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Why do employees take more initiatives to improve their performance after co-developing performance measures? A field study

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Performance measurements may stimulate employee initiatives to improve operational performance, especially when they themselves participate in the development of their own departmental performance measures. Using the theory of planned behavior, we examine why this occurs in a beverage manufacturing company where we helped bottling line maintenance technicians develop measures about the results of their own work. Our analyses are based on qualitative data gathered at 156 meetings, 34 semi-structured interviews, quantitative performance data from the company's information systems, and quantitative questionnaire data. We found that the participatory development process increased employees' attitude, perceived social pressure and perceived capability to take initiative. Moreover, the departmental performance improved when the jointly developed performance measures were put to use.

Key words: Employee participation, Performance measurement, Theory of Planned Behavior, Operations management

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1. Introduction

The participation of employees is an important theme in management accounting research (e.g., Derfuss, 2009; Luft and Shields, 2007). Most studies investigate participation in budgeting: the amount of influence a subordinate manager has for setting his/her unit's budgets. Derfuss (2009) conducted a meta-analysis and found eleven positive consequences of participative budgeting that generalize across samples (e.g., the positive effect of budgetary participation on budget usefulness).

Yet the participation of employees may go beyond the setting of budgetary targets *per se*, extending to processes for developing and implementing management accounting systems (De Haas and Kleingeld, 1999; Eldenburg et al., 2010). Considering performance measurement systems (PMS) specifically, employees may be involved in and have influence on a panoply of factors, including: the conceptualization of performance measures, defining the measures, identifying required data, adapting IT systems, designing graphs and tables for the presentation of the measures, and even producing the periodic performance reports. There are only a few studies in management accounting that have investigated such a broader notion of participation in the development and implementation of performance measurement systems, and these generally found beneficial effects (i.e., Abernethy and Bouwens, 2005; De Haas and Algera, 2002; Hunton and Gibson, 1999; Kleingeld et al., 2004; Li and Tang, 2009; Wouters and Wilderom, 2008).

Investigating participation in the development and implementation of PMS is valuable because so little is known about why performance measurement affects performance. Many studies have investigated relationships between performance measurement and organizational performance (e.g., Chenhall, 2005; Davis and Albright, 2004; De Geuser et al, 2009; Farrell et al., 2008; Grafton et al., 2010; Ittner et al., 2003; Kelly, 2010; Lee and Yang, 2010; Malina et al., 2007; Said et al., 2003; Widener, 2006). These studies assume performance measurement

affects the behavior of individuals within the organization, which in turn facilitates the achievement of organizational goals (Burney and Widener, 2007; Burney et al., 2009; Covaleski et al., 2003; Hall, 2008). However, detailed empirical investigations into how employee behavior mediates the relationship between PMS and performance remain scarce (De Leeuw and Van den Berg, 2010; Hall, 2010; Luckett and Eggleton, 1991; Webb, 2004).

This study focuses on participatory development of performance measures and a particular type of behavior, namely employee initiative. Employee initiative is an increasingly important part of contemporary job performance (Campbell, 2000; Crant, 2000; Frese and Fay, 2001a) aimed at achieving continuous improvements in operational work processes. We define *PM participation* as the substantial impact of one or more employees on the content of the performance measures by means of which one (in this study: a department) is measured. We define *Employee initiative* as self-starting, proactive, persistent and pro-company behavior of individual employees (Frese and Fay, 2001b). The central question of our study is: why is *PM participation* related to *Employee initiative*?

This study investigates performance measurement at the operational level in the organization, where performance measures are quite specific to the operational processes (Franco-Santos et al., 2007; McKinnon and Bruns 1992; Melnyk et al., 2004). We focus on enabling performance measures that are intended to facilitate the responsibilities of employees, rather than primarily as control devices deployed by senior management (Adler and Borys, 1996; Ahrens and Chapman, 2004; Free, 2007; Wouters and Wilderom, 2008). Employees know a great deal about operational processes and the data that are generated, making it important to use their knowledge to develop and implement performance measures (Masquefa, 2008). We do not investigate the use of performance measures for formal evaluation and incentive purposes.

We intend to contribute to the management accounting literature on performance

measurement systems by using a psychological theory to investigate our research question. This is important because psychological theories may give more complete and valid explanations of performance measurement effects (Covaleski et al., 2003; Kleingeld, et al., 2004), thereby extending the existing management accounting body of knowledge on performance measurement. The theory we use in this study (the theory of planned behavior) has not yet been applied to employee initiative behavior, but it has been used to explore and stimulate various other kinds of behavior, such as quitting smoking, using condoms, and using public transportation (Fishbein and Ajzen, 2010). We show *Employee initiative* behavior can also be studied through the same theoretical lens. Using this theory contributes to the management accounting literature because it investigates motivational, social and cognitive variables at the same time, which most likely are the major behavioral effects resulting from participation (Jeong, 2006). Earlier management accounting research has included motivation and/or capability variables, but social effects have been less investigated. In sum, the present study intends to provide an overall explanation for why *PM participation* is related to *Employee initiative* by investigating all three of these important mediating variables simultaneously.

A secondary contribution of this study lies in the report in substantive detail precisely how *PM participation* actually came about and was shaped. This kind of process has received scant attention in the accounting literature heretofore (Otley, 1999; Abernethy and Bouwens, 2005). We report on a one-year field study in a beverage manufacturing company where we jointly developed performance measures with their maintenance technicians. Using action research makes it possible to richly describe how employees reacted before, during and after they participated in developing their own performance measures.

This study was conducted in order to develop a theoretical explanation for why *PM participation* is related to *Employee initiative*, and to provide initial empirical support for it.

We did this by using systematic combining—continually going back and forth between theory and data (Dubois and Gadde, 2002). However, for the sake of clarity, from the outset we structure the paper around the developed model, which provides a structure that helps to convey the theoretical and empirical insights gained throughout this study about the effects of participative development of performance measures.

This paper is structured as follows. In Section 2 we articulate the theory that supports our model, and in Section 3 we lay out our methodology. Section 4 presents the empirical results with regard to qualifying and refining our basic model. Section 5 discusses a range of implications and limitations of our overall account.

2. Theory

We define *PM participation* as the substantial impact of one or more employees on the content of the performance measures by means of which one (in this study a department) is measured. This may include any aspect of the performance measures distinguished by Neely et al. (2002): the name; the purpose; the target; the formula; the frequency of measuring; the source of data; and the responsibility. By actually participating in the development of performance measures, employees' ideas about performance measures are taken seriously (Nørreklit, 2000). The goal is manifestly practical—to make performance measures useful for the involved employees in their everyday work. Of course, participation will not be a completely autonomous affair. For example, there may be guidance in the form of strategic priorities, constraints regarding the timely availability of resources for this developmental process, and project deadlines that the employees have to consider. *PM participation* may provide positive effects to the organization if it creates better quality performance measures (Abernethy and Bouwens, 2005). Good measurement properties of performance measures (such as sensitivity, precision, and verifiability) can reduce costly management control issues (Moers, 2006).

PM participation is not the same as the interactive use of performance measurement systems, which has also been investigated empirically (e.g., Bisbe and Otley, 2004; Henri, 2006; Widener, 2007). In terms of the framework developed by Ferreira and Otley (2009), the interactive use refers to how managers and employees use an *existing* PMS in their communication, whereas *PM participation* is about how managers and employees work together to design and implement a new or modified PMS.

Employee initiative is somewhat comparable to the term "work-related motivation" that is more common in management accounting.[1] However, work related motivation is rarely measured directly and is often focused on a non-observable, internal state of mind (see Birnberg et al., 2007, for an overview). For example, Hunton and Gibson (1999) examined the link between a construct similar to *PM participation* and work-related motivation. They measured motivation indirectly through "self-efficacy" and perceived "participation congruence." We are interested not only in this internal state of mind, but also in employee *behavior*.

The basis of our model is the theory of planned behavior (TPB; Ajzen, 1991; Fishbein and Ajzen, 2010) that is widely used in psychological research to address how people can be motivated to behave in certain ways. It has to date not been used to explain or predict *Employee initiative*, but we determined it would be fruitful given its effective use in a wide range of fields (Fishbein and Ajzen, 2010) including management accounting (e.g., Hill et al., 1996), organizational behavior (e.g., Dunn and Schweitzer, 2005), and change management (e.g., Jimmieson et al., 2008). The TPB differentiates between motivational, social and cognitive variables. This classic distinction is also used in, for instance, Birnberg et al.'s (2007) overview of psychology theory in management accounting research. Most research so

[1] Work-related motivation as used within management accounting is usually conceptualized as consisting of four processes: (1) "arousal"—the stimulation or initiation of energy to act; (2) "direction"—where energy or effort is directed; (3) "intensity"—the amount of effort expended per unit of time; and (4) "persistence"—the duration of time that effort is expended (Birnberg et al., 2007, p. 119).

far—both inside and outside of management accounting—has included only one or two of these types of variables at the same time[2]. The present research contributes to the literature by including all three mediating behavioral variables simultaneously and therefore giving a relatively complete explanation for the relation between *PM participation* and *Employee initiative*.

