 0.12 for critical team reflection. These values were greater than the cut-off score of 0.12 (James, 1982) except for diagnostic use of MCS. The ICC2 values were 0.50 for managerial coaching, 0.30 for diagnostic use of MCS, 0.46 for interactive use of MCS, 0.47 for team reflection, and 0.40 for critical team reflection. Some values were less than the cut-off score of 0.50 (LeBreton & Senter, 2008), but Bal, De Jong, Jansen, and Bakker (2011) stated that many studies have reported low ICC scores.

As all the $r_{wg(j)}$ were greater than the cut-off scores, and all the between-unit variances were significant, the data for these scales were aggregated to the team level by using the mean scores within each team.

Assessment of Common Method Bias

Because the data were collected from self-reported measures from a single source, it was possible that the results would suffer from the common method bias. Two diagnostic analyses were conducted to address this. First, Harman's one-factor test was used. According to this method, common method variance is a serious problem if a single factor emerges from a factor analysis, or one general factor accounts for most of the covariance in the independent and criterion variables (Podakoff et al., 2003). A principal component factor analysis was performed on items related to the four independent variables and two dependent variables, then six factors with eigenvalues > 1 were extracted, where Factor 1 accounted for 43.7% of the variance. These results suggested that no serious common method bias was present.

Second, the partial correlation procedure, as proposed by Lindell and Whitney (2001), was used to address common method bias. An item ('I have a lot in common with the people around me') of the revised UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) was used as the theoretically unrelated marker variable. Then, the effect of this variable was partialled out from the relationships among team size, managerial coaching, interactive and diagnostic uses of management control systems, team reflection, and critical team reflection. The results showed that the original correlations matrix between variables was quite similar to the partial correlation matrix, indicating that common method bias did not affect the results.

Table 2. Means, standard deviations, reliabilities and correlations of the variables

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------------------|------|------|--------|-------|----------|----------|----------|-----------------|
| 1 Team size | 4.70 | 1.24 | | | | | | |
| 2 Functional department | 1.62 | 0.49 | -0.22 | | | | | |
| 3 Managerial coaching | 3.46 | 0.54 | 0.27 | -0.21 | (0.96) | | | |
| 4 Diagnostic use of MCS | 3.53 | 0.37 | 0.12 | -0.24 | 0.70 *** | (0.87) | | |
| 5 Interactive use of MCS | 3.29 | 0.44 | 0.10 | -0.23 | 0.76 *** | 0.79 *** | (0.90) | |
| 6 Team reflection | 3.29 | 0.47 | 0.28 * | -0.26 | 0.74 *** | 0.60 *** | 0.66 *** | (0.71) |
| 7 Critical team reflection | 3.13 | 0.44 | 0.23 | -0.14 | 0.66 *** | 0.64 *** | 0.71 *** | 0.80 *** (0.73) |

Note: Functional department (1 = administrative, 2 = R&D); * $p < .05$; *** $p < .001$; Reliabilities are shown along the diagonal in parentheses.

Results

Table 2 shows the mean values, standard deviations, and correlations for all observed variables. Because of high correlations among dependent variables in this study, the variance inflating factor (VIF) was calculated to test for possible multicollinearity between variables. If the $VIF \geq 10$, it is considered to indicate harmful collinearity (Marquardt, 1970; Mason and Perreault, 1991). A maximum VIF value of 3.49, well below the warning level of 10, indicated that there was no serious multicollinearity between variables. Thus, the data were analyzed normally.

To analyze the effects of managerial coaching and the two types of MCS on team reflection and critical team reflection, hierarchical regression analyses were performed. In the first step of these regression equations, control variables, including team size and functional department (1 = administrative, 2 = R&D), were entered. In the second step, managerial coaching was entered as a predictor of the dependent variables. In the third step, diagnostic MCS and interactive MCS variables were added.

