Perceived Environmental Uncertainty, Performance Measurement Systems, and Competitive Advantage

by Agnes Utari Widyaningdyah

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ABSTRACT

We investigate the effect of diagnostic and interactive performance measurement systems (PMS) on competitive advantage with perceived environmental uncertainty (PEU) as antecedent variable. This study is motivated by the implementation of the ASEAN Economic Community (AEC) and the continuous performance declining most of large-scale manufacturing firms in Indonesia, which has a huge impact on the managers' inability in predicting a competitive business environment. Manager needs critical resources that enable to process information uncertainty and contribute it to its competitive advantage. Unique resources that is discussed in this study is the use of PMS (diagnostically and interactively) as a structural capital based on resource-based view (RBV). We study large-scale manufacturing firms in East Java Indonesia using surveys and interviews as data collection methods with structural equation modeling (SEM) technique. We find that the use of PMS (both diagnostically and interactively) contributes to competitive advantage when managers perceive the uncertainty of the business environment as accordance with RBT. Furthermore, this study suggests that interactive use of PMS drives the diagnostic use of PMS in case of manager perceive the environmental uncertainty in order to survive and achieve the competitive advantage.

Keywords: Diagnostic and Interactive Performance Measurement Systems, Competitive Advantage, Perceived Environmental Uncertainty, Resource-based View, Intellectual Capital.

1. INTRODUCTION

ASEAN Economic Community (AEC) drives business environment uncertainty for the establishment of the ASEAN single market, which will allow a free flow of goods and services, investment, capital, skilled labor, and the free movement of capital across the region (*Dirjen Kerjasama* ASEAN, 2009), this become a threat for the firm to either achieve or sustain competitive advantage. The achievement of competitive advantage is determined by the firm's ability to create a resource that is valuable, rare, inimitable, and non-substitutable or VRIN as contained in the concept of resources-based view (RBV[1]) (Barney, 1991; 2001). The resources that meet VRIN criteria are the intellectual capital[2] (Bontis, 1998;

[1] RBV is a theory that underlie the idea that competitive advantage can be maintained only if the capability of the firm to create excellence is supported by the resources that cannot be easily duplicated by competitors (Hart, 1995).

[2] Intellectual Capital is a knowledge assets owned and used the organization to improve its performance. These assets could be a relationship with customers, suppliers, intellectual property, and human (Tang and Liou, 2010).

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Bontis, Ke[34] and Richardson, 2000). According to Bontis (1998) intellectual capital (IC) consists of three main components, namely, human capital, structural capital, and relational capital. Among the three components of intellectual capital, structural capital is the component that actually o[12]ed enterprises and easy to codified[3]. The important aspects of structural capital is PMS (Martin-de-Castro, Navas-Lopez, Lopez-Saez, and Alama-Salazar, 2006; Cleary, 2015).

The use of appropriate PMS can assist management in processing information about competitive business environment into strategic resource that contributes to competitive advantage (Simons, 1995; 2000). The use of PMS either interactively or diagnostically allows managers maintain or alter the intended strategy in order to make [8]firm more adaptive to business environmental uncertainty conditions (Simons, 2000; Henri, 2006; Widener, 2007). This notion refers to the *levers of control*, a concept of formal and information-based management control system is used to maintain or alter pattern of organizational activities that lead to competitive advantage (Simons, 1995).

Throughout history, PMS have been used to assess if the target's performance or the firm's goal has been achieved (Chenhall, 2003; Langfield-Smith, 2007). However, if manager perceive uncertainty about firm's business environment, focus only on the achievement of targets without considering revising the firm's performance indicators, make firm cannot survive and achieve its competitive advantage. The collapse of many large-scale manufacturing firms in Indonesia, which is some of that firms is the representatives of the world-class manufacturing firms (Toshiba, Panasonic, Sharp), as well as family firms; which is kind of the biggest industries in East Java; triggered by a lack of firm's responsiveness over business environment changes. Therefore, this study proposes the concept of Simons (2000) on interactive use of PMS which is expected to create a firm responsiveness to the competitive business environment.

This study uses sampling frame of large-scale manufacturing firms in East Java Directory Manufacturing Industry in the year 2013 published by Central Bureau of Statistics (*Biro Pusat Statistik Indonesia*). East Java province was chose as object of this research because it is the largest province in Java with more than 7000 large and medium manufacturing firms. The amount is about 30% of the total manufacturing industry in Indonesia (*Biro Pusat Statistik* 2013). The use of manufacturing firms is motivated by the Indonesia Ministry of Industry' data which reveal that during the period 2013 to 2015, Indonesia's manufacturing firms experienced a significant decline in performance (www.kemenperin.go.id/statistik/kinerja.php). Likewise with the data *purchasing managers index* (PMI)[4] for the manufacturing industry showed a contraction of manufacturing performance from 2013 to mid 2015. The pressures of severe [5]business environment

[3] Codification in this article refers to the codification of knowledge; is mechanism for the creation of [28]explicit knowledge (knowledge that can be readily articulated, codified, accessed, and verbalized) (Helie, Sebastian, Sun, Ron, 2010)

[4] Purchasing Managers Index (PMI) manufacturing is a composite index of the five indices that [31]consist of: new orders, output, employment, supplier delivery times, and stocks of purchases for the manufacturing industry. PMI index published by independent agencies Markit *Group*and the Institute for Supply Management by conducting surveys in 30 countries in the world *(www.instituteforsupplymanagement.org/)*. PMI is presented in a scale of 100 and a median of 50, with the interpretation of a reading below 50 indicates contraction conditions, while above 50 indicates expansion.