The TPB distinguishes three antecedents of any particular kind of behavior: *Attitude*—people's evaluation regarding the behavior, *Norm*—the extent to which people think that most people who are important to them, want them to behave in a particular way, and *Control*—the extent to which people feel capable of performing the behavior (see Ajzen, 1991, for the complete theory). Because the terms "Norm" and "Control" have a different connotation for management accounting scholars, we will below use different equivalent terms that are more intuitive: *Social pressure* and *Capability* to take initiative, respectively.

According to the TPB, it is possible to change people's behavior when an intervention is directed at one or more of its antecedents (Ajzen, 2006a). Therefore, we examine if *PM participation* influences *Attitude*, *Social pressure*, and *Capability* to take initiative, and if all TPB relations hold with *Employee initiative* as the dependent variable (see Figure 1).

[Insert Figure 1 about here.]

2.1 PM participation and Attitude to take initiative

In Hackman and Oldham's (1976) "job characteristic model" the *Attitude* to take initiative depends upon three *psychological* states: (1) experienced meaningfulness of the work, (2) experienced responsibility for the outcomes of the work, and (3) knowledge of the results of the work activities (Fried and Ferris, 1987; Hackman and Oldham, 1976; Johns et al., 1992). *PM participation* may invoke these psychological states and thus increase *Attitude*

[2] An exception is Erez and Arad (1986) who studied all three factors simultaneously. Their dependent variable was "performance," and they found that a combination of the three types of variables was indeed the best predictor.

to take initiative. The first state (experienced meaningfulness of the work) is invoked if *PM participation* gives rise to and reflects something employees believe in (Latham, 2003). In this case employees when trying to reach the goals do not have to sacrifice self-interest for the greater good (Bono and Judge, 2003). Hence they are likely to put more effort into reaching the goals (Sheldon and Elliot, 1998).

The second state (experienced responsibility for the outcomes of the work) is an inherent consequence of *PM participation* because it gives employees a certain amount of autonomy (Hackman and Oldham, 1976). When people have an influence on something, they often tend to become involved in making it work because they will perceive its success or failure as their own success or failure (Vroom, 1995, p. 267). In line with that kind of identification, *PM participation* makes them more positive about the developed performance measures (Abernethy and Bouwens, 2005; Wilderom et al., 2007). They will thus perceive the measures as a credible resource, which of course makes them more likely to accept their output (Ilgen et al., 1979) and use them to improve their work (Luckett and Eggleton, 1991).

The third state (knowledge of the results of work activities) is likely to be affected by *PM participation* as well. Performance measures provide feedback, increasing the knowledge of the employees necessary to make decisions (Demski and Feltham, 1976; Sprinkle, 2003; Van Veen-Dirks, 2009). Since participatorily-developed performance measures have fewer measurement errors and better fit the needs of the employees (Abernethy and Bouwens, 2005; Cavalluzzo and Ittner, 2004), feedback is more likely to be accepted (Ilgen, et al., 1979; Luckett and Eggleton, 1991) and the employees' knowledge of the results of their work improves. In summary:

> *Proposition 1: If employees participate in developing their own performance measures, their attitude to take initiative becomes more positive*.

2.2 PM participation and Social pressure to take initiative

In addition to attitudinal gains, participation in developing the measures also seems to give social benefits, especially when speaking of group participation, as we do in this study (Erez and Arad, 1986). We think that *PM participation* leads to more *Social pressure* because performance measures can prioritize behavior (Collins, 1982; Sprinkle, 2003) and clarify the requirements of someone's work role (Hall, 2008). They indicate where employees should direct their effort, and the accompanying targets show how much effort they should put into it. After developing the performance measures together with their colleagues, employees are more likely to feel that they have to justify their performance, including the initiatives towards reaching the targets. Although these relations may also apply to non-participatory performance measures, it appears their influence is more prominent with self-developed performance measures. Acceptance of the measures is assumed to depend on the amount of influence someone has had on the selection and development of these measures (Luckett and Eggleton, 1991). A target should be accepted by the people concerned before it will have an effect on their behavior (Erez et al., 1985). We therefore propose:

> *Proposition 2: If employees participate in developing their own performance measures, they feel more social pressure to take initiative*.

2.3 PM participation and Capability to take initiative

Building on the ideas of enabling formalization (Adler and Borys, 1996; Ahrens and Chapman, 2004), *PM participation* is found to lead to performance measures that are perceived as enabling or empowering (Chiles and Zorn, 1995; Hall, 2008; Quinn and Spreitzer, 1997; Spreitzer, 1995, 1996). Enabling performance measures are perceived by employees as facilitative for their work, rather than as just a monitoring device for managers, as performance measures are often seen (Wouters and Wilderom, 2008). There are two mechanisms that may explain why employees feel more capable to take initiative if they have

developed their own performance measures. The first derives from the literature on the cognitive mechanisms that explain the relation between participation and performance (e.g. Shields and Shields, 1998). It is argued that an important feature of the participatory process is the discussion that takes place between the employees and their leader. Due to these discussions people know better what to do and how to do it, making the performance measures more useful (Kleingeld et al., 2004) and giving the employees more actual and perceived capability.

PM participation may also affect *Capability* via the decision-facilitating role of these developed performance measures. Individuals' knowledge and ability to make better decisions can be improved by providing feedback (Sprinkle, 2003), and accurate performance measures are providers of such feedback (Demski and Feltham, 1976; Sprinkle, 2003; Van Veen-Dirks, 2009). It is generally accepted that *PM participation* leads to performance measures of better quality (Abernethy and Bouwens, 2005; Cavalluzzo and Ittner, 2004), a key factor often leading to more self-efficacy with regard to reaching goals (Webb, 2004). Hence, we propose that *PM participation* makes employees more capable of taking initiative.

Proposition 3: If employees participate in developing their own performance measures, their capability to take initiative increases.

2.4 TPB antecedents and Employee initiative

The theory of planned behavior advances the case that an individual's intention to perform a certain behavior depends on one's attitude, felt social pressure, and/or felt capability to perform the behavior; and that intentions are usually good predictors of behavior. Support for these relations is found in numerous studies and meta-analyses of diverse kinds of behavior (Fishbein and Ajzen, 2010). We foresee similar links with respect to *Employee initiative* behavior and will below explain the rationale behind these propositions. We refer to Fishbein and Ajzen (2010) for the complete theory, and to the empirical papers that document

relations that resemble those between *Attitude* and *Employee initiative* (Frese and Fay, 2001ab; Fuller et al., 2006; Parker, et al., 2006); *Social pressure* and *Employee initiative* (Crant, 2000; Frese and Fay, 2001ab); and *Capability* and *Employee initiative* (Axtell and Parker, 2003; Morrison, 2006; Parker et al., 1997, 2006; Spreitzer, 1995; Thomas and Velthouse, 1990).

The relation between *Attitude* to take initiative and actually taking initiative is intuitively reasonable if you consider the definition of *Employee initiative*: it is practically impossible to be self-starting, pro-active and persistent if you do not feel positive about taking the initiative. The relation between *Social pressure* and *Employee initiative* exists because people generally fear the negative consequence of being different (Brehm et al., 2002). Finally, even if employees want to take initiative and feel the social pressure to do so, they may not actually take initiative if they do not feel capable of it (Fishbein and Ajzen, 2010). Taking initiative "requires the expectation of being in control of the situation and of one's actions" (Frese and Fay, 2001a, pp. 155).

Proposition 4a. Employees' attitude to take initiative is positively related to Employee initiative behavior.

Proposition 4b. Employees' felt social pressure towards taking initiative is positively related to Employee initiative behavior.

Proposition 4c. Employees' capability to take initiative is positively related to Employee initiative behavior.

3. Method

3.1 Research design

This study is designed as action research, or more precisely as clinical field work (Baskerville and Wood-Harper, 1998), which means that the action researcher is involved with an organization in a helping role (Schein, 1987). The main action researcher worked

three days a week on average at the site to do the clinical field work, and spent the other two weekdays at the university concentrating on the scientific part of the study. We chose action research because the research question concerns "understanding the process of change or improvement" (Coghlan and Brannick, 2001 as cited in Coughlan and Coghlan, 2002, p. 227). Our research design was chosen in order to optimize the opportunity to gain valuable insight into how an organizational phenomenon as *PM participation* actually works in practice (Coughlan and Coghlan, 2002). Designing and conducting research in real-world settings improves the exchange of knowledge between researchers and practitioners (Anderson et al., 2001; Miller et al., 1997; Rynes et al., 2001; Van de Ven and Johnson, 2006), and if properly conducted can make accounting research more relevant in practice (Kasanen et al., 1993).