Table 3. Results of hierarchical regression analyses (N=50)

| Variable | Team reflection | | | Critical team reflection | | |
|------------------------|-----------------|-----------|--------|--------------------------|-----------|---------|
| | 1 | 2 | 3 | 1 | 2 | 3 |
| Team size | .23 | .07 | .10 | .20 | .05 | .12 |
| Functional department | -.21 | -.09 | -.07 | -.10 | .01 | .06 |
| Managerial coaching | | .69 *** | .47 ** | | .64 *** | .19 |
| Diagnostic use of MCS | | | .05 | | | .14 |
| Interactive use of MCS | | | .23 | | | .45 * |
| R^2 | .12 | .55 | .58 | .06 | .43 | .56 |
| ΔR^2 | | .43 | .03 | | .37 | .12 |
| ΔF | | 44.92 *** | 1.52 | | 31.02 *** | 6.21 ** |

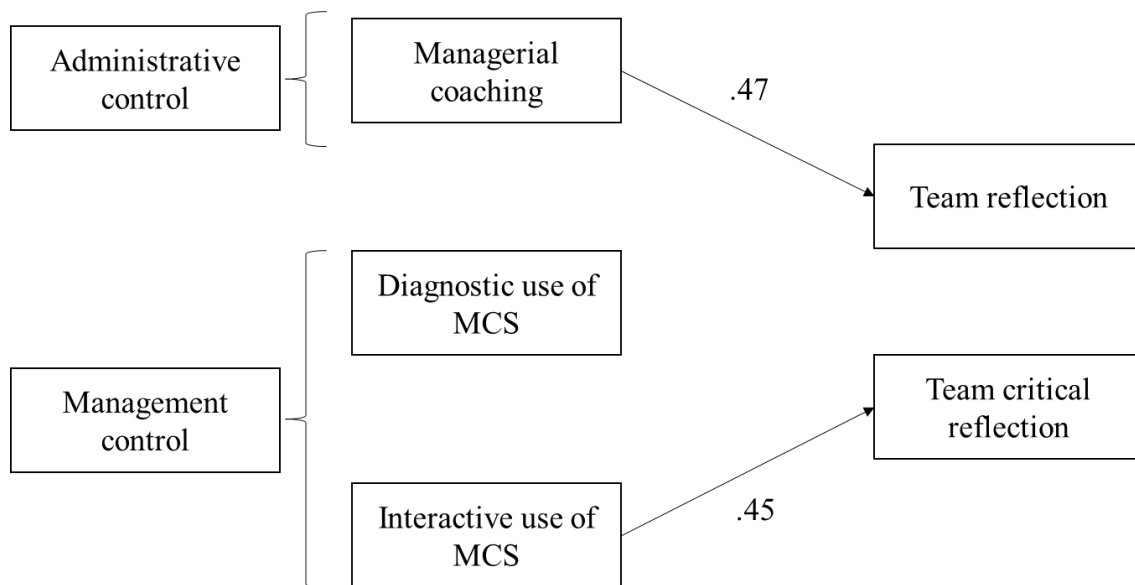
Note: N=50; Functional department (1 = administrative, 2 = R&D); * $p < .05$, ** $p < .01$; *** $p < .001$; Maximam VIF = 3.49

Table 3 shows the results of the hierarchical regression analyses, which estimate the effects of managerial coaching and the two types of managerial control on team reflection and critical team reflection. Hypothesis 1 predicted that diagnostic use of MCS would positively influence team reflection. However, the results showed that there was no significant relationship between these factors ($\beta = 0.05$, ns). Thus, hypothesis 1 was not supported. Hypothesis 2 states that interactive use of MCS positively influences critical reflection in teams. Table 3 shows that there was a significant positive relationship between these factors ($\beta = 0.45$, $p < 0.05$). Thus, hypothesis 2 was supported. Hypothesis 3 states that managerial coaching positively influences team reflection. As shown in Table 3, managerial coaching was positively related to team reflection ($\beta = 0.47$, $p < 0.01$). Thus, hypothesis 3 was also supported. Although no such hypotheses were proposed, Table 3 indicates that there was no significant relationship between the interactive use of MCS and team reflection, or between managerial coaching and critical team reflection.

Discussion

Previous studies have investigated the effects of MCS at the corporate level (e.g., Bisbe and Malagueno, 2009; Henri, 2006), while only a few studies have applied the use of MCS at the team or unit management level (e.g., Sakka et al., 2013; Marginson, 2002). The main objective of our study was to investigate the relative effects of managerial coaching, as well as diagnostic and interactive uses of MCS on reflection and critical reflection in teams. As shown in Figure 2, we have found that interactive MCS had a positive influence on critical team reflection, whereas diagnostic MCS had no significant influence on reflection or critical reflection in the teams. We also identified a positive relationship between managerial coaching and team reflection. The present research may contribute to the existing literature by identifying roles for MCS in terms of reflection at the team level.

Figure 2 Summary of Results



Note: The effects of team size and functional department were controlled.