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surrounding Indonesia's manufacturing industry have created great uncertainty for management.

The Global Teleos Most Admired Knowledge Enterprises (MAKE), reveal their study that there has been a significant change on the management of Indonesia manufacturing firms. The shifting of firm's business strategy happened from low-cost and traditional quality control manufacturing into modern knowledge-driven business (Dunamis, 2013). Knowledge-driven-business refers to the way organization's strategic resources management. Thus, data from the Indonesia Ministry of Industry, the PMI index, and Dunamis triggered the underlying reason why this study is important.

The rapid changing of business environment faced by Indonesia manufacturing firms especially in East Java, and how they continue to sustain their competitive advantage becomes the focus of this study. Based on the problems faced by the manufacturing firms in East Java, Indonesia, this research proposes the use of PMS both diagnostically and interactively as an aspect of intellectual capital to sustain their competitive advantage as manager perceive the uncertainty about business environment. This research is expected to contribute to the development of strategic management accounting knowledge discourse which is the domain of science that still broad enough to be developed. In practice, this research is expected to contribute to the managers of manufacturing firms in East Java to manage performance measurement information into a source of competitive advantage.

The rest of the paper is organized as follows. The next section discuses the theoretical framework along with hypotheses development. The research method is then described and followed by the results. Finally, the conclusion, limitation, and implication for future research will be presented.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 Resource-based View (RBV) and Dynamic Capabilities

This study used the RBV as the conceptual theory to test the relationship between IC, competitive advantage, and firm performance. RBV has already emerged Also an important theory and explanation about the competitive advantage of differences in the field of strategic management. Since 1986, Barney started the change of resource-based view to become a theory by introducing the concept of strategic factor markets as a market where the firm gained or developed the resources they need to implement the strategy (Barney and Clark, 2007). Furthermore According to Barney and Clark (2007), Reviews those firms that develop its own resources and Able to manage it will has the ability to maintain its superiority than if the firm gain its resources from outside of organization. Bundles of unique resources that are owned and managed by the firm Allows the firm to gain and sustain its superior performance. Thus, RBV's focus is the firm ability in maintaining the abnormal return from their resources (Barney, Wright, and Ketchen, 2001). Reviews these resources must be valuable, rare, inimitable, and non-substitutable. Resources are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness. Rare means it is owned only by a few firms to generate perfect competition dynamics in an industry. Inimitable means the resources protected from the possibility imitated by competitors. Non-substitutable means this resource owned only by a few firms and Unable to substitute with other products.

PMS is an aspect of structural capital, one of intellectual capital components. As a source of strategic resources, PMS can be used to achieve competitive advantage. The firm's

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ability to manage performance measurement information can be able to adapt to dynamic business environment in order to sustain its competitive advantage is the essence of the RBV which later developed into the concept of dynamic capabilities (Teece and Pisano, 2007). RBV development into the concept of dynamic capabilities is an underlying theory of this study.

Conceptually, RBV continues to growth (Wernerfelt, 1984; Barney et al.2001; Barney and Clark, 2007) including concept dynamic capabilities (Teece and Pisano, 2007). RBT has been empirically tested in various subject areas, such as strategic management (Spanos and Lioukas 2001; Schroeder, Bates, and Juntilla, 2002; Ray, Barney, Muhana, 2004), human resource management (Gates and Langevin, 2012; Connelly et al. 2012), and accounting (Henri, 2006; Tom, 2010).

2.2 The Relationship of PEU, PMS, and Competitive Advantage

PMS as an aspect of management control systems is a set of financial and non-financial performance indicators used to evaluate the performance of the firm or individual performance of subordinates (Simons, 1995). Information obtained from PMS can be used for resource allocation, coordination, business evaluation, and identification as early warning systems (Simons, 1995).

Debate is often the case related to the performance measurement system is how to use the performance measurement system, in diagnostic or interactive (Tuomela, 2005). The use of diagnostic performance measurement system is intended to monitor the performance of the firm and correcting deviations that occur from performance standards previously set. The system formal information can be used diagnostically when possible to (1) set goals, (2) measuring the output, (3) calculate the variance of performance, (4) using information variant as feedback to change the input or output to bring performance back in line with goals and standards that have been set (Simons, 2000).

