

**Diagnostic and Interactive use of PMM by Japanese local governments: Does the context affect the fitness of use?**

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**Abstract**

Efforts to 'reinvent' government have emphasized the importance of performance measurement and management (PMM) systems to improve government operations. Although it seems clear why organizations adopt PMM systems, less is known about their actual consequences. This study, using a survey to Japanese local government departments, explores whether different uses of PMM and their interaction with the context (predictability and bureaucratic culture) can affect the impact of PMM on organizational performance. Results show that using PMM, not only having it, is not enough to generate performance improvements. It is shown that fitness of use to the local government context is the way to foster performance. A strong bureaucratic culture shows a positive relation with performance in the Japanese setting.

**Key words:** Performance measurement and management, diagnostic and interactive use, Japanese local governments, bureaucratic culture, predictability.

**Words: 8.200** (excluding abstract, references, tables and figures)

## **1. Introduction**

During recent decades, performance measurement and management (PMM) systems have become a cornerstone of public sector reforms, preceding and outliving the New Public Management (NPM) (Moynihan & Pandey, 2010). The NPM was aimed at creating a system of performance management where politicians set goals and allow managers a certain level of discretion in exchange of monitoring (O'Toole & Meier, 2015; Pollitt, 2011). PMM was one of the tools implemented to reduce the implosion of the unsustainable, oversized, bureaucratic and procedural governments (George, Baekgaard, Decramer, Audenaert, & Goeminne, 2018).

Besides the countless efforts to implement PMM systems in the belief that they will enhance public sector performance, there have been few comprehensive impact reviews (Gerrish, 2016), while criticisms of its actual effectiveness have never been more potent (George et al., 2018; Ma, 2017). Moreover, in many cases a negative effect has been noted (Gerrish, 2016; Ma, 2017; Moynihan, 2009; Nitzl, Sicilia, & Steccolini, 2018; Taylor, 2020).

From a theoretical point of view, it seems clear why organizations adopt PMM systems - to support decisions by managers and policymakers, to drive learning behaviors of organizational members, and to give account to external stakeholders- (van Dooren, Bouckaert, & Halligan, 2015; Vogel & Hattke, 2018), but less is known about how to improve their impact (Walker, Damanpour, & Devece, 2011). As a result the field of public management is focused on analyzing when and under what conditions management and managerial tools affect organizational performance (Lee, 2020; Meier & O'Toole, 2013; Vakkuri, 2010). There has been a shift towards studying how these tools are used in practice and which the drivers of purposeful use are (Kim, Johansen, & Zhu, 2019; Kroll, 2015; Moynihan & Pandey, 2010; Vogel & Hattke, 2018). Analyzing how PMM systems are used in public institutions becomes key (Lee, 2020). Without a purposeful use, PMM is a waste rather than a fruitful investment.

The literature recognizes that PMM systems may be used for different purposes (Miller & Power, 2013; van Dooren et al., 2015; Verbeeten & Speklé, 2015), and that those uses need to be studied (Moynihan & Kroll, 2016). This literature also acknowledges that purposeful use depends on different factors (Kim et al., 2019). The aim of this paper is to understand how to foster organizational performance through the use of PMM considering the influence of the context. It combines the study of type of use -the diagnostic and interactive uses of management control systems (Simons, 1990)- and context (predictability and bureaucratic culture). It is acknowledged that the impact of PMM is contingent not only upon its use but upon the way it is used (Bititci, Garengo, Dörfler, & Nudurupati, 2012; Speklé & Verbeeten, 2014; Tuomela, 2005; Vogel & Hattke, 2018) and the context in which it is used (Andrews, Boyne, & Enticott, 2006; O'Toole & Meier, 2015; Speklé & Verbeeten, 2014). Performance routines interact with a wide variety of contextual variables that generate diverse impacts (Moynihan, 2009). Thus, we analyze the direct impact of different uses of PMM over perceived performance, but, in addition, we examine whether the influence of the type of use is mediated by the context. We aim to contribute practical knowledge by analyzing, in the Japanese setting, if, in a given context, one specific use of PMM is more effective.

This study is carried out in the Japanese setting for several reasons. Japan has a highly bureaucratic culture (Tun & Muto, 1995), similarly to Germany, and aims to correct and preserve bureaucracy rather than to eliminate it. In Japan, local governments were recommended, rather than forced, to implement PMM, however, they reached an implementation ratio close to 100% (MIC, 2017). They have similar administrative structures which give certain commonalities to the environment under study, while, at the same time, there is also certain discretion about the PMM model used. Not all local governments have impactful results, and this lack of results has become an important managerial issue.

## **2. Theory development**

Public management theory prescriptions are contingent rather than universal, as they state that the same tool or reform may succeed or fail when the context varies (O'Toole & Meier, 1999; Walker & Enticott, 2004). To explore the impact on organizational performance of PMM, we focus on PMM use and context (predictability and culture), assuming that they may directly influence performance but that there could be a more important mediating effect of the use and the context (see Figure 1). In the following lines, firstly performance uses are explored based on Simons (1990) uses, then the contextual factors are introduced, and finally, the interactions between context and use are reviewed.

## **2.1. Performance measurement and management uses**

Management control mechanisms are formalized procedures and systems that aim to use information to maintain or alter patterns of organizational activity. Use is particularly important because public organizations may adopt an innovation in search of legitimacy without using it (Walker et al., 2011). There is extensive literature that acknowledges that PMM systems serve a variety of purposes (Franco-Santos et al., 2007; Hansen & Van der Stede, 2004; Kim et al., 2019; Moynihan, 2009; Sakka, Barki, & Côté, 2013; Speklé & Verbeeten, 2014). This variety of uses generates differentiated performance impacts (Ma, 2017). For the purpose of this study, we focus on the diagnostic and interactive uses of Simons 'Levers of control' framework (Simons, 1990, 1995, 2000).

The levers of control framework posits that four control systems, – beliefs (e.g., core values), boundary (e.g., behavioral constraints), diagnostic (e.g., monitoring), and interactive (e.g., forward- looking), work together in an organization (Simons, 1995; Widener, 2007). These systems operate as opposing forces that manage organizational tensions, as positive forces are interactive controls and belief systems and as negative forces are diagnosis controls and boundaries systems (Simons, 1995; Tessier & Otley, 2012). Positive controls promote creativity while negative ones ensure predictability, neither of these roles are bad (Tessier & Otley, 2012). When attention is focused on a specific managerial tool as PMM, as shown in Toumela (2005),

Tessier and Otley (2012) and Sakka et al (2013), diagnostic and interactive controls represent a description of how a PMM system is used in practice. Interactive systems are used to react strategically and to learn from organizational problems through a continuous dialogue (Simons, 1991, 1995). Diagnostic systems are formal control systems which are used to ascertain that people behave according to preset goals or to track the progress.

The interactive use represents an enabling control that promotes creativity, flexibility and change management (Sakka et al., 2013; Tessier & Otley, 2012). The main objectives of this type of use are: to identify sources of uncertainty, to challenge initial plans, if necessary, and to encourage the proposal of new ideas (Sakka et al., 2013). It represents the use of PMM to capture the whole breadth of uncertainties and to pinpoint problems with specific uncertainties (Tuomela, 2005). Interactive controls facilitate and promote communication, focus attention on key objectives and promote double-loop learning (Adler & Chen, 2011). By contrast, the diagnostic use corresponds to the traditional monitoring role attributed to formal control mechanisms. It aims to ensure that predetermined objectives are met and that corrective actions are taken whenever a gap between planned and actual results is detected (Sakka et al., 2013; Tuomela, 2005). It reports information on the success factors and allows managers to focus on the key organizational drivers to carry out the organizational strategy (Widener, 2007).