The intended contribution of the paper is to extend the current body of management accounting knowledge concerning the question of why *PM participation* is related to *Employee initiative*. We did this by means of systematic combining: continually going back and forth between theory and data (Dubois and Gadde, 2002). From the beginning the research question was clear and we intended to answer it by using a psychological theory. We gradually focussed on the theory of planned behavior because it includes motivational, social *and* cognitive type variables, all relevant to adequately explaining the link between employee participation and performance (cf. Jeong, 2006). Meanwhile, working in concrete, everyday contexts gave us a better feeling about what actually goes on when performance measures are being developed together with employees. This experience helped us to gradually see more and more connections between these observations and existing literature, which enabled us to extensively embed our observations in theory. Although the study was undertaken for purpose of theory development, we used the opportunity to do some theory testing as well. Our qualitative study suggested that all three TPB-variables seemed relevant to increasing *Employee initiative*. Hence, at the tail end of the study we asked the employees to complete a

questionnaire that would help us to examine whether some of these relations were also statistically significant.

We designed this study in ways that adhered to Baskerville and Wood-Harper's (1998, pp. 103-104) seven validity criteria for action research: "(1) The research should be set in a multivariate social situation. (2) The observations are recorded and analyzed in an interpretive frame. (3) There was researcher action that intervened in the research setting. (4) The method of data collection included participatory observation. (5) Changes in the social setting were studied. […] (6) The immediate problem in the social setting must have been resolved during the research. (7) The research should illuminate a theoretical framework that explains how the actions led to the favorable outcome."

The first five criteria are met through our choice of the research setting that we will describe in Section 3.2. Most interesting and relevant here are Criterion 6 and 7. To meet Criterion 6 the intervention should actually lead to more *Employee initiative*. If it fails to lead to more *Employee initiative* then it is impossible to examine how and why employees took more initiative after the intervention, so it would make the research invalid. In Section 4 we show that employees indeed eventually did take more initiative. Moreover, Criterion 7 can be read as suggesting this study illuminates a theoretical framework that explains why our intervention led to more *Employee initiative*. This of course is our main research question and what our paper is all about. The developed theory is brought forward in Section 2, and in Section 4 we discuss how this model actually worked in the company in our case study.

In order to make our research replicable, we turn next to a very precise description of our methodology (see Checkland and Holwell, 2007). We start with a sketch of the research context that will help in the interpretation of the results. In section 3.3 we describe each of the steps that we took to develop the performance measures together with the employees. In Section 3.4 we report how we captured the data and how we went about our analyses.

3.2 Research context

3.2.1 Organization

The organization under study is a medium-sized Dutch company in the beverage manufacturing industry. We focused on its maintenance department for the bottling lines. Figure 2 shows the relevant part of the organizational chart. The director of the supply chain department was a member of the board of directors. The supply chain department consisted of five sub-departments, one of which was the bottling sub-department. The head of bottling was part of the "supply team" which met at least monthly to discuss the broader picture of the supply chain department. The supply team consisted of the supply chain director, the head of supply chain control, and the heads of the sub-departments of supply.

[Insert Figure 2 around here.]

The organizational chart changed slightly during our study, but the bottling sub-department was basically comprised of (a) the operators who were led by their own team bosses; and (b) the maintenance technicians who were led by two maintenance managers. Our study was situated among all the maintenance technicians and their managers. Of the 34 maintenance technicians, 16 were electro-technical and 18 were mechanical technicians. The remaining staff of the maintenance department included a planner, administrator, and secretary.

The bottling department has eight bottling lines. Each maintenance *manager* was responsible for four lines: one for lines that bottled using *returnable* materials, and the other for the lines using *non-returnable* materials. The processes of returnable and non-returnable materials differ because non-returnable materials are quality-checked before they enter the company, whereas returnable materials are not, which preempts directly comparing one-to-one the maintenance managers' performance. The maintenance *technicians* had an individual

area of responsibility: 8 were responsible for one of the bottling lines, 24 for one kind of machine, and 2 were jack-of-all-trades and helped wherever and whenever they could.

Apart from the secretary all the employees of the maintenance department were male. The maintenance managers had both completed higher-level vocational education. One had been with the company for 28 years and had a departmental tenure of 20 years. The other, in contrast, had only recently joined the company at the beginning of our study. Four maintenance technicians had a lower-level and thirty had an intermediate vocational education background. The mean age of 33 of the 34 maintenance technicians was 45; their mean organizational tenure was 19 years. On average, they had spent 16 years working in this very same maintenance department[3].

3.2.2 Changes over time

Besides our intervention, other relevant changes inside and outside the company were going on during our study. To put these changes into perspective, we refer to Figure 3 that gives an overview of the study's timeline. We already mentioned that a new maintenance manager entered the company close to the beginning of the study. Moreover, in February 2008, the company was acquired by a larger, global, foreign based beverage manufacturing company. This new faraway owner had a decentralized structure in which the production locations work independently, and it seemed at the time the take-over would have no major consequences for the supply department. Nevertheless, in October 2008 a company-wide reorganization was announced and ten percent of all the employees would lose their jobs. Within the maintenance department, about 11 of the 39 positions would disappear. By the end of our study, three technicians had taken early retirement and two technicians and the secretary had been transferred to other departments.

[Insert Figure 3 around here.]

[3] One of the participating maintenance technicians did not provide information on age and tenure.

3.3 Process

The actual process of developing the performance measures— illustrated in Figure 3—took four months. The rest of the sixteen months of the study were used to prepare this process, to include the developed performance measures in the departmental routines and to collect data.

3.3.1 Preparation

The preparation consisted of several introductory meetings with several internal stakeholders. Moreover, four groups were formed. These groups were as diverse as possible, mixing the maintenance technicians from different lines and specializations. To make sure that the performance measures were explicitly in line with the goals of the organization, the head of bottling attached themes to the groups: (1) energy use, (2) material losses, (3) planned maintenance, and (4) machine failures. As part of the supply team, he had specific insights about the strategic priorities of the company and of the supply chain department. He wanted these four themes adopted because they were currently important for the bottling department in supporting the company's strategy. The rest of the supply team agreed with these themes.

3.3.2 Developing the performance measures

Figure 3 summarizes the seven phases of the developmental process. It should be noted that in practice the transitions between the phases were more gradual than the schema suggests. Each phase can be briefly encapsulated as follows:

(1) Before the summer-break of 2008 a newsletter was e-mailed to all members of the maintenance department with information about the purpose of performance measures and the process that was going to be used to develop them. The technicians were asked to attend an individual meeting with the action researcher after the summer-break. We emphasized in the original newsletter and afterwards that the measures were supposed to assist *them* (the

technicians) in improving their own work, rather than being used by management to evaluate their performance.

(2) During the individual meetings, the maintenance technicians could (a) explain the current ways of working in the maintenance department, (b) articulate their expectations about the project, and (c) ask questions about it. The meetings were also conducted to collect interview data.

(3) Each group created performance measures in five to eight group sessions led by the main action researcher. During each group's first session one of the two maintenance managers explained the importance of the project and the technicians participated in a so-called brain-write (e.g., Terhürne, 2008; Thompson, 2003). Somewhat analogous to brainstorming, they were asked to individually write down as many improvement ideas as they could think of for the theme of their group. After ten minutes they handed their notes to their neighbors who used these to identify new or related ideas. This last step was repeated until everyone had received and elaborated upon the notes of everyone else. By beginning with improvement ideas rather than performance measures we had hoped to generate more efficient discussions and more commitment because: (a) it made the discussion immediately more concrete since improvement ideas are more tangible for the technicians than are performance measures, and (b) it showed the link between performance measures and taking initiative.

(4) The action researcher prior to each second group session categorized the improvement ideas and discussed them with the maintenance managers. During the second session the group prioritized and discussed them, selecting three areas within which they were going to develop performance measures.

(5) At the next session the action researcher helped the maintenance technicians to decide on the contents of the performance measures. She explained established criteria for making useable performance measures based on the Neely et al.'s (2002) performance measurement

record sheet. This helped the maintenance technicians to specify the performance measures' purpose; relation to company goals; target; formula; data source; frequency of updating and discussing; and responsibility for updating, etc.