In contrast to the use of performance measurement system diagnostics, interactive performance measurement is a formal system that is used managers to involve themselves regularly and personally in the decision making process subordinates (Simons, 1995; 2000). The system provides information that became the focus of the manager and used to create a dialogue with a subordinate.

The use of performance measurement system in this research refers to the concept of *levers of control* Simons (1995, 2000), namely the *tension* that is a balance between all *levers*. Further Simons (1995) stated that the essence of a management control system is to manage stress congenital organizations *(inherent organizational tension)*. By using the performance measurement system diagnostics and interactive, the balance on the pressure innate organization can occur, due to the use of performance measurement systems and interactive diagnostics are complementary functions (Henri, 2006).

According to Widener (2007) the use of interactive performance measurement system is a response to the firm on the uncertainty of the business environment that is perceived by the manager. The manager personally involved in the decision making of his subordinates. The use of performance measurement system can interactively create measures of performance that will be used as constraints on the achievement of performance targets performance measures replace the old that may already be responsive to the changing business environment. Thus, there is a relationship between the interactive and diagnostic uses of performance measurement systems.

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The uncertainty of the business environment that encourages managers perceived the firm uses a mechanism to be able to adapt to using the resources and maintain the organization in achieving competitive advantage. The use of a good performance measurement system that can influence decision making in accordance with the firm crucial business environment perceived by the manager (Henri, 2006; Widener, 2007; Bisbe and Malagueno, 2009; Mundy, 2010).

The relationship between the perceived uncertainty of the business environment, the use of performance measurement systems, and competitive advantage can be described in a conceptual model of the following:

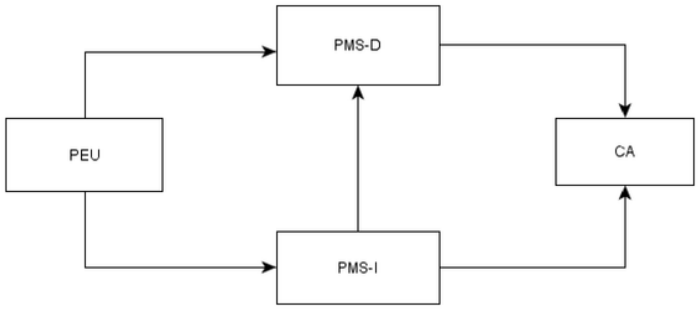

Figure 1 Conceptual Model Research

2.3 Hypotheses

2.3.1 Relationships between PEU and PMS Use

Dynamic capability perspective as a part of the RBT development stated that the firm which has the capability to adapt with business environment changing will achieve competitive advantage (Teece and Pisano, 1997). PEU, in information processing perspective, derives from a difference in the information required to perform a task and the amount of information possessed by the organization (Simons, 2000).

The use of a good performance measurement system is expected to reduce the uncertainty perceived environment so that competitive advantage can be maintained (Simons, 2000; Henri, 2006; Widener, 2007). Diagnostic control systems are used managers to manage uncertainty and risk firms (Simons, 2000). Performance measurements are integrated into the control system diagnostic referrals for employees to present their behavior in line with corporate objectives. Performance measures that may be used as diagnostic manager as a measure of security, quality, inputs / raw materials cost are usually stable and regular. By contrast, the performance measures are not stable, neither such tactics nor their competitors use new technologies. These measures allow for discussion between managers. Various empirical studies show that effective interactive control system is used when a firm

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experiencing uncertainty (Bisbe and Otley, 2004). Research Simons (1991) suggests that the uncertainty in technology, new product introductions, and market competition relates to the use of interactive control system. Abernethy and Brownell (1999) found empirical evidence that the use of budget interactively improve hospital performance which is undergoing a change in strategy. Based on the above description it can be formulated hypotheses as follows:

H_{1a}: The higher the environmental uncertainty perceived by managers, the more diagnostic use of performance measurement systems.

H_{1b}: The higher the environmental uncertainty perceived by managers, the more interactive use of the performance measurement systems.

2.3.2 The Relationships between PMS and Competitive Advantage

RBV viewpoint stated that the unique resources can contribute to a sustainable competitive advantage (Barney Clark, 2007). Performance measurement system as a form of structural or organizational resources are believed to contribute to the shaping of competitive advantage (Martin-de-Castro, Navas-Lopez, Lopez-Saez, and Alama-Salazar, 2006; Cleary, 2015).Management of the information contained in the performance measurement system and the use of such information may serve as a means of achieving the target predetermined so that corporate objectives are achieved and even expected to achieve competitive advantage.

The use of performance measurement system in diagnostics can control strategy as a planning, this system ensures that the performance targets that have been planned to be achieved, while the control system of interactive control strategy as a pattern of action, that although the business unit does not have a formal plan, managers can use this system to force consistency and lead the process of creativity / experimentation in response to environmental uncertainty (Simons, 1995; Bisbe and Malagueno, 2009).