In order to analyze whether a specific PMM use (diagnostic or interactive use) in a given context affects the performance, rather than focusing on the definition of beliefs (shared values, purposes and direction) and boundaries systems (formally stated limits and rules) (Simons, 1994), we focus on a different definition of context, based on the concepts of predictability and bureaucratic culture. As will be explained below, they reflect to a greater extent the particularities of a local government department.

Prior to introducing the contextual factors, our first hypothesis is based on the common agreement that the primary purpose of PM is to improve performance (Heinrich, 2002; Kim et al., 2019; Moynihan, 2009; Poister, Pasha, & Edwards, 2013; Walker et al., 2011).

*H1: PMM use (either diagnostic or interactive) is positively associated with organizational performance.*

## **2.2. The influence of the context on use and performance**

Performance achievements are dependent on the context (Grossi, Dobija, & Strzelczyk, 2020; O'Toole & Meier, 2015). Results-based reforms aim to create new performance routines that are going to interact with other institutions and individual preferences (Moynihan, 2009). Organizational context results in control systems being used differently by managers (Simons, 1994). When the aim is to explain a management reform, it is necessary to take account of the complexity, uncertainty, and munificence of the internal and external context (Walker & Enticott, 2004). Managers are affected by circumstances that require them to make trade-offs not only among the circumstances faced but also among the information systems used (Hansen & Van der Stede, 2004).

Context was defined by Johns (2006) as situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables. This paper focuses on two key characteristics of the context of local government departments: predictability and bureaucratic culture. The former measures the level of certainty of the activities to be carried out and its measurability, while the latter reflects the administrative culture of Japanese local governments, as it has traditionally been considered as an element influencing public reforms (Pina, Torres, & Yetano, 2009). Predictability and bureaucratic culture are not the only contextual factors (see O'Toole & Meier, 2015), but their study is key to understanding the relationship between contextual variables and the use of PMM<sup>1</sup>. This is particularly important in an environment where strategy (Simons, 1991, 1994, 1995) and contractibility (Speklé & Verbeeten, 2014) are not as relevant as in other contexts.

### **2.2.1 Predictability in local governments**

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<sup>1</sup> See Moynihan (2009) for an extended explanation of mediating variables creating first-order and second-order effects over performance management implementation.

Public institutions are often driven by multiple, ambiguous and potentially contradictory goals that create difficulties in defining results-oriented control mechanisms (Carlin & Guthrie, 2001; Chun & Rainey, 2005). Predictability represents the capacity of the local government departments to predict the likely outcomes of alternative courses of action (see Speklé and Verbeeten, 2004). In addition, as local government departments are the units of study, it includes the capacity to predict what top management of the organization will ask from each department.

Predictability is divided into three elements: uncertainty, ambiguity and complexity. The distinction is not terminological but depends on the source of the predictability as analyzed in the study. Uncertainty is related to the external environment of the department and deals with circumstances beyond its control. Also known as turbulence, it represents the capacity to anticipate externally-produced changes that affect managerial activities (O'Toole & Meier, 2015). It includes circumstances imposed on departments, such as the general policy of the local government. Ambiguity and complexity are factors related to the internal environment. Ambiguity represents the way of functioning of a department. Ambiguity, called clarity of goals by Speklé and Verbeeten (2014), evaluates whether the department has clear objectives and goals. Although public sector goals are often ambiguous, there may be entities or departments that have a univocal mission statement with specific and detailed goals. Finally, complexity refers to the tasks carried out by each department, called knowledge of transformation processes and measurability of goals by Speklé and Verbeeten (2014). It reflects that some tasks have a greater level of standardization, so the way to proceed is clearer as well as how to measure them. Environments with complexity pose challenges for public managers as they reduce the standardization and measurability. Some tasks are more compatible with performance management than others (Moynihan & Pandey, 2010).

Uncertainties in the environment, rapid changes and unpredictability are all likely to reduce organizational performance. O'Toole and Meier (2015) indicate that goal ambiguity increases managerial difficulties and can reduce performance. Clear and measurable goals contribute to



performance (Speklé and Verbeeten, 2014), while complex programs can make measurement more difficult (see Moynihan, 2009). In the following hypothesis, this paper proposes that organizational performance is affected by predictability in a positive way.

*H2p High (low) predictability increases (decreases) the performance of the organization.*

### **2.2.2. The bureaucratic culture of Japanese local governments**

The term bureaucratic culture refers to the administrative style of Japanese local governments, assuming that each country has a set of characteristics that defines a particular public administration style (Pollitt and Bouckaert, 2011, 2017). Research on public reforms has shown that public administration culture matters and that the existence of a dominant administrative culture in each country is moderated in each particular entity or decision-making unit (Pina, Torres, & Royo, 2007; Pina et al., 2009; Pollitt & Bouckaert, 2011, 2017). Organizational culture can be the driver or the barrier to adopt or adapt performance measures (Moynihan, 2009). Thus, in the following lines, the characteristics of the Japanese administrative culture are explored, which is expected to have a different strength in each unit.

As a result of the Japanese unitary system, all municipalities have similar municipal structures, regardless of location and size (Miyazaki, 2014; Suzuki & Avellaneda, 2018; Suzuki & Sakuwa, 2016), have experienced similar institutional change, and have dealt with similar historical and macroeconomic factors (Suzuki & Han, 2019). The Japanese governmental system is organized in two layers: central government and local governments<sup>2</sup>. There are 1,774 municipalities which manage 51.7 percent of the public expenditure. The government is highly centralized and its public administration culture was influenced by the French and Prussian legal models before World War II (Sato, 2002). The Ministry of Internal Affairs and Communication (MIC) monitors local governments country wide (Miyazaki, 2014). In order to provide the same

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<sup>2</sup> See Kobayashi et al (2016), Suzuki and Han (Suzuki & Han, 2019), Suzuki and Avellaneda (Suzuki & Avellaneda, 2018), Suzuki and Sakuwa (2016), Miyazaki (2014) and Council of Local Authorities for International Relations (2013) for a detailed explanation of the Japanese system.

standard of local services across the country, central government makes financial adjustments by distributing part of the national tax to local governments (Suzuki & Sakuwa, 2016) In fact, local governments heavily rely, with a few exceptions, on central government funding (Suzuki & Han, 2019). The Japanese public sector embraces the ethos of bureaucratic structure, hierarchy, specialization, rules and regulations, complex structures, technology, and big size, where most public employees are aware of the senior and junior relationships (Tun & Muto, 1995). The Japanese view of these relationships is one of mutual interdependence, where the success of one party in the relationship depends on the support of the other (Tun & Muto, 1995). The majority of public sector employees are civil servants, ruled by public law, and usually work in the same entity until their retirement.