(6) The action researcher created a prototype of each performance measure before the subsequent session, and updated it before every next group session. The rationale for using prototypes was to have a more concrete discussion and make the measures as valid, reliable and understandable as possible (Wouters and Roijmans, 2010). The prototypes were based on information received during the sessions with the maintenance technicians and from others in the company, primarily those responsible for various information systems. The prototypes contained real data that were already being measured by the company's information systems.

(7) During the last group sessions, each group evaluated the developmental process and the results.

During the developmental process, the action researcher had regular meetings with the two maintenance managers where process and content issues were raised and addressed. Furthermore, with the same aim formal evaluation sessions took place before, during, and after the intervention with the maintenance managers, the head of bottling, and the head of supply chain control. The action researcher also kept the director of the supply chain department informed about the progress and results. These meetings helped the researchers to find solutions for context-specific problems during the process. Moreover, they enabled the managers to be alert about the progress of the process and be sure the technicians would work on strategically relevant performance measures. As it turned out none of these managers felt it was necessary to change the intervention process at any point in time.

3.3.3 Inclusion

All maintenance managers and technicians agreed to discuss the newly designed performance measures at least monthly during one of their daily line meetings. A daily line

meeting is a half-hour morning meeting of the maintenance technicians that are present at the time, their manager, and the team boss of their bottling lines. At these meetings they discuss events of the past 24 hours, as well as other issues related to the work of the maintenance technicians. The researcher joined some of the daily line meetings in which the performance measures were discussed. During these meetings, she helped the maintenance technicians explain the measures to others who had not participated in the making of a specific measure. These early morning meetings afforded the researcher with an excellent opportunity to see how the measures were being used, and what initial effects they seemed to be having.

3.4 Data collection and analysis

We used multiple data sources for our analyses. We collected qualitative data from all the meetings, observations and semi-structured interviews and relevant quantitative performance data from the company's information systems. Moreover, the maintenance technicians completed a questionnaire after the performance measures were in use.

The level of analysis in this study was the individual. We were interested in the participatory development process that individual employees experienced, and the effect this had on the employee initiative behavior of individuals through *Attitude*, *Social pressure* and *Capability*. These variables were all at the individual level (see our model in Figure 1). The process led to the development of aggregated departmental performance measures as well, but this is not part of our model.

3.4.1 Meetings and observations

Most of our qualitative data was gathered at 190 meetings with 96 different company employees. These sessions lasted approximately 200 hours in total (see Table 1). The action researcher routinely took notes and made a report of each meeting, objectively noting date, starting time, duration, attending employees, attending researchers, the involved department,

subject, reference to input for the meeting, reference to meeting notes, reference to company documents received, and type of contact (e.g., scheduled or ad hoc).

[Insert Table 1 around here.]

The notes were systematically coded in terms of "performance measurement," "attitude," "social pressure," "capability," "employee initiative," and "performance." In other words, all text relating to one or more of these constructs was highlighted and tagged with the name of the associated construct. Moreover, for each variable of interest the corresponding pieces of coded text were assembled in a separate listing.

3.4.2 Interviews

34 of the 190 meetings were semi-structured individual interviews with the maintenance technicians about *Attitude*, *Social pressure*, and *Capability* to take initiative. Each interview began with an introduction aimed at putting the respondents at ease, explaining the aim, content and estimated duration of the interview. The scientific goal of the data collection was stressed. The technicians were told a project would start later that month in which the action researcher would help them develop their own performance measures. They were told that the final purpose of the project was helping them take more initiative in improving the performance of their department. The working definition of "initiative" was explained, and reminders of this definition were also given later in the interview.

Based on Ajzen's (2006b) and Francis et al.'s (2004) manuals for constructing TPB questionnaires, *Attitude*, *Social pressure* and *Capability* to take initiative were measured directly with these questions: "What is your opinion about taking more initiative?" "What would colleagues think of you if you were always the one that came up with improvement ideas?" and "Do you think you are able to take initiative?"

Furthermore, questions were asked about the behavioral, normative, and control beliefs of the maintenance technicians. The answers gave us more and richer information

about the contextualized meaning and examples of *Attitude, Social pressure* and *Capability* and gave us a qualitative basis for assessing whether *PM participation* had influence on *Attitude, Social pressure* and *Capability*. We asked the technicians about (1) their views on the advantages and disadvantages of taking initiatives; (2) the groups or persons that are explicitly positive or negative when coming up with and implementing improvement ideas; and (3) the factors or conditions that hinder or facilitate the spotting and implementing of improvement ideas (see Ajzen, 2006b; Francis et al., 2004). The responses to these questions indicated that, for example, *Attitude* depends on whether taking initiative is perceived as a natural part of the job, the enjoyment or fun experienced, earlier experiences with improvement initiatives, and the appreciation received for taking the initiative.

As advised by Strauss and Corbin (1990) we began the analyses of the interviews with "open coding" giving every statement of the maintenance technicians a label. Then we classified the labels under "attitude," "social pressure" and "capability". Subsequently we selected and combined the labels into the aspects listed in Table 2. We recoded the interview texts using "attitude," "social pressure" and "capability" as codes so that we could assess if each respondent had given a response on each of those aspects, and if so whether it was positive, neutral or negative (see Table 2).

[Insert Table 2 around here.]

3.4.3 Quantitative departmental performance data

It is important to stress here that all the performance measures taken in this study refer to departmental performance rather than the performance of any of the individual maintenance technicians. The technicians developed and implemented five performance measures: (1) rejection due to under-filling, (2) rejection of empty bottles, (3) use of water, (4) use of electricity, and (5) use of compressed air. The first two measures were developed

by the group "material losses", and the other three by the "energy use" group.[4] These performance measures are directly related to the company goals for the bottling department: "cost reduction," "sustainability," and "efficiency improvement," as illustrated in Table 3. We use the results from the developed performance measures to assess the change in performance of the department. It was possible to reconstruct the measures for the period before the performance measures were developed (in the period June 2008 - May 2009) because the measures are based on information already present within the IT-systems of the company.

[Insert Table 3 around here.]

3.4.4 Questionnaire

In June 2009, 25 maintenance technicians completed a questionnaire measuring *Attitude*, *Social pressure* and *Capability* to take initiative, and employee initiative itself (see Appendix). To measure *Employee initiative*, we used Frese and Fay's (2003, p. 14) often used and thoroughly validated items. We used a 7-point Likert scale with anchors "totally disagree–totally agree." Earlier studies reported Cronbach's alphas of .80 (Frese et al., 1997) and .92 (Den Hartog and Belschak, 2007). In the present study Cronbach's alpha was .79.

Attitude, *Social pressure* and *Capability* to take initiative were each measured by four items (again using a 7-point Likert scale with anchors "totally disagree–totally agree") that were constructed following Francis et al. (2004). Cronbach's alphas were .91 for *Attitude* and .66 for *Social pressure*, but only .20 for *Capability* to take initiative. In hindsight, we concluded two items that measured *Capability* did not really measure what we had intended. Deleting them increased Cronbach's alpha to .36, which of course was still unacceptably low.

[4] It was not possible to develop performance measures with the other groups ("planned maintenance" and "machine failures") mainly because the IT-system was not capable of generating such measures, and higher management did not want to invest in adjusting the extant IT-system. This does not mean that these themes were irrelevant for top management. Managers repeatedly told us these themes were vital to the organization. They already had one employee working on defining the requirements of such an IT-system (for managerial purposes) before our project started. But that project was cancelled after the take-over when the company was not allowed to make such investment decisions in the remaining time of the study. We focused on the effects of those performance measures that were put into practice, rather than the ones that were not, to better understand why *PM participation* can lead to more *Employee initiative*. We refer to Bourne and colleagues (Bourne, 2005; Bourne et al., 2002) for more information about why some performance measurement initiatives succeed and others do not.

Since there was no better alternative, we nevertheless used this scale. As a robustness check we also performed all analyses with the single item that best represents the *Capability* construct (*I am confident that I could think up and carry out improvement ideas by myself*). In all other measures the scale scores were based on the average of the items.

4. Results

4.1 Results of the model

Propositions 1-3 are based on both qualitative and archival data. They state that *PM participation* affects the three TPB variables (*Attitude*, *Social pressure*, and *Capability* to initiative). We investigated whether the maintenance technicians improved on these variables and on the developed performance measures. As a reference point, Table 4 gives index numbers of the production level of each line per month. Propositions 4a-c are examined based on the questionnaire data.

[Insert Table 4 around here.]

4.1.1 PM participation and Attitude to take initiative

Attitude before—At the outset of the study, several people in the company felt the maintenance technicians' work attitudes would be quite negative, mainly because they had been subjected to several failed organizational changes in recent years. Amidst this skepticism, the manager of the bottling department was clearly perplexed in stating that "everyone has good intentions, but somehow improvement is not achieved." These good intentions were confirmed in nearly all the interviews held before the performance measures were developed: 29 out of 34 technicians said they felt positive about taking an initiative, 4 were neither positive nor negative, and only 1 was negative about it (see Table 2).