Research Henri (2006) and Widener (2007) showed that the use of interactive control system affect the formation of organizational learning so that it can be a tool for creating new strategies in response to environmental uncertainty. Diagnostic control systems related to the implementation of the strategy that has been running (Simons, 2000; Ismail, 2013). Based on the above description it can be formulated hypotheses as follows:

H_{2a}: The more diagnostic use of performance measurement systems the higher the competitive advantage.

H_{2b}: The more interactive use of the performance measurement systems the higher the competitive advantage.

2.3.3 Relationship between the Uses of Performance Measurement Systems

Interactive control system allows the firm to seek new strategic opportunities. The new strategy that emerged as a result of the use of performance measures interactively requires a re-definition and explanation of the key factors of success. Thus, the interactive control system requires an organizational structure (in this case is reflected on a control system diagnostics) to support the effectiveness of interactive control system (Chenhall and Morris, 1995). When the adjustment of the strategy due to the use of interactive control systems, the diagnostic performance measures should also be adjusted to reflect the new strategic positioning and the critical success factors (Widener, 2007).

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Simons (1994) found that managers are changing their business unit's strategy (the result of the interactive control system) using a diagnostic control system to communicate the critical success factors of a new one. Chenhall and Morris (1995) proved that interactive control system will be effective if its use coupled with diagnostic control system. Likewise with empirical evidence discovered by Henri (2006), which uses the term stress *(tensions)* to refer to the combination of the use of interactive control systems and diagnostics in measuring performance. Based on the above description it can be formulated hypotheses as follows:

H 3: The interactive use of performance measurement systems has positive effect on the diagnostic use of performance measurement systems.

Figure 2 below presents the research model and hypotheses propose in this study:

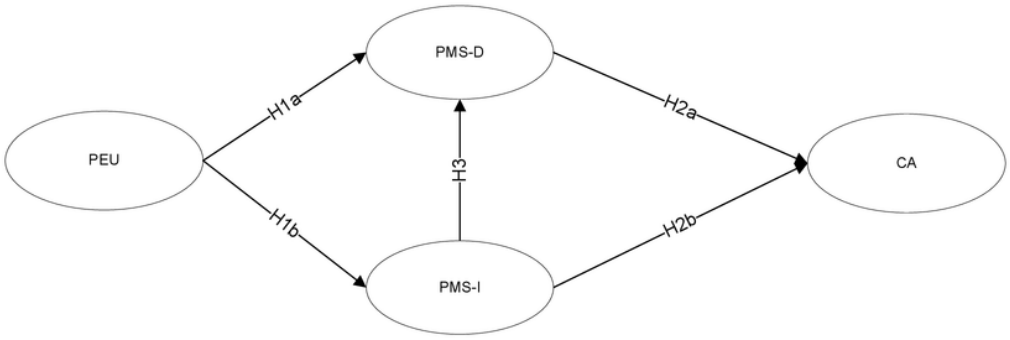

Figure 2 Research Model

3. RESEARCH METHOD

This study uses the entire population of large-scale manufacturing firms in East Java Directory Manufacturing Industry in 2013. This categorization refers to the provisions of the Indonesia Central Statistics Agency (*Biro Pusat Statistik/BPS*) that medium and large firm with more than one hundred employees. Consideration of using large-scale manufacturing firms is they already has a formal and complex PMS (Bouwens and Abernethy, 2000; Henri, 2006; Widener, 2007). Based on the population, the sampling framework was obtained in the form of a list of large-scale manufacturing firms listed on the Manufacturing Industry Directory 2013 by BPS.

The sampling technique used is purposive sampling. The sampling criteria used are listed in the Directory of Manufacturing Industry in 2013 according to the BPS, has a workforce of more than a hundred people, not including State Owned Enterprises (SOEs), because this firm type has its specific regulation (PER 1 / MB / 2011 on The Implementation of Good Governance in SOEs); and firm as limited company (Ltd or *Perseroan Terbatas*/PT), because this firm type have a clear organizational structure.

The unit of analysis of this research is the firm, either as a single firm as well as strategic business units (SBU) because a single firm or business unit has the authority to manage its own operational activities under the direct supervision of operational managers and business unit managers. Respondents were encouraged to participate in this research is

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the manager of accounting and finance. These managers are at the secondary level (upper middle). The selection of respondents was they have sufficient knowledge of the management control systems and the growth performance of the firm as it is also used in empirical studies conducted by the Bisbe and Otley (2004), Chenhall (2005), Henri (2006), Widener (2007), Yinan and Zhao (2011), as well as Al-Jawazneh (2012).

Based on the sampling frame that has been determined there are 841 firms that meet the criteria. Of this amount each firm gets only one bundle questionnaire consisting of a cover letter that contains the purpose of the study, a questionnaire to be filled along with the identity of respondents, as well as the reply envelope. In addition, data collection is also done by conducting brief interviews with the CEOs of three large-scale manufacturing enterprises in East Java with the aim to strengthen the argument of research results and to explore the context of research to fit the business environment in which research is conducted.