Until the middle of the 1990s, Japan was conservative with respect to NPM (Guthrie, Olson, & Humphrey, 1999; Kobayashi, Yamamoto, & Ishikawa, 2016). Economic growth and the good financial situation of the government before that time prevented interest in NPM. Since then, the economic recession, a worsened the financial situation of the government, and new challenges, such as, the rapid decrease of the birthrate and the aging of the population, increased interest in NPM-type reforms. Japanese local governments were not obliged to implement PMM. However, the MIC, the Board of Audit, the Cabinet Office, and other central government entities recommend local governments to implement evaluation systems for effective budgeting formulation and accountability. The central government has provided information about excellent cases of PMM implementation, without requiring a standard PMM model. As a result, while the evaluation of economy, efficiency and effectiveness has become commonplace, through an isomorphism process (Fujiwara & Matsuo, 2013), the number of projects to be evaluated, the evaluation units, the criteria, the measurement processes, the linkage with the budget formation, and the information to be disclosed varies to a great extent. Nowadays, the majority of local governments, all of the 47 prefectures, 95% of the largest cities and 85% percent of the medium and small cities, have implemented some kind of PMM (MIC, 2017). Similarly

to accrual basis accounting, central government recommendations have had a high level of adoption (Kobayashi et al., 2016).

The PMM systems implemented in Japan have commonalities. In all cases, PMM is used for what is called “administrative evaluation”. These evaluations are focused on the mid/long-term city plan and monitor departmental programs or projects (e.g. library service, garbage collection service). At municipal level, the planning system to which PMM is linked can be classified as Zimuzigyou (dealing with several hundred programs), Sesaku (about one hundred programs) and Seisaku (tens of programs). Though the style of evaluation depends on each local government, inputs, outputs, and outcomes are evaluated generally. Each evaluation uses financial indicators, such as budgetary and cost indicators, and non-financial indicators, such as output, outcomes and qualitative indicators. Usually, each department self-assesses its projects and/or programs. Later, the report is analyzed by the city evaluation committee which, in some cities, is external. Finally, results are reported to Congress and are aimed to be disclosed to citizens at local government level. However, the level of reporting and the measures used varies a lot among local governments, making comparisons of reported local government performance a difficult exercise and/or a rare example.

PMM systems are implemented to support the emergence of a ‘results-oriented culture’ which seems to be opposed to a traditional and low innovative bureaucratic context that is more input-control oriented and has been portrayed as restrictive and wasteful (Pollitt & Bouckaert, 2011). However, in each organization flexibility may increase or decrease according to the circumstances. On the negative side, it is argued that rules and procedures create bureaucratic rigidity, frustrate responsiveness, stifle creativity and are detrimental to a focus on results (Løgreid, Roness, & Rubecksen, 2012; Verbeeten & Speklé, 2015). From this point of view, the level of bureaucratization of the administrative culture can negatively affect the performance of the organization. However, Verbeeten and Speklé (2015) found that reliance on rules contributes positively to a results-oriented culture. The purpose of rules and regulations is to inform

employees about the acceptable domain, (Simons, 1995). Accordingly, rules and procedures can facilitate task performance rather than create bureaucratic red tape (Verbeeten & Speklé, 2015). Similarly, Bourdeaux and Chikoto (2008), Dull (2009) and Moynihan and Pandey (2010) highlight that the existence of basic bureaucratic competence and expertise in performance management is associated with the use of PMM. In sum, the existence of a bureaucratic culture has been associated with greater and lower performance (Brewer & Walker, 2010, 2012). Given these contradictory findings, our third hypothesis does not anticipate the sign. The hypothesis posed is:

*H2c The level of bureaucratization of the administrative culture of each department affects the performance of the organization.*

### **2.3 The context and PMM use: does the fitness of use exist?**

Figure 1 shows our theoretical model and displays the possible relationships between the use of PMM, the context (predictability and bureaucratic culture) and performance. As argued by Kim et al (2019), we pose that the impact of PMM use may diverge due to variations in organizational context, but also due to the type of use given to PMM.

#### **INSERT FIGURE 1**

An environment with low predictability will be characterized by uncertainty about the objectives to be carried out, ambiguity with regards to the goals to be attained and complexity to measure the tasks. Uncertainty, ambiguity and complexity are characteristics of the activities of local government departments that create an environment where greater flexibility seems to be required. The literature highlights that, when objectives are complex and ambiguous, when circumstances are continuously changing and when the organization cannot fall back on routines, the decision-facilitating role of the interactive use of PMM is especially important (Verbeeten & Speklé, 2015). Moreover, interactive use has been found to have a positive effect on performance in settings characterized by innovation and change (Bedford, 2015). By contrast, high

predictability implies certainty about the mission, goals and measures to be used. Interactive systems are not beneficial when more standardized activities are needed (Simons, 2000). Diagnostic systems are more useful when goals are clearly defined and communicated, as they help to direct attention toward desired outcomes (Bedford, 2015). In these cases, normal operating activities may be disrupted by interactive controls because subordinates are encouraged to frequently challenge established procedures (Chenhall & Morris, 1995), while a diagnostic use encourages subordinates to search for performance improvements within a limited space (Mundy, 2010). Diagnostic use is a constraining control that aims to reduce options and thus increases predictability (Tessier & Otley, 2012). Thus, predictability fits with a diagnosis use that will foster the performance of the organization.

*H3p Emphasis on diagnostic (interactive) use has a positive association with performance in environments with high (low) predictability.*

The effectiveness of PMM systems may be moderated by internal contingencies such as the employees' experience and the organization's strategic orientation, structure, information systems, and management style. Thus, it is expected to find departments where the bureaucratic environment is softer or stronger. As highlighted by Vogel and Hattke (2018) public managers may create more informal and softer forms of bureaucracy than the mere use of hierarchical power and authority. Diagnostic systems act as a constraint on employee behavior (Bisbe, Batista-Foguet, & Chenhall, 2007; Simons, 2000), similarly to the aim of bureaucratic cultures that tend to solve uncertainty avoidance through rules and standardized procedures (Hofstede, 2001; Pollitt & Bouckaert, 2011). By contrast, in a bureaucratic setting, an interactive use that continuously debates assumptions will undermine the validity and motivational potential of performance objectives (Bedford, 2015). Thus, diagnostic use seems to fit with environments with a stronger bureaucratic culture. Our last hypothesis is:

*H3c Emphasis on diagnostic (interactive) use has a positive association with performance in environments with strong (soft) bureaucracy.*

### **3. Methodology**

Our analysis is based on a survey sent to managers of Japanese local government departments. The business unit of analysis are local government departments, their managers and their use of PMM systems. Local governments are multipurpose authorities, thus, their PMM systems, their level of use and performance itself may vary among departments (Yetano, 2013). Moreover, evaluating the use of PMM at municipal level will have introduced greater subjectivity in the answers of respondents that would have had also affected the common source bias problem (see below). We did not focus on a specific definition of performance measurement and management, as argued by Vakkuri (2010), management instruments do not remain the same, so sticking to a definition may be problematic. Thus, a formal definition was considered less appropriate than statements based on the literature about performance measurement management, as they do not require a direct general judgment of whether PMM is used or not. The survey data were collected during April and May 2015. The questionnaire was sent to 813 cities<sup>3</sup>, to 8 different departments in each local government (a total of 6,504 departments were surveyed). The number of respondents was 1,227 from 532 different cities, which represent 18.9% of the departments and 65.4% of the cities. On average, 2.3 departments answered in each city. Table 1 shows the descriptive information of the respondents. For the Hierarchical Linear Model analysis in Tables 5, there were 918 and 917 valid responses respectively, due to missing values.