We divided the technicians' responses to the interview questions regarding *Attitude* into four aspects: "part of the job," "fun," "experience" and "appreciation" (see Table 2). Many technicians during the interview noted they already considered improvement as part of

their job, and some of them explicitly stated they liked it, or they had had earlier positive experiences with improvement efforts. Nevertheless, at the same time many complained about the lack of appreciation they received from management. “We only hear from them when we have done something wrong” was a common sentiment. This was corroborated by the interim manager of the maintenance department who repeatedly said: “The motivation of the maintenance technicians to come forward with improvement ideas is decreasing more and more, because they never get feedback on the results of their ideas.” Thus, any improvement in employees’ *Attitude* should be visible in the “appreciation” aspect.

Attitude after—In November 2008, when most of the performance measures had already been implemented, the maintenance managers mentioned: “The maintenance technicians now talk to each other about the performance measures and about what could be improved.” A month later one of the maintenance managers reported that the technicians were actually checking the results of each performance measure update. Moreover, during the daily line meetings, both the action researcher and the maintenance managers noted that the maintenance technicians now seemed to be focused more on improving than before. Example 1 shows the most prominent case of improved *Attitude* during the development of the performance measures.

Example 1–Rejection of under-filled bottles on bottling line 4. In October 2008 the maintenance technicians reviewed the output from the first version of the performance measure “rejection of under-filled bottles” (see Table 5 for this performance measure’s data) in which all but one bottling line had a rejection percentage of about 0.2% or lower. Line 4 was the exception—it had a mean rejection percentage of about 0.5% (SD = $1.1*10^{-3}$) from June through October. The technicians of that line were shocked and aimed to lower that percentage to 0.2%. They became eager to improve this percentage after seeing the current performance of the other lines, so the next month they revised their line. The mean rejection

percentage was indeed on average 0.2% (SD = $0.9*10^{-3}$) for the next seven months (November through to May), a statistically significant improvement ($T(7) = 4.94$; $p<.001$). In March 2009 the percentage rose, but this problem was quickly resolved without any interference by the maintenance managers.

[Insert Table 5 around here.]

In this example, the maintenance technicians found it obvious that putting effort into improving the percentage was worthwhile. In contrast, in the following example the technicians did not see the benefit—at least not initially. They needed additional information about the costs before they were willing to make improvement efforts.

Example 2–Use of water and compressed air on all bottling lines. The early versions of the performance measures regarding energy use did not immediately lead to better results. When in December 2008 the energy costs in the bottling department were made explicit, and known to everyone, the maintenance technicians were very surprised to learn that the total energy costs of the department were equal to that of at least ten full time employees. The technicians thereafter commented that this financial aspect of the performance measure motivated them to improve. They stated they had simply not realized the scale of the benefit to be gained from improving that particular aspect of their work.

By February 2009 the use of water (see Table 6) improved. In the first eight months the realized performance was .5% better than the target (SD=6%). For the months February-May 2009 it was on average 18% (SD=6%) better than the target: a statistically significant improvement ($T(6) = -4.69$; $p<.01$). This statically significant improvement did not extend to compressed air (see Table 7), primarily due to a defect in the bottling line machinery that resulted in a major negative result in April 2009 (-27% compared to the target). However, when we remove this outlier, there is a statistically significant improvement: in the first eight

months they were on average .1% (SD = 5%) better than the target, and in February, March and May 2009 they were 14% (SD = 5%) better than the target ($T(4) = -4.24$; $p<.01$).

[Insert Table 6 and 7 around here.]

In the evaluation sessions the maintenance technicians praised the fact that the newly developed performance measures allowed them to see how well they were doing their job. This gave them a feeling of appreciation, which was further reinforced when their managers also used the information from the performance measures to compliment them for their work. Before the performance measures were put into play such positive feedback had hardly ever been received. This indicates that the "appreciation" area of *Attitude* had improved. In the section "Attitude before," we claimed that this area of *Attitude* needed the most improvement. These changes in patterns of behavior support Proposition 1.

4.1.2 PM participation and Social pressure to take initiative

PM participation also increased *Social pressure* to take initiative (Proposition 2). We will again examine this relation through the use of qualitative and archival data.

Social pressure before—In the initial interviews we asked the maintenance technicians what they thought colleagues would think of them were they themselves to come up with improvement ideas. Out of the 34, twenty-three of them thought their colleagues would react positively (see Table 2), and the others said that should some colleagues react negatively it would not stop them from consulting with colleagues. We asked the maintenance technicians which groups or persons they thought would be *explicitly* positive or negative to the creation and the implementation of improvement ideas (as mentioned in Section 3.4.2). They mentioned other "maintenance engineers," "line operators," their "managers," and "the company," and they expected mostly positive responses (see Table 2). On the other hand, some could also think of negative responses from their fellow maintenance technicians and line operators: if the performance of the machines improves "too much" both line operators

and maintenance technicians would have to fear for their jobs. Yet at the time of the interviews they had not thought this fear was realistic. In summary, most maintenance technicians felt that the social pressure was directed towards taking more initiative, some felt the social pressure was against taking more initiatives and some did not feel it at all. In other words, there was a broad mix of interpretations of colleagues' opinions regarding taking more initiatives.

Social pressure after—Our qualitative data suggest that the performance measures made it explicit that improvement was expected. The performance measures provided the maintenance technicians with a target that was developed together with people who are important to them. Consequently, it was a manifestation of *Social pressure*. This target was an explicit goal in Example 2 above. However, even when no explicit goal was set, we did find instances where the performance improved after the performance measures were discussed during the daily-line meeting. Example 3 illustrates this and together with Example 2 supports Proposition 2.

Example 3–Use of compressed air on bottling line 5. The performance measure "use of compressed air" (see Table 7) showed that bottling line 5 had used on average 10,556 Nm^3 (SD=962) compressed air per month over the previous seven months, despite rarely being in operation. When in December 2008 the maintenance manager and technicians discussed this at a daily line meeting they quickly concluded the strong discrepancy implied there were leakages. They all agreed they would try to find and repair them soon. Afterwards the amount of compressed air used by that line dropped significantly to an average of 5,518 Nm^3 (SD = 2,000) over the following five months ($T(5) = 5.22$; $p<.01$).

4.1.3 PM participation and Capability to take initiative

Finally, we will discuss how *PM participation* helped to increase *Capability* to take initiative (Proposition 3).

Capability before—Most maintenance technicians said in the interviews that they felt capable of showing initiative in their work (30 of the 34, see Table 2). Triggered by the question "are there any factors or conditions that hinder or facilitate you in finding and implementing improvement ideas?" they discussed several aspects of their work regarding their *Capability* to take initiative. We summarized them as: "knowledge, skills and ability," "opportunity," "facilitation by the manager," "time," "money," and "communication and cooperation." The performance measures were expected to influence all of these aspects.

Initially, the maintenance technicians' "knowledge, skills and abilities" seemed to be operating satisfactorily (see Table 2). Many technicians said they usually had answers to the problems that arose in the bottling department, and if not they were generally confident *someone* would know a solution. According to the previous interim manager of the maintenance department the education and knowledge level of the maintenance technicians was good; and current maintenance managers said the technicians knew the bottlenecks in the lines better than anyone. Accordingly, many indicated that there of course was ample "opportunity" to improve (see next line in Table 2), also because they were of the opinion that a lot went wrong in the bottling department.

With regard to "facilitation by the manager," the maintenance technicians noted that their managers did not take enough time to assess and approve their suggestions. They could thus not carry out all the possible improvements they had in mind, because they needed permission before trying to implement an improvement idea. In a similar vein some maintenance technicians found it difficult to convince the management to invest "time" and "money" (see Table 2) in projects resulting from their improvement ideas. The frustrated technicians coped with this inattention in different ways—some went to the head of the bottling-line, others to the maintenance managers, and others just ordered the materials they

needed directly from the planner. This may explain why some technicians say there is enough time and money to implement their own improvement ideas, while others do not.

Maintenance technicians reported high levels of bureaucracy within the company, which made implementing improvement ideas difficult and time-consuming. Some technicians reported that they were often sent “from pillar to post,” and eventually stopped trying. Other technicians stated that they did not always tell their managers about the improvement ideas they are implementing. This is a typical problem with regard to “communication and cooperation.” In May 2008 the daily line meetings were introduced (see Section 3.3) which positively influenced the information transfer between the technicians and their managers, and vice versa.