A statistical tool used in this research is the structural equation modeling (SEM). The statistical tool is used for the main purpose of this study is testing models involving multiple variables with latent constructs (Hair, Black, Babin, and Anderson, 2010). Analysis of the data used in this study include: *non-response bias test,* test data quality include validity and reliability, as well as testing the hypothesis by using SEM.

3.1 Measurement of Variables

3.1.1 Perceived Environmental Uncertainty (PEU)

Perceived environmental uncertainty is a reference to the perception of the manager instead of the actual condition of the environment (Gul and Chia, 1994). Perceived environmental uncertainty refers also to the emergence of the threats and opportunities that can make assumptions as the basis for determining the strategy this time is not valid anymore (Simons, 2000).Perception is referred to in this study is the predictability and stability with regard to the differences between the information held by the information needed. When managers cannot predict the business environment due to insufficient information then it is called as the perceived environmental uncertainty (Gordon and Narayanan, 1984).

The PEU measurement using instruments developed by Gordon and Narayanan (1984) and used in research Chenhall and Moris (1993), as well as Jusoh (2008) using a seven-item question with *a* Likert scale of 5 points starting from point 1 (very disagree) to 5 points (strongly agree). This instrument is the development of the concept of perceived environmental uncertainty and strategies which are then used also in research Chenhall and Moris (1993).Indicators of environmental uncertainty perceived covering the intensity of competition in the industry, many new products are marketed, the dynamics that firms face in the macro economy and technology, the prediction market activity competitor, prediction tastes and preferences of customers, the development of legal constraints, the constraints of the political and economic constraints; and frequent scientific discovery.

3.1.2 Diagnostic Use of Performance Measurement Systems

Diagnostic control system is a formal feedback system used to monitor outcomes *(outcomes)* of the organization and correcting deviations that occurred on set performance standards (Simons, 1995; 2000). There are three main features control system diagnostics, namely (1) the ability to measure results *(output)* a process, (2) the presence of

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

the prescribed standards are compared to actual results, (3) the ability to correct deviations from the standard (Simons, 1995) ,

Constructs diagnostic control system developed by Vandenbosch (1999) and used by Henri (2006), and tested again by Widener (2007). There are four items to measure constructs question diagnostic control system using a 5-point Likert scale, from point 1 (strongly disagree) to 5 points (strongly agree). Indicators diagnostic control system includes PMS allows searches of progress in achieving the firm's goals, PMS monitor the results that have been achieved, PMS compare the outcomes with expectations, PMS examined key performance measures.

3.1.3 Interactive Use of Performance Measurement Systems

Interactive control system is defined as a formal system that is used by managers to involve them regularly and personally in the decision-making activities by subordinates (Simons, 2000). There are four characteristics of the control system interactively, namely (1) the information generated is critical and requires an agenda that is repeated *(recurring agenda)* undertaken by management, (2) requires attention constantly from operational managers, (3) the resulting data interpreted and discussed in a face to face meeting of superiors, subordinates, and colleagues, (4) a catalyst on an ongoing challenge and debate over the data, assumptions, and plan of action.

Constructs interactive control system developed Vandenbosch (1999) and used by Henri (2006), and tested again by Widener (2007). There are seven of the questions were measured using 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Indicator control system interactive is the top managers rarely notice PMS (reversed), top managers rely on specialized staff to set up and interpretation PMS (reversed), the operations manager rarely involved with PMS (reversed), top managers pay attention to PMS, top managers interpret its own PMS, operations managers are often involved with PMS, and the use of PMS allow for discussion.

3.1.4 Competitive Advantage

Competitive advantage is the ability of the company to have advantages compared to its competitors (Porter, 1985), as well as the utilization of resources and capabilities (Barney, 1991; 2001; Barney and Clark, 2007). Competitive advantage can be seen from the cost, product differentiation, and speed point of view (Porter, 1985). Based on this view, the indicators used to measure competitive advantage refer to the Chenhall (2005) study which is based on Porter. Firstly, respondents were asked questions about the perception of the indicators importance of for companies using a Likert scale of 5 points from point 1 (very unimportant) to 5 points (very important). Finally, respondents were asked questions about the respondents' perception of their performance compared to competitors by using a Likert scale of 5 points starting from point 1 (significantly below average) up to 5 points (significantly above the average). Score items were determined by multiplying indicators of performance and its importance. Factor analysis was used to measure competitive advantage view based on Porter (1995); quality/delivery/service, low cost, and flexibility.

Indicators for competitive advantage was developed by Chenhall (2005), includes: make dependable delivery promise, provide affective after-sales service and support, provide fast deliveries, product availability, provide high quality products, make rapid volume and/or

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

product mix changes, make changes in design quickly, provide unique products, customize products to customer needs, low price, and low production cost.