#### **INSERT TABLE 1**

Tables 2 and 3 show the information captured with the questionnaire grouped by constructs. The survey instrument was developed following previous studies (see Bisbe & Otley, 2004; Speklé & Verbeeten, 2014). Before carrying out the survey, the questionnaire was presented to

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<sup>3</sup> Cities were selected as the ratio of PMM implementation is 84.9%, Towns and villages were discarded as the implementation ration is much lower (38.9%) (MIC, 2017). The departments analyzed were Disaster Recovery Support and Risk Management; Culture and Sports Affairs; Industrial and Labor Affairs; Child affairs; Regional Cooperation and Community support; Urban Development and Construction; Environment, Public Cleaning and Health and Welfare

other academics as well as to five local government departments, and the questions were clarified and reworded following their recommendations. In addition to the control variables –employees and population- the type of the department was also analyzed, but no significant differences were found.

### **INSERT TABLE 2 - TABLE 3**

The questionnaire was used to create multidimensional constructs (Edwards, 2001) that measure perceived performance, diagnostic and interactive uses, predictability (uncertainty, ambiguity and complexity) and the bureaucratic culture. It should be acknowledged that respondents were not directly presented the concepts but a series of statements based on the literature. Each construct is a composite of several questions that form the construct by aggregation with equal weight. An item was excluded from the construct if it did not reach a coefficient higher than 0.3. In short, aggregate or formative constructs have been used.

Using employees' perceptions can result in common source bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Vogel & Hattke, 2018), especially in this case as the analysis uses a survey of managers both to ascertain the level of organizational performance and to collect information about management practices. When using managers self-assessments of performance, benefits need to be weighed against the costs (Meier & O'Toole, 2013), but, as Moynihan and Pandey (2005) noted, the existence of common-source bias does not necessarily invalidate the empirical findings when employing self-reported data (see George & Pandey, 2017). In our case, the survey gives at least informative data about performance use and results in the Japanese local government sector and there is no other source to obtain this information from. Although this bias can inflate the relationships, in order to capture a large number of comparable individual responses on items difficult to observe, survey-based approaches are key (Moynihan & Pandey, 2010). Thus, interpretations need to be done with caution, but results represent an important starting point. Additionally, several recommendations have been followed. With regards to the questionnaire, respondents' anonymity has been ensured and most

variables have been measured with a Likert scale of 7 points, a combination of the scale and dichotomy variables has been used for “performance use” (see below), and concepts have been divided into several questions reducing one possibility into simpler and more focused questions. Moreover, the factor analysis has shown that not all questions are grouped in just one factor and Heckman model has been used.

### ***Performance***

The dependent variable of the model is perceived performance. The questionnaire considers results and capacity to perform as perceived by managers. Although, managers views identify individual routines, as their routines affect departmental performance this study can be considered a proxy to that perceived performance (Johnsen et al., 2019). Managers were asked to compare their situation with similar departments, as in Speklé and Verbeeten (2014), Verbeeten (2008) and Williams et al. (1990). In this study, the construct of performance not only includes productivity, efficiency and accuracy, but also managerial performance. A seven-point Likert scale was used (1 = far below average; 7 = far above average). Table 2 shows the descriptive analysis for each of the elements of this variable. The Cronbach alpha for this construct is 0.942.

### ***Type of use of PMM***

Local government departments were asked whether they used PMM for a series of activities related to the different uses that PMM can have, including the incentive use. Within the questionnaire there was no distinction between diagnosis or interactive use, but a list of activities and the type of measures used for each of them as defined in the theoretical section (see Table 3). A seven-point Likert scale was used to measure the level of use of PMM for each activity (1 = far below average; 7 = far above average) and, for each of the three types of information (input/process/outcome), a dichotomic variable was used (1 = use; 0 = no use). The analysis of the performance measures identifies which are the control targets established and thus what processes performance management is trying to influence (Vogel & Hattke, 2018). Table 2 shows



the descriptive analysis for the items. In order to put all the information about the level of use and the type of information in one variable, firstly, we homogenized the information about the level of use to vary from 0-1. The final variable varies from 0 to 4 and includes the level of use and the three types of measure used for a certain process.

The preliminary assumption, that processes 1 to 5 were related to diagnostic use and processes 6 to 14 to interactive use, was confirmed through factor analysis. In addition, the lack of importance of incentive processes - 15 and 16 – for Japanese local government departments was confirmed by the floor effect<sup>4</sup>. The correlation coefficient is 0.292 (p value <0.001) for diagnostic use, and 0.282 (p value <0.001) for interactive use. In the models, special attention has been paid to the VIF coefficients to avoid multicollinearity problems. The Cronbach alpha is for diagnostic use 0.928 and for interactive use 0.940.

### ***Predictability***

It consists of three constructs, uncertainty, ambiguity, and complexity. The three elements that make up predictability were measured considering the characteristics given in the theoretical framework. Uncertainty is measured with 6 items, ambiguity is measured with 5 items, and complexity is measured with 10 items (see Table 3). Respondents were asked to indicate the situation of their unit in each dimension, using a seven-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree). Prior to elaborating the constructs, a factor analysis was carried out with the results to confirm that the grouping of statements for each element of predictability was supported by the data. All the items of ambiguity and items 1 to 8 of complexity were reversed. We eliminated the 5<sup>th</sup> item of uncertainty and the 8<sup>th</sup> item of complexity because the correlation coefficients with the other items within the construct were lower than 0.3. We calculated each construct by taking the average of the item scores. Table 3 shows descriptive analysis of

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<sup>4</sup> Results of this analysis have not been included due to the length of the paper but can be provided by the authors on demand.

predictability. The cronbach alpha for **un**predictability is 0.825, for uncertainty 0.754, for ambiguity 0.880, and for complexity 0.755.

### ***Bureacratization level***

Considering the characteristics of the Japanese bureaucracy, respondents were asked to rate, using a seven-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree), the level of alignment of their department with these characteristics (see Table 3). The cronbach alpha for bureaucratic culture is 0.865.

### ***Control variables***

The study has considered the following control variables: the department size (number of employees), city size (population), operating expense ratio, and aging ratio (population over 65 ratio). For population variables, the logarithm has been used. The operating expense ratio is the average for 2012-2014 of current revenue to current expenditure ratio. Current expenditures included labor costs, ordinary social welfare costs, debt repayment. Aging ratio is the population over 65 year of the total population.

### ***Model estimation***

As the questionnaire was sent to several departments of each city prior to the estimation model, a Heckman's two-step estimation model has been carried out (Dull, 2009). This allowed evaluating whether each department could be analyzed independently and, so, the participant departments of each cities did not need to be aggregated. Results of the Heckman estimation showed that departments could be analyzed as independent units. It is important to highlight that results confirm that it is appropriate to carry out this study at departmental level as there are different behaviors within a city. Once it was confirmed that there is not selection bias, Hierarchical Linear Modeling (HLM) has been used. Results of the models are shown in Tables 5.

HLM allowed us to input the interaction variables hierarchically into the model. This technique not only tests the existence of the main effect and the combined effect, but also shows how the significance of the model changes in each interaction. The first group of regressions includes predictability as an individual concept (models 1A and 1B) while the second group divides it into its three elements –uncertainty, ambiguity and complexity- (models 2A and 2B). The sequence followed to introduce the independent variables was: firstly, the introduction of the direct effects of use and context and, secondly, the introduction of the combined effects.

#### **4. Analysis of results**

Table 4 shows the descriptive analysis of the constructs. Performance, uncertainty and bureaucratic culture have the highest averages, the last one especially, but it also has the greatest standard deviation. Ambiguity has the lowest averages and also one of the highest standard deviations.