Capability after—One of the maintenance technicians of bottling line 4 stated that the performance measures’ most important contribution was that the technicians could finally demonstrate to the management the importance of improving the filler station of the bottling line. Consequently their manager was more supportive, allowing them to spend more “time” and “money” which helped them to decrease the rejection percentage due to under-filling (see Example 1 above). Thus, the aspects (Table 2) “support of manager,” “time” and “money” improved with the introduction of the performance measures.

“Communication and cooperation” improved somewhat with the introduction of the daily line meetings where both the maintenance manager and the maintenance technicians raised improvement ideas. Once the implementation of the performance measures began they started discussing improvement opportunities more routinely and in a structured manner, which further improved communication and cooperation in the maintenance department. Moreover, the development process itself led to more knowledge transfer between maintenance technicians. In the evaluation sessions, many technicians pointed with approval to the “discussions” during the sessions that “allowed them to learn from each other.”

In general the process of developing performance measures gave the maintenance technicians more insight into their own improvement opportunities. Before they became involved in the development of their own performance measures, they were unaware so many improvements were possible. Although they knew a lot was going wrong in the maintenance department, they failed to accurately grasp what the problems were or how to solve them. The development process and the performance measures made them more competent to upgrade their overall performance. We see this change as supporting Proposition 3.

The next example, one in which the performance measures did not improve *Capability*, may show that the *Capability* to take initiative is a necessary condition for actually taking initiative.

Example 4–Use of electricity on all bottling lines. In Example 2 we saw that the maintenance technicians managed to increase the performance with regard to the use of water and compressed air. The same group of technicians developed the measure for the use of electricity (Table 8). However, during one of the first meetings, the maintenance technicians mentioned that they had no influence over the use of electricity. They said that it was not up to them to implement all the electricity-use improvement ideas they had written down at the brain-write session. The intended performance measure had nevertheless been developed, but at the time the action researcher left the company the technicians were still unable to improve the situation.

[Insert Table 8 around here.]

4.1.4 TPB antecedents and Employee initiative

The questionnaire data provide the basis for examining Propositions 4a-c. Table 9 shows the correlations between all variables, including many demographic variables. The significant correlations found between all TPB variables and *Employee initiative* seem to

support P4a-c (P4a: r=.58, p<.01; P4b: r=.43, p<.05; P4c: r=.38, p<.05[5]). Moreover, we find a significant correlation between *Attitude* and *Social pressure* to take initiative (r=.68, p<.01). Table 10 shows the results of the regression analysis used to determine which variables contribute most to the variance in *Employee initiative*. Since we neither found any correlations between any of the demographic variables and any of the variables of the model, nor had a theoretical reason to expect such a relation, demographic variables should not be included in the regression specifications (Becker, 2005). The link between *Capability* and *Employee initiative* is the only factor that remains significant when all the variables are analyzed at the same time.

[Insert Table 9 and 10 around here.]

4.2. Influence of PM participation

In sections 4.1.1-4.1.3 we have shown that the *Attitude, Social pressure* and *Capability* to take initiative all increased after the departmental performance measures were implemented. A key question is: was the participatory nature of the intervention process important for this result, or would top-down development of the performance measures have generated the same desirable effects? The following example indicates that indeed participation did matter. It shows that the maintenance technicians—who were involved in the development process—took action when the performance in the measures decreased; whereas the responsible maintenance manager—who was not directly involved in the development process—did not take any action because he did not believe the numbers.

Example 5–Rejection of under-filled bottles on bottling lines 2 and 3. When the performance measure "rejection of under-filled bottles" (Table 5) was made, the maintenance technicians of bottling lines 2 and 3 were convinced that their rejection percentage due to

[5] When *Capability* is only measured with the item that best represents the construct (*I am confident that I could think up and carry out improvement ideas by myself*), the significance levels are the same in both the correlation and regression analyses.

under-filling was already satisfactory. Yet about one month later, following changes made to bottling lines 2 and 3, the rejection percentages of these two lines began rising. Bottling line 2's percentage rose because the line began to be used for small batches only, and batch changes are always followed by under-filling. The maintenance technicians were familiar with this and believed they were thus unable to reach the target again. Regarding bottling line 3, the maintenance technicians took action after recognizing the decreased performance on the measure was stable, leading them to believe the target could only be reached again if they themselves improved the bottling line. Just before the performance was satisfactory again, in March 2009, the responsible maintenance manager —who had not attended the sessions—saw the decreased performance on the measures. He stated he did not believe those statistics because he was (falsely) convinced that it was impossible to perform badly on under-filling and be satisfactory in terms of line efficiency at the same time. Participation in the development of the performance measure on under-filling seems to explain why the technicians felt they should improve, while the manager did not.

We have another indication that *PM participation* worked well in this setting. Initially, when we told some maintenance technicians that we were going to develop performance indicators together with them, they reacted negatively. Examples of their reactions are: "That is impossible for such a complicated process" and "I don't think we should be evaluated." The action researcher said that she would actively help them and that the resulting performance measures would only be used to facilitate them in their jobs. The maintenance manager who was present endorsed this process. Contrary to their earlier negative reactions, in the evaluation sessions after the performance measures were developed, these same technicians were now convinced of the value of using performance measures. They had come around to the idea the measures really showed how they performed and these positive results were a consequence of the specific process that was used. They especially liked the fact that the

process was begun with them thinking of improvement ideas, because that made the performance indicators more prospectively relevant to them. Table 11 shows these and the other reactions during the evaluation sessions.

[Insert Table 11 around here.]

Although they were disappointed about not being able to realize their ideas, the maintenance technicians that were not allowed to implement their performance indicators were positive about the process. They said the process had helped them to understand what performance measures are and how to use them. Moreover, they valued the fact they were finally able to speak constructively to their colleagues in other parts of the department. Moreover, they were excited about the large number of improvement ideas that came up during the brain-write sessions.

4.3 Quality of the measures

We think that the positive influence of *PM participation* on the behavior of employees partly occurred because involving employees leads to better quality performance measures. In terms of Moers (2006), quality consists of precision, sensitivity and verifiability of performance measures, which were all positively influenced by the participatory development process. Verifiability increased because the performance measures were based on sources that were identified by the maintenance technicians, so they knew exactly where the numbers originated. Moreover, discussions of prototypes sometimes led to better precision and sensitivity in the performance measures (see Example 6).

Example 6–Use of electricity prototypes. The first version of the performance measure "use of electricity" was developed by the action researcher. It was based on the maintenance technicians' initial answers to the performance measurement record sheet, and conversations with a staff employee of the bottling department well versed in the information system that stores information about the use of electricity in the bottling department. The first prototype

included every kind of electricity use the information system contained pertaining to the bottling department. When the prototype was discussed with the maintenance technicians at the next session they indicated that many of these identified electricity usage points were actually not part of the bottling department. These usage points were thus eliminated from the next prototype in order to make the measures more precise. Moreover, the maintenance technicians wanted to exclude the battery charging station of the fork-lift trucks, because this used a constant amount of electricity throughout all of the previous months. This narrowing of the energy use performance measure also increased the sensitivity of this measure.

Another way in which the quality of the performance measures increased is detailed in Example 7.

Example 7–Use of water on bottling line 1. In the first week of December 2008, the maintenance technicians discussed the performance measures at a daily line meeting. They noticed the measures showed that the use of water on bottling line 1 had recently increased a lot. The person responsible for that line explained that this was due to a problem with the flow meter. Before the performance measures were developed, he would just have tolerated it and waited until someone from another department (responsible for the meters) made the discovery and took action to resolve it. Now, however, he took the initiative himself to have that department solve the problem quickly. Overcoming this faulty metering immediately increased the validity of the measurement data. The management also used this data for their own performance measures. Hence not only the quality of the maintenance technicians' performance measures improved, but also the quality of the performance measures of the managers.

4.4 Alternative explanations

Section 3.2.2 showed that the maintenance department faced some significant changes at the time of the development of the performance measures. These changes may have

influenced the attitude of the maintenance technicians, and thus provided an alternative explanation for our findings. First of all, the company was being reorganized with the expectation of lay-offs, resulting in insecurity among the maintenance technicians. When the maintenance technicians were filling in the questionnaire, many cynically remarked that we had arrived with "perfect timing." Asking them for clarification often resulted in a response like: "Because of the current reorganization, everybody is very negative." Yet in order to avoid losing their jobs the reorganization may have triggered the maintenance technicians to work harder. While losing their jobs based on their performance was not very likely[6], the upcoming lay-offs in the maintenance department may have given some workers a sense of urgency about the need to improve. Indeed, the next example shows that some of the registered improvements were anomalous—they could not be explained by an increase in improvement initiatives after the performance measures were developed.

