Effects of staff bonus systems on safety behaviors☆,☆☆

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ABSTRACT

Bonus systems are a common means in trying to motivate employees to perform well. However, there is still disagreement regarding the effects of bonus systems. Some theories even suggest that such systems could cause an increase in risk-behavior. This makes further research regarding bonus systems warranted, especially when applied in high-risk organizations. This study aims to explore potential effects on safety-related behavior associated with bonus systems currently used at Swedish nuclear power plants. Fifteen semi-structured interviews with employees were performed based on an eclectically composed framework from motivational and organizational theories. Results do not indicate any negative effects on safety-related behaviors, but rather that safety behaviors may be promoted insofar as bonus rewards are linked to performance goals concerning safety. Differences in bonus system design appeared to affect behavioral outcomes. The comparative and qualitative approach of this study contributes valuable information by highlighting the types of factors that may serve to stimulate greater incentive for employees to engage in safe behavior.

1. Introduction

A large proportion of companies around the world are presently making use of monetary incentives in the form of so-called bonus systems in order to motivate employees to perform better (Patton, 1972). However, there are still disagreements regarding the real effect of bonuses on motivation and performance (Pfeffer, 1997). While a few studies have found indications of increased motivation and improved performance due to monetary incentives such as bonuses under some conditions (e.g. Engellandt & Riphahn, 2011; Kahn & Sherer, 1990), there are also studies showing no or even negative effects of incentive systems.

Workplace accidents are increasingly common and one of the biggest issues facing employers today is the safety of their employees. Organizational practices that promote safety are vital for organizations in general and high-risk organizations in particular. As a consequence, many high-risk organizations use bonus systems that are more or less directed towards achieving safety through improved safety-related performance among its employees. However, empirical research is scant regarding the effects of these systems and the results from the little research that has been conducted are mixed as well. Some evidence suggests that bonus systems that reward safety behavior could result in a decreased accident frequency (Goodrum & Gangwar, 2004). However, other research suggests that bonus systems designed to reward employees for working injury-free over a set period of time could be detrimental due to underreporting of accidents as a result of fear among the workforce of losing their

bonus. This could result in continuing problems and risks that may otherwise have been attended to (Cooper, 2001; Miozza & Wyld, 2002).

Given the ambiguous empirical evidence of the effects of bonus systems, organizations making use of these kinds of systems take an imminent risk of obtaining unintended, and even undesirable, effects. This could be especially harmful to certain kinds of organizations, such as those dealing with operations involving high risks. Several reviews indicate that bonuses could be particularly detrimental to performance when the task is intrinsically interesting enough and when the task is complex enough that flexible thinking is needed (e.g. McGraw, 1978). Considering the complexity and high technology characterizing the environment in many high reliability organizations (HRO's), these findings implicate that bonus systems could potentially pose a threat to safety. This may be especially relevant when confronted with an accident situation where complexity and ambiguity are particularly evident. More research is therefore warranted regarding which factors involved in bonus systems that are perceived as motivating by the employees and in extension, that promote safety-related behaviors.

The aim of the present field study was to find out whether bonus systems could compromise safety in nuclear power plants and other high-risk organizations. The main question concerned the potential effects on motivation and safety-related behavior that could be associated with the use of bonus systems by identifying factors that could possibly affect safety via changes in behavior. The data used in the study comes from in-depth interviews with employees at three Swedish nuclear power plants where employee bonus systems are currently applied. The systems applied at the three plants have considerable differences in design, which enabled a tentative comparative analysis of the perceived motivational effects due to these differences.