#### **INSERT TABLE 4**

HML results are show in Table 5. It is divided into model 1A and 2A, which only test direct effects, and model 1B and 2B, which also include combined effects. Models 1A and 1B show that contextual variables have a direct effect on performance. Thus, results of model 1 confirm H2 for predictability and culture. Performance decreases with low predictability (H2p) and increases with a strong bureaucratic culture (H2c), so the sign of the hypotheses should be positive. In addition, both models show that the mere use of PMM does not foster performance, whether it is used diagnostically or interactively. In model 1B, there were no combined effects (H3c/p). The combined effects only appear when predictability is divided in its different components. Model 2 shows that two components of predictability, the internal ones –ambiguity and complexity- have a negative direct effect on performance (H2p), while bureaucratic culture has a positive one. Both models also show that the mere use of PMM does not produce results. When combined effects are introduced, there is a slight improvement of in model significance. Uncertainty and interactive use have a combined positive effect on performance (H3p).

Ambiguity only shows a direct effect. Complexity and diagnostic use show a combined positive on performance (H3p), this effect is also positive for bureaucratic culture and diagnostic use (H3c). These results confirm that fitness of use helps to attain better performance with PMM. Table 7 summarizes the hypotheses tested in the study. As can be seen, the hypotheses related with predictability are confirmed for the direct effect as a global construct and for two of its components (ambiguity and complexity), while the mediate effects are only confirmed if components are separated and for two of them (uncertainty and complexity). Figure 2 shows the mediating effects for those pairs of variables that are significant. As an example, it can be seen, for type of use and uncertainty, that high uncertainty improves performance with low diagnosis use and with high interactive use<sup>5</sup>. No control variables show any significance in either of the models, except for the operating expense ratio in model 1B.

## **INSERT TABLE 5 –TABLE 6- FIGURE 2**

### **5. Discussion**

The objective of this paper was to analyze the effect of the use of PMM on the performance of Japanese local government departments, considering the influence of the context. Our starting point was that PMM systems have different types of uses (diagnostic and interactive) and that, depending on the context, one use may be more productive. Previous research has shown a low level of use of PMM systems, despite the great number of implementers (George et al., 2018; Gerrish, 2016) and has focused on identifying the key characteristics of the organizations that use performance measurement (Agasisti et al, 2019; Ammons & Rivenbark, 2008; Torres et al., 2011; Yetano, 2009). It seems clear that the use of performance management systems by itself does not produce results (Gerrish, 2016). The results of this study confirm that, for PMM to make a difference, local governments should consider their context, as argued by Nitzl, et al (2018),

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<sup>5</sup> To validate the graphs of the figure Johnson-Neyman technique has been use as recommended by Bauer et al. (2005).

since not all the types of performance information uses are directly associated with improved performance.

Japanese local governments report actually using, not only having, PMM systems. As shown by Moynihan and Kroll (2016), the passive reporting routines (Moynihan, 2009) related to the reporting apparatus to the Ministry in Japan, have created the appropriate environment or pressure to foster purposeful use. The correlation between the diagnostic and interactive uses confirms that, in practice, it is difficult to totally separate uses because control tools themselves overlap in organizations, and it confirms that organizations need systems to be used interactively and diagnostically (Sakka et al., 2013). The results suggest that these uses tend to reinforce each other, rather than being exclusive. Despite, local governments are using PMM both diagnostically and interactively, it is the fitness of use with the context which produces results. So, in case, managers need to give relevance to a specific use, the context needs to be analyzed. The need of fitness of use, not only the utilization of PMM, may explain why PMM studies report many failures in practice. In fact, context influences performance more than PMM use. Both predictability and bureaucratic culture have a direct effect on performance. Low predictability acts as a barrier to performance, while a strong bureaucratic culture has a positive effect on performance. As shown by Simons (1995), Malmi and Brown (2008), Merchant and Van der Stede (2011), research must consider non-technical aspects such as organizational culture to enrich PMM literature.

The absence of certainty negatively affects performance. However, the analysis of its individual components provides a better picture. The internal factors, ambiguity and complexity, have a negative direct effect on performance while the external uncertainty does not affect performance directly. The negative effect of ambiguity and complexity, shows that these environments pose additional challenges to managers (O'Toole & Meier, 2015). As argued by Moynihan and Kroll (2016), reducing ambiguity by establishing clear goals fosters performance use and its impact. Moreover, ambiguity and complexity may create an environment that hinders

the measurement of performance itself, creating difficulties to understand not only how it should be measured but what good performance should be. The existence of ambiguity and complexity generates problems of PMM validity. As argued by Padovani et al (2010), validity reflects understandability and the need to base measures on a mission statement and clear objectives. Measures must be clear, accurate and credible to internal and external audiences (Sanger, 2008). Thus, the success of PMM is hindered from its inception, rather than from the lack of use or inadequate use.

The strength of the bureaucratic culture has a positive effect on performance. The Japanese case has shown that a centralized system has fostered a high percentage of implementation and that this implementation produces better results in those settings where the bureaucracy is stronger. Rather than acting as a barrier to performance, it acts as a catalyst, confirming that reliance on rules can also contribute to a results-oriented culture (Verbeeten & Speklé, 2015). It confirms that bureaucracy can have positive effects on performance (Brewer & Walker, 2010, 2012). George et al (2018) indicate that institutional pressures for PMM may have a positive impact on its use. It supports why in some bureaucratic environments, such as Japan or Germany, bureaucracy does not have as many negative connotations as in other environments, like Southern-European countries. Bureaucracy can be interpreted as the boundaries system that inform employees about the acceptable domain that orientates their actions towards the required objectives (Simons, 1995), rather than as red tape that creates structural complexity, excessive paperwork and rules as well as task delay (Brewer & Walker, 2012). The observation of law and governmental recommendations, often referred to as the compliance mentality (Hood & Peters, 2004; Lapsley, 1999; Power, 2003), has acted not only as a catalyst for implementation but has also fostered performance. However, this result requires further study as the bureaucratic culture may also affect the way respondents are answering the questionnaire, by avoiding criticizing the performance of the organization.

The context determines which use increases performance, confirming the idea of fit and misfit in Speklé and Verbeeten (2014). Thus, as these authors argued, it is recommendable to have a situation approach to performance management. Similarly, Agasisti et al (Agasisti, Agostino, & Soncin, 2019) show that certain factors determines heterogeneity among PMM systems. Fitness of use appears with uncertainty, complexity and the bureaucratic culture. As hypothesized, uncertainty benefits from flexible models or interactive use which help to identify the sources of uncertainty and encourage new ideas (Sakka et al., 2013), and this combination increases the perceived performance (see Figure 2). The effectiveness of interactive use is confirmed as one way of reducing uncertainty (Davila, 2000). Results did not confirm that uncertainties reduce performance but they show that an interactive use of PMM helps an organization to work with uncertain environments. By contrast, when tasks are complex, close monitoring of processes, typical of a diagnostic use, benefits the performance of the organization (Figure 2). This use creates a constraining control which aims to reduce options and increase predictability (Tessier & Otley, 2012). Diagnostic use becomes useful in an environment with greater complexity. The existence of a strong bureaucratic culture benefits from diagnostic use. In this type of setting, the monitoring role of PMM fits better with the reliance on rules common to bureaucracies.