Example 8–Rejection of empty bottles on bottling lines 2 and 4. After the performance measures were introduced three of four bottling lines showed a small but statistically significant ($p<.05$) improvement in the empty bottle rejection rate (Table 12). Yet the action researcher who often attended daily line meetings never observed any discussions between the maintenance technicians about this performance aspect, nor any overt attempt to improve the reported performance. So besides a possible contagion effect, there was no evidence whatsoever the developed performance measures had anything to do with that improvement. Hence there may have been another force—such as the reorganization—that caused this effect. However, the performance improvement in the other examples—that supported our propositions—is much higher than the improvement shown in Example 8. In other words, the best inference to draw is that the improvement initiatives after the performance measures were developed probably had an incremental effect on the performance, more than any other factor.

[6] In accordance with Dutch labor-law regulations, the selection of which maintenance technicians were to lose their jobs was based on criteria of age and tenure (last-in, first-out per age group), rather than performance.

Therefore, in general it is reasonable to contend that the employees' involvement in and influence on the development of the performance measures played a key part in the realized improvements.

[Insert Table 12 around here.]

Another important change was the recent replacement of one of the two maintenance managers, as mentioned in Section 3. While it is difficult to compare their performance because the lines they supervised were so different, we did see performance improvements in the lines of both managers. Thus, it does not seem likely that differences between these managers provide alternative explanations for the reported results.

Finally, our entire "package" of the intervention to develop performance measures in a participatory way will have contributed to an increase in *Employee initiative*, rather than only "participation." For example, the simple fact that the employees were told from the beginning they would be expected to take more initiative may have explained the increase in initiative. However, this was an important step in the intervention process and it is consistent with TPB being transparent and explicit about the intended behavioral change of participants. This entire project was not an experiment wherein the objectives should be kept secret from the subjects. To the contrary, we think telling the objective was an important element of the approach taken for participatively developing performance measures—albeit not sufficient. Perhaps the social pressure towards taking initiative increased a bit, because it made the technicians start to recognize what was expected of them. But it is unlikely that it would have an influence on *Attitude* and *Capability*. Since *Capability* seems to be a necessary condition to increase employee initiative (see Section 4.1.3), we think more was needed than just communicating the purpose of the project.

Another possible alternative explanation for the increase in *Employee initiative* with regard to the development process that was used is the fact the process started with thinking

of improvement ideas before the performance measures were even developed. Again, this was helpful for reaching the goals and a deliberate part of the participative approach for developing performance measures, but not sufficient. We only saw attempts to actually improve after the performance measures were in use, but not immediately after the brain write sessions in which the technicians had to write down as many improvement ideas as possible. If those early meetings in September 2008 had indeed led to more *Employee initiative,* we would have detected improvements in departmental performance by October or at least November. However, the evidence in Tables 4-7 and 11 tells a different story—the first improvements were realized only right after the measures were put to use.

5. Discussion

In this study, we developed a model that explains why *PM participation* influences *Employee initiative*. We provided empirical support for the propositions. Our main findings showed that the performance measures developed in a participatory fashion can improve: (1) *Attitude*—due to feedback on the outcomes of improvement initiatives; (2) *Social pressure*—because it provided the maintenance technicians with shared priorities and targets; and (3) *Capability*—because the performance measures uncovered various improvement opportunities. These variables in turn positively influenced *Employee initiative*. Questionnaire results show that all three—*Attitude*, *Social pressure*, and *Capability*—are significantly correlated with *Employee initiative*. However, only the relation with *Capability* remains significant when all the variables are analyzed at the same time.

We found no support for alternative explanations, and we found one unexpected strong relation, namely a correlation between *Attitude* and *Social pressure* to take initiative. This supports a slightly different representation of our model wherein *Social pressure* indirectly leads to *Employee initiative* via *Attitude* to take initiative (cf. Chang, 1998; Vallerand et al., 1992). Chang's (1998) explanation for this is that people base their attitude

towards performing a certain behavior on how others who are important to them consider the behavior. Our qualitative results provide some suggestive support for this interpretation: In the examples we saw that the *Attitude* to take initiative was mainly influenced by the feedback the employees received from the performance measures that they had developed together with peers and managers, which are both manifestations of *Social pressure*.

Describing how operational employees were involved in the process of developing performance measures is a further contribution of this research, because this bottom-up approach has received little attention in the accounting literature so far (Otley, 1999; Abernethy and Bouwens, 2005). Importantly, we made it clear from the beginning that the performance measures were intended to help the employees taking the initiative to improve the performance of their department, and not as a control device for management. To make sure that the performance measures were in line with the goals of the organization, the technicians were divided into four groups. The process began by soliciting operational improvement ideas during the groups' meetings, using a so-called brain-write. Performance measures were then developed iteratively at several subsequent group sessions. In many of these meetings prototype versions which were based on actual data were discussed (Wouters and Roijmans, 2010). The process was facilitated in a *nuanced* way. The main action researcher presented herself as a process facilitator who would help the employees to get their own ideas to work and thus increase productivity, instead of as an expert who introduces contextually ambiguous new ideas. She sought to maintain a careful balance between listening and proposing new measurement ideas. She had a broad knowledge of the performance measurement literature and previous performance measurement projects, and she was familiar with complex information systems. She used this expertise to not only assure their engagement for this work; she had a far more demanding job—asked countless questions

and follow-ups; building collaborative prototypes; asking for continual feedback and resolutions; bringing fresh ideas to the table; and challenging constructively extant ideas, etc.

Since the action researcher plays a key role within the process of developing the performance measures, a relevant question is if the results are driven by the researcher instead of the development process: Would the results have been the same had another action researcher directed the actions, or would the same researcher have achieved the same results in other ways? In Section 3.3 we tried to be very clear about the intervention in order to make it replicable. In fact, a very similar intervention has been conducted among the employees of a public sector call center by another action-researcher (Gravesteijn et al. 2011; Groen et al. 2011). In that study it was found that employees also showed more *Employee initiative*, resulting in many small performance improvements. In both projects the facilitative project-management role of the action researcher as well as the new participatively built performance measures seemed essential. We cannot conclude definitively whether the same researcher would have achieved the same results in other ways, but we do believe that such would be very unlikely.

Developing performance measures together with the maintenance technicians had a positive effect on their *Attitude*, *Social pressure*, and *Capability* to take initiative, which in turn affected their behavior regarding taking more initiatives for performance improvement. To affect behavior on a continuing basis, *Attitude*, *Social pressure* and *Capability* should be kept at the same level as after the intervention, until the new behavior becomes habitual (Ajzen, 1991). Our model does not extend to that longer-term aim. We only explain and observe behavior in direct relationship to the intervention aimed at changing the behavior in the near term; sustaining the desired behavior is another critically important issue but is not within the scope of this study.

Since we found a positive effect of an intervention on the behavior of employees, a comparison with the Hawthorne studies is relevant. These studies showed a change in employee behavior after the employees participated in an intervention that could not be explained by the intervention itself. This is often termed "the Hawthorne effect." In hindsight the behavioral changes in these classical studies were explained in several ways, such as due to changes in employees' attitude, interpersonal relationships, acquiring skill, awareness of being under study, continuous feedback, or supervision (Wickström and Bendix, 2000). We explicitly addressed similar effects in the present study. The first three alternative explanations for the Hawthorne studies' results are included in our model in the form of *Attitude*, *Social pressure*, and *Capability*. We do not know whether awareness of being under study played a part in the results, but we do know that influence of continuous feedback and supervision was present in this study. These were part of our intervention and necessary to develop useful performance measures together with the employees, and to eventually get the positive changes in behavior. However, as similarly discussed in Section 4.4, just conditions of being under study and continuous feedback and supervision do not explain why improvements were only found immediately after the performance measures were in use. This supports our conclusion that participatorily-developed performance measures may positively affect *Employee initiative*.

Limitations of our research design are that the results are built on only one company, and that we do not know if all the relations hold were they analyzed together in one model. In addition, since we only developed the performance measures in a participative way, it was not possible to compare it to a situation in which performance measures were made without the participation of employees. It would be desirable to conduct a large-scale, cross-sectional quantitative study, testing the whole model with varying degrees of participation.

Furthermore, inasmuch as action research is inherently an iterative and selective process of theory development and data gathering, researcher bias may play a role (Maxwell, 2005).