3.3 Data Analysis and Results

Questionnaires were returned from a total of 841 questionnaires distributed was 192 questionnaires, which means the response rate was 22.83%. The response rate of this study are considered because they are above 20%, which is the average rate of return on management accounting research, as stated by Young (1996). In addition, the low *response rate* because the target respondents in this study is the manager at the secondary level so it was hard to get their response as stated by Van der Stede,*et al.* (2005) that the *response rate* is low occurs on research involving top management and representatives of firms*(organizational representatives)*.

38% of respondents of this study comes from the food industry, with 65% were male and working in the office now about 3 to 5 years (70.8%). Under these conditions, the respondents were considered sufficiently representative firm in answering the questions as they are experienced enough questionnaire.

Stage next test is a test *for non-response bias*. Testing *for non-response bias* in this research because of the three-stage delivery of the questionnaire and the data collection was conducted over a long time, so it is necessary to test bias among respondents who returned the questionnaire at the beginning with at the end of the date determined by comparing answers to the entire construct of the respondents (Widener, 2007). Based on the date of return of the questionnaire, then there are 102 respondents who sent the questionnaire before the specified time, while as many as 90 respondents returns after the date set. Non-response bias testing done using independent samples t test.

Table 1 Non-response bias Test

Variables	Result	
	t	Sig. *(2-tailed)*
PEU	1,448	0.371
PMS-D	-0.579	0.563
PMS-I	0.524	0.601
CA	1,273	0.205

Table 1 shows that there was no difference in the respondent's answer at the beginning of the return of questionnaires and in the end the return of the questionnaire. Therefore, all the respondents' answers can be used for further testing.

After non-response bias test, we conduct the quality of data testing, including validity and reliability of research variables. Validity test results data using Pearson correlation shows all the variables have a significance level of less than 5%, which means that all indicators are valid, while the reliability testing done using Cronbach alpha. Here are the results the reliability test of each of the variables studied:

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

Table 2 Reliability Testing Results

Variables	Cronbach alpha
PEU	0.865
PMS-D	0.681
PMS-I	0.799
CA	0,746

Value *Cronbach alpha* for all the variables studied showed a value of more than 0.6, as suggested in 0.6 (Nunnally in Santoso, 2013).

3.3.1 Descriptive Statistics

Table 3 below lists the mean and standard deviation for all variables studied. Based on Table 3 shows that the highest answer score is the competitive advantage variable (4.71), while the lowest score is the variable interactive SPK (3.68). However, overall, respondents tend to agree to all of the questionnaire.

Table 4 is a correlation matrix by using the *Pearson correlation* for all the variables studied. All variables showed significant correlations for p-value <0.01 and 0.05; except PEU with CA were negative correlated and not significant.

Table 3 Descriptive Statistics of Variables

variable	Min	Max	mean	Standard deviation
PEU (7 items)	2.29	5	4.05	0.731
PMS-D (4 items)	2.25	5	3.80	0.790
PMS-I (7 items)	1.29	5	3.68	0.806
CA (11 items)	2.29	5	4.71	0.446

Table 4 Pearson Correlation Matrix

	PEU	PMS-D	PMS-I	CA
PEU	1:00			
PMS-D	0455 ***	1:00		
PMS-I	0587 ***	0421 ***	1:00	
CA	-0017	0374 ***	0218 **	1:00

***, **, * Significant at p-value <0.01; 0.05; 0.1; respectively

3.3.2 Results

As discussed earlier, that hypothesis testing is done by using SEM. Before testing using SEM is done, there should be testing several assumptions, namely normality, multicollinearity, singularity, and *confirmatory factor analysis* (CFA). Normality test results indicate that there are three observations categorized as *outliers* that are not included in further testing. The final result of normality test showed the value of *multivariate normality* 1,671 that are in the range of Â ± 2.58 (Ghozali, 2014).Likewise with

ISSN: 2304-1013 (Online); 2304-1269 (CDROM); 2414-6722 (Print)

multicollinearity test and singularity that is not detectable using the covariance matrix determinant value (0.0001) is very small (Hair, *et al.*, 2010). In testing the CFA there are some modifications to the variable ULC (KLP6), SPI (SPI4 and SPI7) and SPD (SPD4). Modifications made based on the value of *standardized residual covariance, modification indices, items correlation,* and *factor loading;* besides the modifications done by considering the theory and concepts underlying this research.

After conducting SEM assumptions test and CFA, the next stage is to examine the structural model. In the first step, we conduct the basic model test according to the hypothesis. The next step followed by several alternative models to find the best model that fits the data collected. According to Kline (1998), the model fit to the data is not the only answer since there may be some other models that provide the same or better value fit. The structural model result can be seen in Table 4.