## **6. Conclusions**

PMM can produce results but increasing performance is not straightforward. PMM use needs to be adapted to the circumstances of each entity, bureaucratic culture and the internal characteristics of the activity of each local government department being elements that have a direct effect on performance. Moreover, depending on the setting, bureaucracy, traditionally seen as contrary to PMM, can help to obtain improvements from PMM use. Fitness of use is key to obtaining results from PMM use. The context, rather than acting as a barrier or a catalyst, only indicates which PMM use is having an impact on performance. However, uses are complementary and the fitness of the use should be balanced with the need of having both

diagnosis and interactive systems. Future studies should deepen on how this balance takes place. Moreover, PMM are not the only control systems, in fact, budgeting systems have a great importance in the public sector, and their interaction with PMM will be crucial to understand PMM impact.

It has been argued that one-size fits-all is not a valuable argument for introducing PMM at local government level, which is in line with contingency theory. This work has identified some of the factors that should be considered to define the tailored solution. As time is limited, local government departments should focus to a greater extent on the use that suits their context. Moreover, professionals should analyze these characteristics before exploring the possibilities of a management control system as its implementation may create expectations that will become frustrated if the preconditions have not been considered.

The high level of adoption of PMM and the type of administrative culture have provided an interesting setting for the study of PMM use. However, it should be acknowledged that the results are based on self-reported performance and use and so they may be biased. Nevertheless, some measures have been taken to reduce this risk and, notwithstanding the limitations, findings shed light on the relationships among PMM use, context and performance. Thus, future studies may need to analyze actual performance, when available, in order to generalize about the results obtained. This will allow to see whether perceptions that show a change of their managerial discourse (Karlsson, 2018), also reflect a change in the use of PMM tools. Current literature highlights the role of top managers and their leadership styles as another crucial ingredient in PMM success (Andrews & Boyne, 2010; Wallace, O'Reilly, Morris, & Deem, 2011). Consequently, combining the analysis of the context, the uses and the type of leadership seems a rational demand for future studies. Finally, future studies should analyze the balance required between the diagnostic control systems and interactive control systems, and need to study to what extent the same management tool is used for both purposes or there are different tools for each one.



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**Table 1: Sample characteristics**

Number of cities		532 (65.4% of 813 cities)
Number of departments		1,227 (18.9% of 6,504 departments)
Type of Departments (The number of respondents)		Disaster Recovery Support and Risk Management (148), Culture / Sports Affairs (169), Industrial and Labor Affairs (162), Child affairs (119), Regional Cooperation / Community Support (163), Urban Development and Construction (181), Environment / Public Cleaning (148), Health and Welfare (136), N.A. (1),
Rank	Department staff	331 (27.0% of 1,227)
	Middle Managers	731 (59.6% of 1,227)
	Senior Managers	29 (2.4% of 1,227)
	n/a	136 (11.1% of 1,227)
Gender	Male	1,034 (84.3% of 1,227)
	Female	149 (12.1% of 1,227)
	n/a	44 (3.6% of 1,227)
Age	under 25	25 (2.0% of 1,227)
	25-34	168 (13.7% of 1,227)
	35-44	399 (32.5% of 1,227)
	45-54	449 (36.6% of 1,227)
	over 54	141 (11.5% of 1,227)
	n/a	45 (3.7% of 1,227)
Staff (size)	Min	1
	Max	2,320
Population	Min	4,033
	Max	3,714,200

**Table 2: Performance and uses of PMM constructs**

<b>PERFORMANCE (<math>\alpha:0.942</math>)</b>					
Results	min	Mean	std. dev.	max	N
1. The amount of work and/or services provided by your department	1	4.91	1.02	7	1199
2. The accuracy of the work produced by your department	1	4.71	0.91	7	1199
3. The number of innovations, process improvements or new ideas implemented by your department	1	4.27	1.14	7	1198
4. Efficiency of the services provided	1	4.38	0.88	7	1200
5. The attainment of the service goals of your department	1	4.57	0.89	7	1198
6. The reputation of your department in terms of excellence	1	4.58	0.90	7	1200
7. The ethics of the department's employees	1	4.68	1.01	7	1198
<b>Capacity to manage</b>					
1. Planning (capability to perform plans, such as mid-term plans and budgetary processes)	2	4.50	0.89	7	1195
2. Collection of information (capability to collect the information required for monitoring and analyzing the processes of the department)	1	4.50	0.89	7	1195
3. Capability of co-ordination (vertically and horizontally within the department)	2	4.62	0.88	7	1195
4. Evaluation (capability to evaluate plans and how they are implemented)	1	4.38	0.83	7	1190
5. Control (capability to measure performance against expectations)	2	4.54	0.92	7	1195
6. Personnel management (capability to distribute human resources properly)	1	4.21	0.94	7	1184
7. Negotiation (capability to reach consensus with top managers outside the department and/or other departments)	1	4.54	0.93	7	1194
8. Overall capacity to manage	1	4.53	0.85	7	1195
<b>USES of PMM</b>					
<b>DIAGNOSTIC USE of PMM (<math>\alpha:0.928</math>)</b>					
	min	Mean	std. dev.	max	N
1. Process planning	0.14	2.57	0.96	4	1181
2. Allocation of budget	0.14	2.65	0.94	4	1191
3. Monitoring of processes	0.14	2.33	0.96	4	1194
4. Evaluation of operating results	0.14	2.44	0.94	4	1191
5. Comparative analysis of plans and results	0.14	2.47	0.95	4	1187
<b>INTERACTIVE USE of PMM (<math>\alpha:0.940</math>)</b>					
	min	Mean	std. dev.	max	N
6. Focusing on departmental priorities	0.14	2.16	1.01	4	1184
7. Focusing on key performance indicators	0.14	2.26	1.00	4	1182
8. Communication of goal setting or determination of priorities	0.14	2.33	1.00	4	1190
9. Review of the fitness between objectives and plans	0.14	2.42	0.97	4	1186
10. Review of organizational and project targets	0.14	2.47	0.98	4	1187
11. Analysis of improvement proposals of departmental processes	0.14	2.52	0.99	4	1192
12. Development of new projects	0.14	2.25	0.93	4	1192
13. Co-ordination with other departments	0.14	2.19	1.00	4	1190
14. Dialog with external stakeholder	0.14	2.09	1.04	4	1180