Given these caveats, the fact remains that the strength of this research method is that it allowed the gathering of triangulated data, including the observing of the processes first-hand. From the start, we were challenged to demonstrate that company-university cooperation could lead to innovative results that could be implemented straightaway and be of practical relevance to the company. The employees were surprisingly cooperative and helpful in trying to make their work more measureable. There was a remarkable change from “this won’t work in our situation” to “now we know what performance measures can do for us.” We found that positive effects were brought about despite—or maybe because of—the fact that performance measures were not used for formal evaluations by management. The employees became quickly engaged and expected that spending time with the researchers would be worthwhile *for them*. It was extraordinarily interactive, the complete opposite from the commonplace top-down linear process where the researchers design frameworks and the company implements them. Our journey of collaborative discovery (Van de Ven and Johnson, 2006) helped to better understand how employees can together develop their own departmental performance measures, and why this may lead them to take useful initiatives for operational performance improvement.

Role of the funding source

The company of our study provided financial support for the research, in exchange for which the action researcher spent 60% of her time at the company to develop and implement performance measures together with the departmental employees. The goals formulated by the company, following several discussions with the researchers, were (1) stimulating employees to take more initiative and (2) increasing the performance of the department. Consequently the study was designed as action research, to be focused on *Employee initiative*

and *Departmental performance*. We were free to use any other instrument that would help us to reach our practical and/or scientific goals. Data collection and analysis were done by one action researcher who was guided in the entire process by two university-based senior researchers. The report was written by the three researchers, and after completion the company consented to its publication under the condition of making minor adjustments only in terms of the level of detail in which the departmental performance data were presented in Table 4, because it revealed production volume data.

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Appendix–Measurement instruments

Answering format for all items in the questionnaire: 1. totally disagree – 7. totally agree

Items "Attitude to take initiative"
1. Thinking up and carrying out improvement ideas by myself is pleasant
2. Thinking up and carrying out improvement ideas by myself is useful
3. Thinking up and carrying out improvement ideas by myself is positive
4. Thinking up and carrying out improvement ideas by myself is good

Items "Social pressure to take initiative"
Most people within <<the company>> who are important to me…
1. ...expect of me to think up and carry out improvement ideas by myself
2. ...want me to think up and carry out improvement ideas by myself
3. ...think that I should think up and carry out improvement ideas by myself
4. I feel social pressure to think up and carry out improvement ideas by myself

Items "Capability to take initiative"
1. I am confident that I could think up and carry out improvement ideas by myself
2. It is easy for me to think up and carry out improvement ideas by myself
3. There are factors that make it difficult for me to think up and carry out improvement ideas by myself (recoded and deleted)
4. It is possible for me to think up and carry out improvement ideas by myself (deleted)

Items "Employee initiative"
1. I actively attack problems.
2. Whenever something goes wrong, I search for a solution immediately.
3. Whenever there is a chance to get actively involved, I take it.
4. I take initiative immediately even when others don't.
5. I use opportunities quickly in order to attain my goals.
6. Usually I do more than I am asked to do.
7. I am particularly good at realizing ideas.

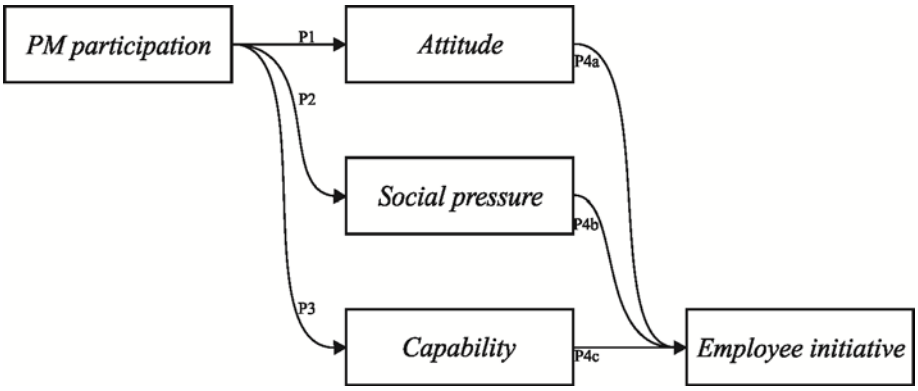

Figure 1 Proposed model of the study

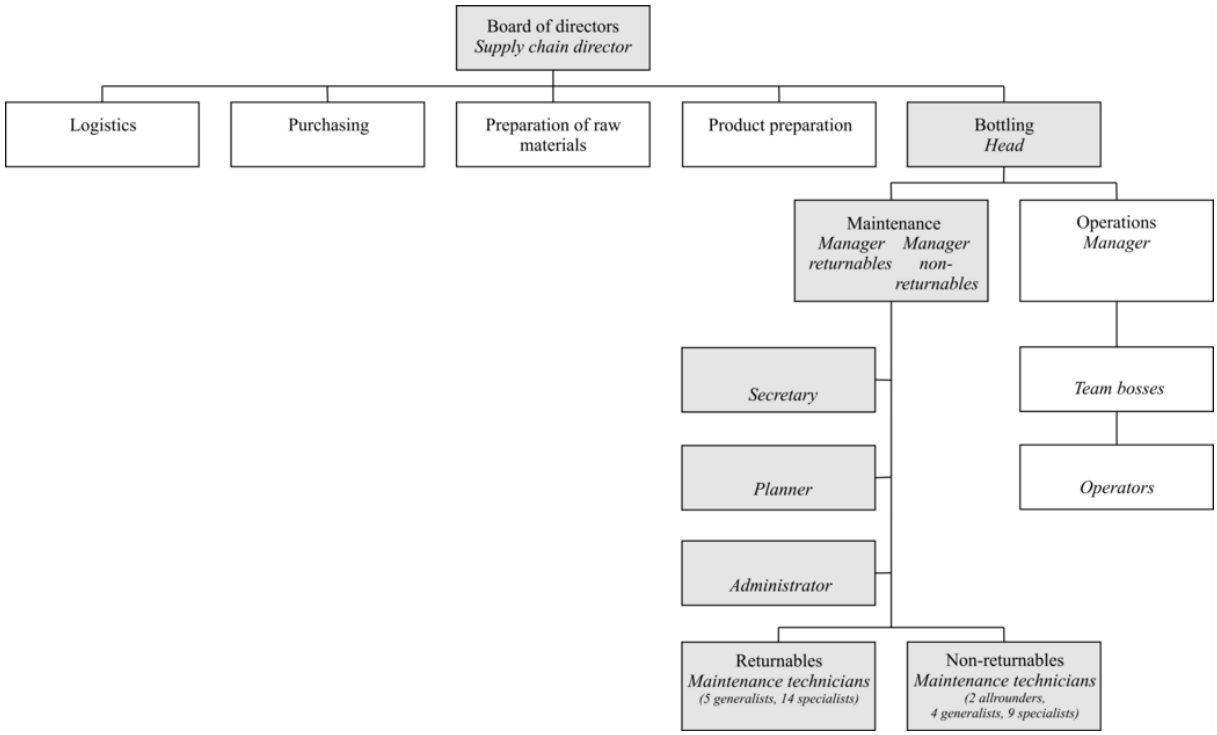

Figure 2 Part of the company's organization chart including the stakeholders of the study

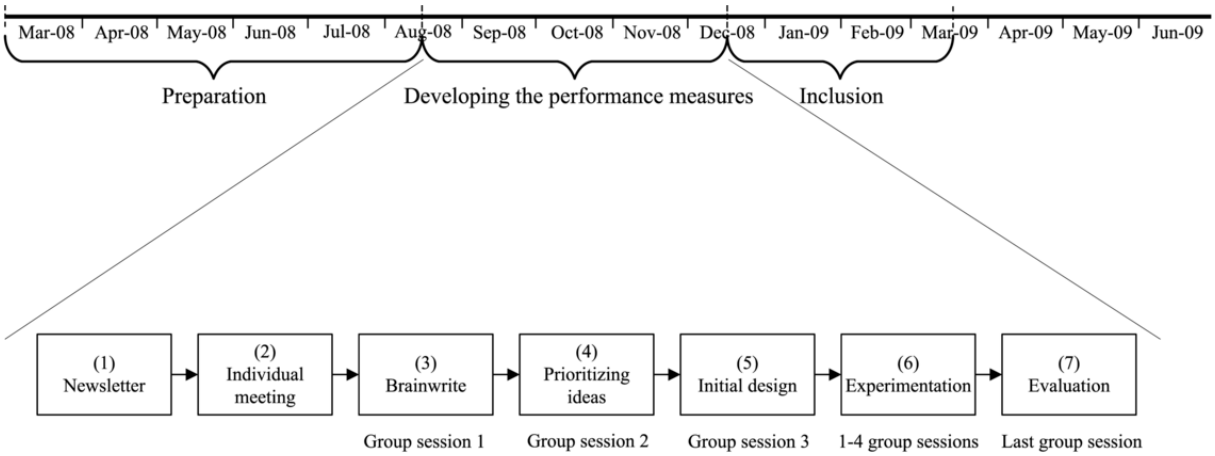

Figure 3 Time line of the study