The value of chi-square (X^2) are not significant, CFI and GFI close to 1, and RMSEA less than 0.08 indicates that the model is fit (Cunningham, 2008). Based on Table 4 the basic model tested showed adequate fit values. The alternative model is developed by adding a path between PMS-D to PMS-I. The test results on an alternative model structural model shows that the model does not fit with the data, so it is not recommended for hypotheses testing.

Based on the basic model, all hypotheses (1a, 1b, 2a, 2b, and 3) indicate significantly positive effect. An alternative model indicate that the PMS-D does not affect PMS-I.

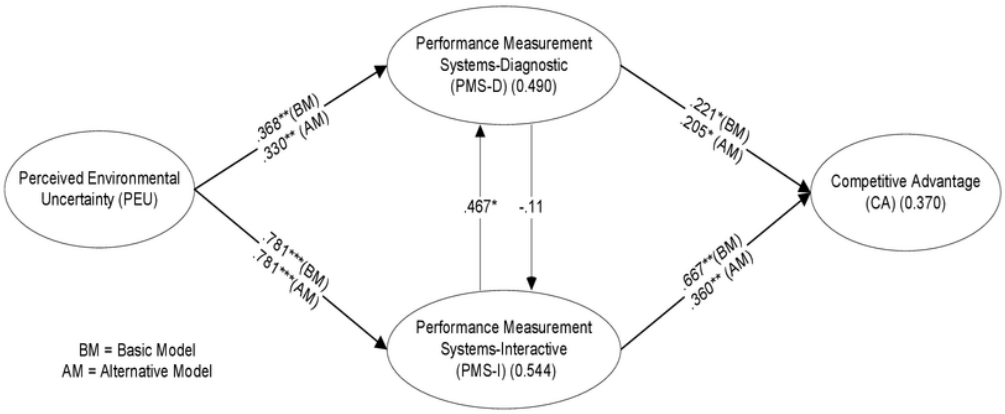

Figure 3. Graphical Depiction of Model

Table 4 Structural Model

Dependent Variables (R^2)	Independent variables	Baseline Model (coef.)	Alternative Model (coef.)
PMS-D (0.490)	PEU	0.368 **	0.330 **
	PMS-I	0.467 *	-
PMS-I (0.544)	PEU	0.781 ***	0.781 ***
	PMS-D	-	-0.11
CA (0.370)	PMS-D	0.221 *	0.205 *
	PMS-I	0.667 **	0.360 **

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Model fit	X^2	99.472	101.123
	p-value	0.723	0.048
	Df	63	63
	CMINDF	1.133	1.232
	GFI	0.924	0.855
	CFI	0.903	0.832
	RMSEA	0.021	0.078
	X^2 different test		
	Df difference (df)		3.893 (1)
	p-value		<0:10

***, **, * Significant at p-value <0.01; 0.05; 0.1; respectively (one-tailed).

4. DISCUSSION

The discussions proceeds based on the hypotheses provide. First, hypotheses 1a and 1b relating to the PEU and the use of PMS. Based on baseline model test, the higher the PEU, the more diagnostic and interactive use of PMS. Widener (2007) study reveal that strategic uncertainty conditions is going to change the target performance be achieved, so it will influence the diagnostic use of PMS. When managers perceive the uncertainty of the business environment, then it triggers the interactive use of PMS, by doing a review on a regular basis to adapt with rapid changing business environment and to continue in providing challenges for all organization participants in order to seek innovation and opportunities (Simons, 1995; 2000). That opportunity-seeking and innovations are expected to be used to maintain the viability of the firm and achieve competitive advantage.

Manager experiencing with uncertainty if there are any discrepancies between the information required and the information obtained (Galbraith, 1973, in Janke, *et al.,* 2014). Therefore, managers need current information as an additional channel of information, and it can be obtained through subordinates and peer. It can be said that the interactive use of PMS allows information to flow hierarchically or lateral (Abernethy and Brownell, 1999; Henri, 2006).

The results of the survey research were supported by interviews with managers during our survey study from 2014-2016. One of manager said that the company has some regular meeting to review and develop the PMS measures. This activity is done in order to anticipate the uncertainty face by the company:

> "Deciding PMS measures held in meetings involving the head of the division up to the director. Every month PMS measures will be reviewed ... the head of the business unit review meeting conducted in once a week." (Accounting and IT/Information Technology Manager of Pharmacy Company).

The other managers from different company also reveals the similar activity:

> "That... (Discussion about firm/ business unit performance) the head of division's agenda every month to meet with the *board* to discuss. Two weeks after the end of the month, reporting (financial reports) should already prepare." (Human Resource Manager of Tobacco Company).

> "But that change is for a year... (Determining key performance indicators / KPIs) .. We'll try in a year. If next year the KPIs are good, and we want to emphasize in training activities, we will make a greater weight to training indicators, the substitution or addition indicators in KPI will do once in a year. But once in every

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three months we regularly review it." (Tax and Accounting Manager of Bicycle Company).