**Table 3:** Predictability, uncertainty, ambiguity, complexity and culture constructs

	min	Mean	std. dev.	max	N
<b>UNPREDICTABILITY</b> (Absence of predictability) ( $\alpha : 0.825$ )	1.056	3.518	0.724	5.72	1181
<b>UNCERTAINTY</b> ( $\alpha : 0.754$ )	min	Mean	std. dev.	max	N
1. Problems or issues that must be solved quickly are common	1	4.87	1.45	7	1216
2. It is difficult to predict when new projects/objectives can emerge	1	4.01	1.50	7	1216
3. The achievement of our goals depends heavily on external factors	1	4.81	1.38	7	1215
4. It is difficult to predict the amount of budget necessary for next year	1	3.38	1.32	7	1217
5. The results (effects) of our projects take more than a year to arise	1	3.53	1.46	7	1215
6. It is difficult to predict resource needs when new projects are planned	1	3.64	1.17	7	1217
7. It is difficult to predict effectiveness when new projects are planned	1	3.79	1.22	7	1217
<b>AMBIGUITY</b> (reversed, $\alpha : 0.880$ )	min	Mean	std. dev.	max	N
1. The mission of the department is unequivocal	1	5.86	1.24	7	1218
2. The mission is communicated and understood by the department personnel	1	5.43	1.50	7	1217
3. The goals of the department are specific and detailed	1	5.57	1.35	7	1216
4. The goals are clearly linked to the mission	1	5.16	1.34	7	1216
5. The long/mid-term plan of the department is clear	1	4.99	1.44	7	1214
<b>COMPLEXITY</b> (reversed: No.1-8, $\alpha : 0.755$ )	min	Mean	std. dev.	max	N
1. The department tasks are performed following of standard procedures and rules.	1	4.39	1.46	7	1215
2. There is a logical and clear way to proceed when performing departmental tasks.	1	4.36	1.30	7	1214
3. The procedure is ordained by law, ordinance, rule, etc.	1	4.78	1.52	7	1214
4. The procedures to carry out a task are shared within the department.	1	4.63	1.34	7	1214
5. The goals of the department are expressed through performance measures.	1	3.71	1.46	7	1212
6. The performance measures reflect the efforts made in the achievement of the task.	1	4.00	1.40	7	1214
7. The task performance measures are clearly linked with departmental goals.	1	4.33	1.34	7	1206
8. Project managers can manage a project from its start to its completion.	1	3.18	1.55	7	1212
9. An important number of tasks require cooperation with other departments.	1	5.63	1.25	7	1213
10. The progress of departmental projects is influenced by other departments.	1	4.49	1.30	7	1213
<b>BUREAUCRATIC CULTURE</b> ( $\alpha : 0.865$ )	min	Mean	std. dev.	max	N
1. Our department has a code of conduct (formally stated limits and rules) to define appropriate behavior for our personnel.	1	4.61	1.74	7	1205
2. Our personnel fulfills the code of conduct	1	4.44	1.62	7	1202
3. Our departments allows individual creativity within defined limits of freedom	1	4.33	1.60	7	1202
4. The mission and values of a government official are shared	1	5.58	1.27	7	1212
5. The mayor's speeches and/or behavior have a great influence on the employees' behavior.	1	5.76	1.17	7	1210
6. The employees are proud of working in the organization.	1	5.40	1.26	7	1205

**Table 4:** Descriptive Statistics of constructs and variables

	average	sd	Theoretical range	min	max
<i>Department level variables</i>					
Performance	4.522	0.687	1-7	2.267	7.000
Diagnostic use	2.502	0.835	0-4	0.143	4.000
Interactive use	2.298	0.816	0-4	0.175	4.000
Predictability <sup>6</sup>	3.671	0.655	1-7	1.400	5.750
Uncertainty	4.083	0.900	1-7	1.000	7.000
Ambiguity	2.599	1.129	1-7	1.000	7.000
Complexity	3.991	0.800	1-7	1.556	7.000
Bureaucratic culture	5.015	1.126	1-7	1.167	7.000
Unit size (number of employees)	65.670	180.309	---	1.000	2,320.000
<i>City level variables</i>					
City size (population)	161,425.60 0	287,764.10 0	---	4,033.00 0	3,714,200.00 0
Operating expense ratio	89.587	4.544	---	70.100	108.133
Aging ratio	29.324	5.123	---	16.118	46.639

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<sup>6</sup> It should be notice that predictability is the sum of uncertainty, ambiguity and complexity. Thus, high values represent low levels of predictability. The variable is measuring the absence of predictability. The analysis will be done considering this fact.

**Table 5: Statistical Result of Multi-level Analysis**

	Model 1A	Model 1B		Model 2A	Model 2B
(Intercept)	3.386*** (0.575)	3.321*** (0.574)	(Intercept)	3.405*** (0.576)	3.471*** (0.571)
<b>Un</b> Predictability	-0.181*** (0.032)	-0.184*** (0.032)	Uncertainty	0.000 (0.023)	0.002 (0.023)
Diagnostic use	0.034 (0.047)	0.046 (0.047)	Ambiguity	-0.094*** (0.022)	-0.088*** (0.022)
Interactive use	0.039 (0.049)	0.03 (0.049)	Complexity	-0.079** (0.030)	-0.089** (0.030)
Bureaucratic culture	0.180*** (0.021)	0.178*** (0.021)	Diagnostic use	0.030 (0.047)	0.051 (0.048)
Unit size (employees)	-0.009 (0.018)	-0.013 (0.018)	Interactive use	0.041 (0.049)	0.022 (0.049)
Log(City size)	0.028 (0.031)	0.034 (0.031)	Bureaucratic culture	0.170*** (0.022)	0.169*** (0.022)
Operating expense ratio	0.008 (0.005)	0.008 (0.005)	Unit size (employees)	-0.008 (0.018)	-0.016 (0.018)
Aging ratio	0.005 (0.005)	0.006 (0.005)	Log(City size)	0.031 (0.032)	0.037 (0.031)
<b>Interaction Effect</b>			Operating expense ratio	0.007 (0.005)	0.006 (0.005)
Diagnostic use with <b>Un</b> Predictability		0.062 (0.072)	Aging ratio	0.006 (0.005)	0.006 (0.005)
Interactive use with <b>Un</b> Predictability		0.01 (0.077)	<b>Interaction Effect</b>		
Diagnostic use with Bureaucratic culture		0.068 (0.047)	Diagnostic use with Uncertainty		-0.134* (0.055)
Interactive use with Bureaucratic culture		-0.081 (0.049)	Interactive use with Uncertainty		0.113* (0.055)
			Diagnostic use with Ambiguity		-0.002 (0.049)
			Interactive use with Ambiguity		0.038 (0.052)
			Diagnostic use with Complexity		0.177** (0.063)
			Interactive use with Complexity		-0.119+ (0.064)
			Diagnostic use with Bureaucratic culture		0.089+ (0.048)
			Interactive use with Bureaucratic culture		-0.089+ (0.051)
AIC	1742.453	1742.216	AIC	1740.884	1736.79
BIC	1795.497	1814.549	BIC	1803.558	1838.033
Log Likelihood	-860.226	-856.108	Log Likelihood	-857.442	-847.395
Num. obs.	918	918	Num. obs.	917	917
Num. groups: city	464	464	Num. groups: city	464	464
Var: city level Intercept	0.030	0.029	Var: city level Intercept	0.028	0.026
Var: Residual	0.354	0.351	Var: Residual	0.353	0.347