The study also innovates by adopting a qualitative approach using a theoretical analysis and in-depth interviews in investigating potential behavioral effects. To date, qualitative approaches such as in the present study are unusual when it comes to examination of monetary rewards and safety. The more frequently used quantitative studies in the field offer valuable information about relations between different factors, such as between the application of bonus systems and particular safety outcomes, but they do not provide us with any deeper understanding of the underlying causes of those relations. The qualitative and comparative nature of this study could contribute by reducing the gap between research and practice in the application of bonus systems in high-risk organizations. This could be achieved through the offering of valuable information in this regard by highlighting the types of factors and goals that may serve to stimulate greater incentive for employees to avoid risk and engage in safe behavior.

1.1. Bonus systems

Almost all organizations pay their employee for the work that they do, but there are considerable differences in the extent to which the pay system is related to performance. Many organizations make use of different types of performance-related pay systems, based on the general idea that employees should be motivated to work harder because they see the connection between job performance and reward. Nevertheless, the design of such systems can differ in terms of who is included (on which levels), how performance is measured and which incentives are used (money, shares etc.). Many different names are used to indicate the type of performance-related pay system, but the distinctions are not always clear-cut. A system where employees receive a guaranteed weekly or monthly wage, plus a bonus based on their performance is often called a bonus system. Productivity measures could be based on either the performance of the individual, a group (e.g. team or department) or the whole organization (Furnham, 2008). According to agency theory the relationship between the principal and the agent is crucial for the individual's behavior and performances and the focus of the theory is to determine the most efficient contract governing this relationship, often assuming that people are driven by self-interest, bounded rationality, and risk aversion (Eisenhardt, 1989). The question is, if a behavior oriented relationship or contract focused on bonuses for "right" behavior is the most efficient way of compensating the employees.

Economic theory often assumes that monetary incentives drive or even improve individuals' performances while for example many psychologists argue for a reverse scenario (Gneezy & Rustichini, 2000). In a frequently cited meta-analysis Deci, Koestner, and Ryan (1999) concluded that tangible rewards in general had a negative impact on individuals' intrinsic motivation. It has also been argued for that implementation of reward systems in organizations often are accompanied by increasing surveillance and evaluation as well as increased competition which have also been found to have a negative impact on intrinsic motivation (Deci & Ryan, 1985; Lepper & Green, 1975). However, in a comment and re-run of the Deci et al. (1999) meta-analysis, Eisenberger, Pierce, and Cameron (1999) found the results presented by Deci et al. questionable and argued that rewards in fact increased autonomy, decreased negative impact on intrinsic motivation and that the effects of rewards on motivation were dependent on the motivation measure used. In a series of controlled experiments Gneezy and Rustichini (2000) concluded that subjects that were offered monetary rewards performed more poorly as compared to subjects that were offered no monetary incentives. The authors also concluded that, if a monetary incentive was offered the performance of the subjects was dependent of the amount, a higher amount of money generated a higher performance. Yet, another meta-analysis found that the type of task that was to be performed moderated the relationship between pay for performance and actual performance, where pay for performance had a strong positive relationship with performance if the task was classified as non-interesting. If the task however, was perceived as interesting the relationship between pay for performance and actual performance tended to be negative (Weibel, Rost, & Osterloh, 2009).

The phenomenon that provision of extrinsic rewards can undermine intrinsic interest and motivation to perform task activities is known among economists and is discussed in terms of motivation crowding or crowding out effects (e.g. Frey & Jegen, 2001). Still, a thorough meta-analysis by Cameron and Pierce (1994) including 101 experimental studies between 1971 and 1991 contradicts the assumption that such a phenomenon may hold general relevance except for in extremely circumscribed conditions. Further, these findings are indirectly supported by another meta-analysis by Jenkins, Gupta, Mitra, and Shaw (1998) in

which 39 empirical studies from 1975 to 1996 were analyzed regarding how individual level financial incentives related to performance. Their results support the generalizability of a positive relationship between incentives and quantitative performance (i.e. doing more), this regardless of the type of task to be performed (intrinsic/extrinsic). For the purpose of our study, dealing with safety behaviors that are mostly about qualitative aspects of performance, it is relevant to note that this meta-analysis found no significant effect regarding qualitative behaviors (i.e. right/wrong) across the few studies in their material that used qualitative criteria.