The results indicates that the company uses interactive management control to review their PMS (Simons, 2000; Mundy, 2010).

Empirically, both surveys and interviews results that the manager held numerous meetings to address the environment uncertainty, both derived from market competition, government regulations, as well as information technology. These regular meetings do not just review the consequences of action ever taken, but it also provides a challenge for subordinates to take the initiative in dealing with this uncertainty, as a manager following statement:

"... a firm with profit declining.... the head of each division informed about this and they give suggestions and opportunity." (Human Resource Manager of Tobacco Company).

This results are consistent with Tuomela (2005), Henri (2006), Widener (2007), Kober, *et al.*(2007). Janke, Mahlendorf, and Weber (2014) study also showed that managers' perceptions on the economic crisis increased the interactive use of PMS.

Second, hypotheses 2a and 2b are relating to the use of PMS with a competitive advantage. Based on the baseline models tested can be seen that the use of PMS both diagnostically and interactively contribute to competitive advantage. PMS-I contributed higher (0,260; p-value <0.05) than PMS-D (0.221; p-value <0.1). These results indicate that PMS as an aspect of MCS becomes a VRIN resource that contribute in achieving a competitive advantage. These results are in line with research conducted by Henri (2006), Bisbe and Malagueno (2009) and the RBT concept (Barney Clark, 2007).

Third, the hypothesis about the influence of the PMS-I to PMS-D supported statistically (0,287; p-value <0.1) on the baseline model, but on the alternative model, PMS-D has no effect on PMS-I (-0.11). These results are consistent with research conducted by Widener (2007) which shows that the strategic uncertainties will affect the new targets setting. It have been adapted to the new business environment will make the firm survive and have a competitive advantage. However, based on the concept expressed by Simons (1995, 2000), the diagnostic use of PMS will be affected by the manager's perception about the dynamic environment trough interactive use of PMS. The purpose of interactive use of PMS is to stimulate dialogue and learning organizations to adapt with environmental rapid changes, thus allowing the re-estimation on predetermined targets that may influence the use of diagnostic control system (Simons, 1995; 2000). This concept is confirmed by the results of empirical testing, both through this surveys and interviews. The significant path of structural models (PEU → PMS-I →PMS-D →CA), means that the interactive use of PMS in case of managers perceive the business environment uncertainty will revise the firm's performance targets. Changes in performance targets to be achieved would affect the diagnostic use of PMS, and finally will affect the competitive advantage. A bicycle manufacturing managers who experience with uncertainty in the application of information technology states that, heads of divisions will be intensively involved in setting the new KPI, which will affect the diagnostic use of PMS in sustaining competitive advantage

This study empirically results is consistent with the study conducted by Tuomela (2005) which investigates relationship between the levers of control in case of new PMS introduction Tuomela (2005) suggests that when the firm realized to control the strategy triggered by strategic uncertainties, it will encourage the establishment of a new targets. The new target is proposed on critical performance measures that will be used in the PMS-D. It will provides the feedback as well as the results of an intended strategy through the *single-*

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loop learning. This result was also confirmed by interview with the CEO of bicycle manufacturing:

> "Now we use *balanced score card*. So the KPI must be in balance score card perspective. Not only one aspect that you have to pay attention, first, your sales achieved, second, you must control your inventory level (Tax and Accounting Manager of Bicycle Company).

Based on the results of these interviews can be seen that the use of balance scorecard to be a benchmark for the firm in setting the PMS measures and become PMS-D. The relationships between interactive and diagnostic use of PMS is expected to contribute on the firm's competitive advantage.

Future research should improve the collecting data method in order to increase response rate, especially for middle-upper manager respondent. From conceptual view, future research need to explore other performance measurement systems outside the scope of this study because firms usually using various performance measurement systems to adapt with business uncertainty and gaining competitive advantage.

5. CONCLUSION

This study objective is to investigate the relationship between PEU, the diagnostic and interactive use of PMS, and competitive advantage in Indonesia manufacturing firms. The underlying theory use in this study is RBT that states the VRIN resources contribute to the firm's competitive advantage. The use of PMS as an aspect of structural capital can make a relevant information about firm performance in creating a competitive advantage.

The interactive use of PMS can generate a dialogue between managers and subordinates so it is possible to revise the performance targets in order to adapt with the conditions of a competitive business environment. Therefore, the new performance targets will create new key performance indicators and finally affect the diagnostics use of PMS. Responsive actions in facing business environment uncertainty, making the firm survive and even able to compete with its competitors.

However, there are some limitations on this study. First, this study used a survey and a brief interview, so it needs the necessary caution in interpreting the results of this research, mainly due to the latent and multidimensional construct. Second, the difficulty in collecting data with survey method in Indonesia is the lack of enthusiasm upper mid-level managers to participate, so further research is necessary to find the best ways to increase the participation of managers as respondent. Third, it need for deeper exploration on other variables that allegedly influenced the firm's competitive advantage.

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