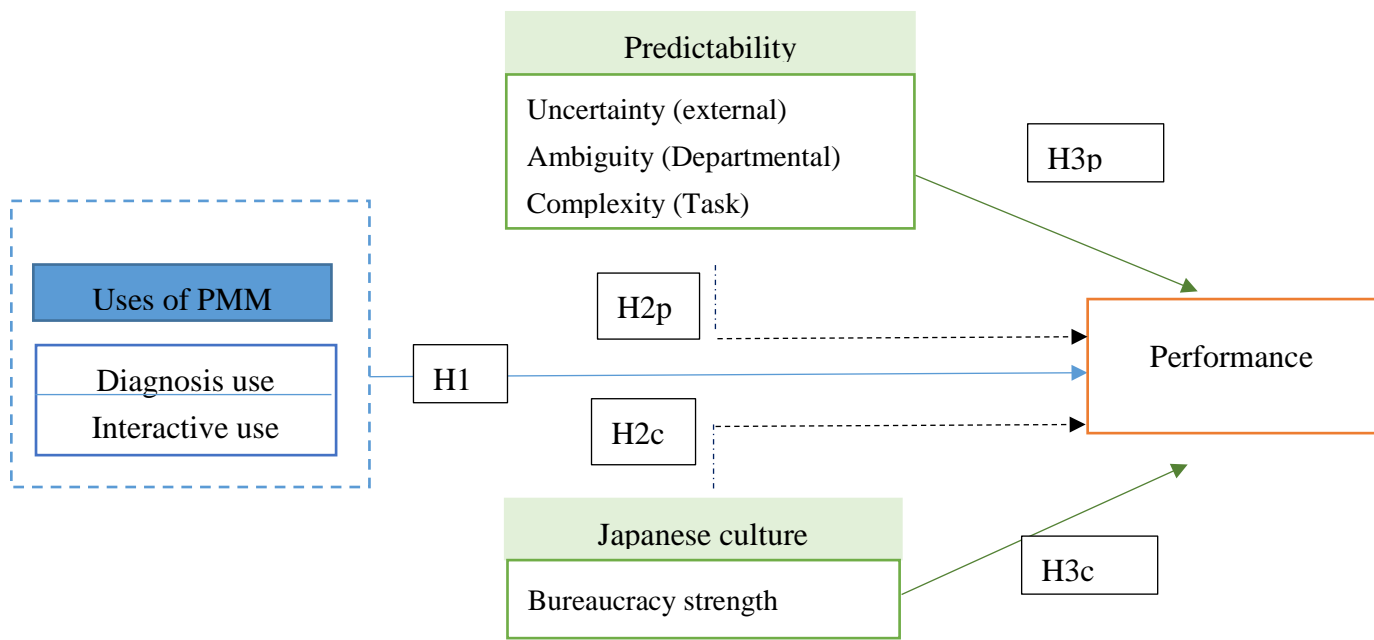
Note: Estimated coefficients and standard error (in parentheses). Signif. codes: '\*\*\*' < 0.001, '\*\*' < 0.01, '\*' < 0.05, '+' < 0.1.

**Table 6:** Summary of hypotheses

Hypotheses		
H1: PMM use (either diagnostic or interactive) is positively associated with organizational performance.		<b>NO DIRECT EFFECT (Model 1 and 2)*</b>
H2p High (low) predictability increases (decreases) the performance of the organization.	Predictability	<b>DIRECT EFFECT (Model 1)</b>
	Uncertainty	<b>NO DIRECT EFFECT (Model 2)</b>
	Ambiguity	<b>DIRECT EFFECT (Model 2)</b>
	Complexity	<b>DIRECT EFFECT (Model 2)</b>
H2c The level of bureaucratization of the administrative culture of each department affects the performance of the organization.	Bureaucratic culture	<b>DIRECT EFFECT (Model 1 and 2)</b>
H3p Emphasis on diagnostic (interactive) use has a positive association with performance in environments with high (low) predictability.	Predictability and type of use	<b>NO EFFECT (Model 1)</b>
	Uncertainty and type of use	<b>INTERACTIVE USE PREFERRED (Model 2)</b>
	Ambiguity and type of use	<b>NO EFFECT (Model 2)</b>
	Complexity and type of use	<b>DIAGNOSTIC USE PREFERRED (Model 2)</b>
H3c Emphasis on diagnostic (interactive) use has a positive association with performance in environments with strong (soft) bureaucracy.	Bureaucratic culture and type of use	<b>DIAGNOSCTIC USE PREFERRED (Model 2)</b>

\* Direct effects are shown with models 1A and 2A, and mediated effects with models 1B and 2B

**Figure 1:** Conceptual model

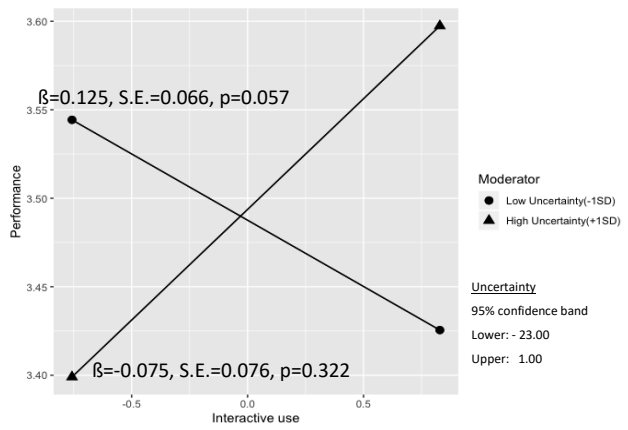
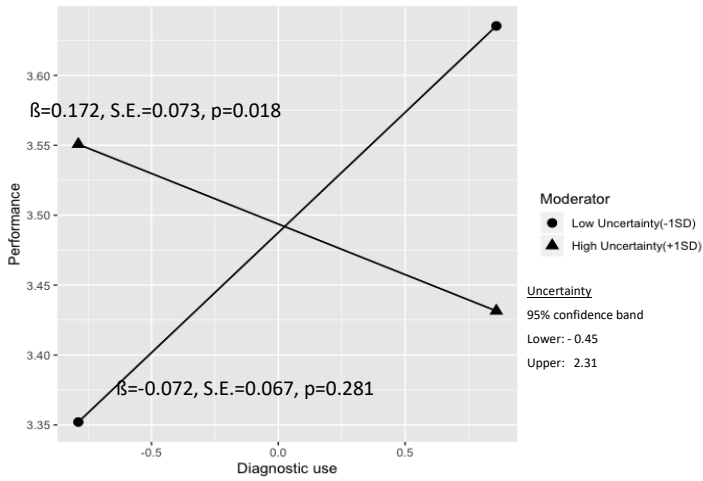


**Source:** Adapted from Speklé and Verbeeten (2014)

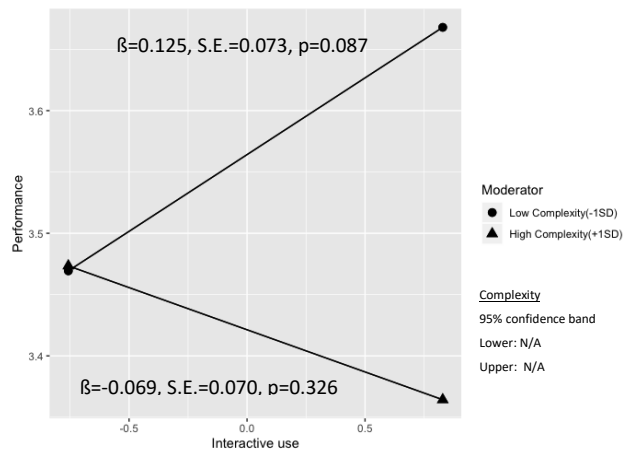
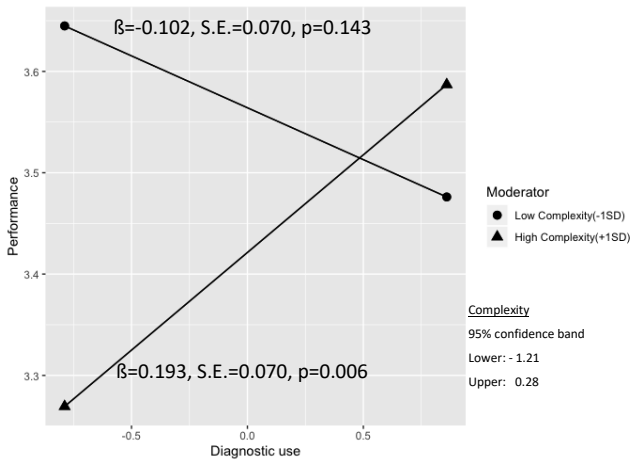


## Figure 2- Interaction effects

### 1- Type of use and Uncertainty



### 2- Types of use and complexity



### 3- Types of use and bureaucratic culture