Theoretical Implications

This study has some theoretical implications. First, interactive MCS promote critical team reflection, probably because this control system may provide managers with the opportunity to debate and challenge underlying assumptions, and to stimulate dialogue and learning within teams (Artto et al., 2011; Simons, 1995, 2000). It should be noted that interactive MCS had no substantial effect on team reflection. Reflection relates to single-loop learning while critical reflection corresponds to double-loop learning (Argyris, 1991; Cunliffe, 2004); therefore, the results suggest that the main role of interactive MCS is to promote double-loop learning rather than single-loop learning.

Second, managerial coaching has a positive impact on team reflection, which seems to be due to its facilitative function through listening and questioning (Hooijberg & Lane, 2009). As Heslin et al. (2006) argued, when managers encourage employees to explore new ways to solve problems and enhance their performance, reflection may be enhanced within the team. The results suggest that MCS should be managed as a package (Malmi and Brown, 2008; O'Grady and Akroyd, 2016), which should include managerial coaching, which in turn plays a complementary role as an administrative control in promoting team learning. However, it is important to note that the effect of managerial coaching was limited to reflection on regular work processes within the team. This implies that managerial coaching is effective only for single-loop learning.

Third, diagnostic MCS do not have a significant effect on team reflection when managerial coaching was controlled. This finding is consistent with that of Chong and Mahama (2014), who reported that diagnostic use of budgets had no positive impact on collective efficacy or team

effectiveness. The results indicate that diagnostic MCS can be replaced by managerial coaching to facilitate reflection within a team. That is, the characteristics of diagnostic MCS such as monitoring outcomes and correcting deviations from predetermined standards may be implemented through managerial coaching. This research suggests that a skillful manager's use of an interactive MCS and coaching may be significant contributing factors to improving the organization's dynamic capabilities (Augier and Teece, 2009; Teece, Pisano, and Shuen, 1997; Winter, 2003).

Practical Implications

The present research has some practical implications for using management control systems. First, organizations should note that management control systems can be applied not only at the organizational level, but also at the team level. Of the two types of MCS, interactive MCS are more effective than diagnostic MCS in promoting reflection within a team. Specifically, it is important that managers use performance measures in discussing assumptions or action plans with a common view, through which double-loop learning may be achieved.

Second, managers need to recognize managerial coaching as an administrative control that complements the interactive use of MCS in promoting reflective activities within a team. Although many managers tend to focus on diagnostic MCS to achieve short-term goals, managerial coaching is more effective than a diagnostic MCS in solving problems in everyday tasks. This study suggests that MCS should be used interactively, in combination with managerial coaching, to facilitate reflection within a team.

Third, organizations have to develop training programs in which participants learn how to use MCS interactively to examine taken-for-granted assumptions critically within a team, and how to conduct coaching to encourage team members to reflect on immediate tasks. It is important for managers to understand the complementary relationships between interactive use of MCS and managerial coaching in promoting reflection in the workplace.

Limitations and Future Research

While this study contributes to the general understanding of relationships among MCS, managerial coaching, and reflection in teams, its limitations must be taken into account when interpreting the results. First, as this study used data from employees of a Japanese automotive supplier, the results may have been influenced by the Japanese management style, in which employees are required to think in a reflective way. Thus, this model should be tested further in other cultures and industries to assess its viability in future research.

Second, the effect of team size and functional department were examined as a control variable due to the limited sample size. Given that team dynamics can vary in terms of size and functional roles, future research should investigate the moderating effects of these team characteristics on the relationship between managerial coaching, management controls, reflection, and critical reflection.

Third, this study did not examine belief or boundary systems in the four MCS categories (Simons, 1994). Given the unique nature of Japanese management style, belief systems may play important roles in inspiring employees to commit to team and organizational goals. Thus,

additional research is needed to investigate relationships between belief systems and diagnostic and interactive use of MCS in enhancing team learning. In particular, it may be interesting to examine the complementary relationships between Japanese management culture, managerial coaching, and MCS types.

Fourth, in the present study, it was assumed that reflection and critical reflection may lead to learning outcomes or affect the performance of the teams, but we did not actually examine those relationships. Future research should incorporate learning-related factors, such as innovation, creativity, entrepreneurship, and product development success, into the research model.

Finally, although in the present research we found a positive impact of managerial coaching on reflection within a team, there is a possibility that coaching from managers may cause negative emotional responses, such as fear (Smith and Northcott, 2012). It is an interesting research theme to examine the effects of managerial coaching with MCS on emotional aspects of accounting practices (e.g., Sawabe, Yoshikawa, and Shinohara, 2010).

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