It has also been argued that bonus systems often only reward observable goals, neglecting those which are more creative and constructive in the long run (Kerr, 1975) and that individually based rewards can reduce the incentive to cooperate (Lazear, 1989) and tend to create internal organizational conflict (Gabor, 1990). Even much of the traditional economical literature claiming to examine the effects of incentives is dubious due to the failure to control for a number of highly plausible alternative interpretations of the results. One problem seems to be the distinction between incentive effects, which are assumed to follow from increased motivation, and informational effects. Other than to motivate effort, bonus systems often tell people what is valued, expected and important in the particular setting (Pfeffer, 1997). In addition they can provide the employees with important feedback on their performance and productivity, which in turn can lead to increased motivation and behavioral effects (Hackman & Oldham, 1976). Despite this knowledge, virtually no studies have attempted to empirically examine the effects of bonuses with regard to these distinctions (Pfeffer, 1997).

Another distinction that can be made is to what degree the goals and rewards are individual or collective. Many researchers have focused on bonuses based on individual performance (Welbourne & Cable, 1995). However, some studies have also addressed the effects of group or organizational incentives on individual behavior and attitudes. For example, Wageman and Baker (1997) reported that task and reward interdependence had an interactive influence on group performances, other studies suggest that team based rewards may have positive effects on team members' motivation, performances, pay satisfaction and communication (Hertel, Konradt, & Orlikowski, 2004; Rack, Ellwart, Hertel, & Konradt, 2011). Also group or team based reward systems have been found to have a number of drawbacks (see Rynes, Gerhart, & Parks, 2005, for a review). One reason for this could be that the main focus has often been on bonus systems directed towards top management teams or CEO's (e.g. Jensen & Murphy, 1990; Kahn & Sherer, 1990; Patton, 1972). More studies about systems involving also regular employees are necessary in order to gain a better understanding of how bonuses could affect attitudes and behaviors at all levels within an organization.

1.2. Performance-related pay systems and safety

When it comes to which behaviors are affected by monetary rewards and how, several meta-analyses demonstrated positive effects in a number of areas, such as safety behaviors (Gerhart & Rynes, 2003). Other meta-analyses, or reviews, indicate that monetary rewards correlate positively with behavioral aspects that are quantitative (such as performing more and faster) but not with those that are qualitative (cf. Jenkins et al., 1998), and that such rewards affect performance in "dull" tasks that require the application of rules but not in "interesting" tasks and problem-solving tasks that require a more flexible way of thinking (Gagné & Forest, 2008; McGraw, 1978). Considering the potential need for flexible thinking and problem-solving capabilities in an emergency situation in HRO's, a bonus system might according to these views, if not pose a danger to the operations, at least be ineffective in affecting these behaviors positively.

Patton (1972) claims that bonus systems for managers often fail because of difficulties in measuring the behaviors fairly. When the division of bonuses is unequal between employees, especially among individuals who are similar in some way, envy can easily arise. Envy could, in turn, lead to a desire to restore equity by hurting those who have more than they seem to deserve (Elster, 1989; Frank, 1988). Perceived unfairness and envy could also lead to counter-productive behavior among employees (Cohen-Charash & Mueller, 2007), which could potentially compromise safety.

Research suggests that bonus systems that reward safety behavior could result in a decreased accident frequency (Goodrum & Gangwar, 2004). Others, however, claim that safety-focused bonus systems that reward employees for working injury-free over a set period of time could discourage workers from reporting injuries and illnesses. Thus, the apparent positive results from these systems could be hiding a constant or even higher rate of accidents (Cooper, 2001; Howe, 2000; Lawrence & Flanders, 2000; Miozza & Wyld, 2002). According to Howe (2000), this kind of systems achieves lower accident rates only by driving the problems underground and by making them invisible, ensuring that they will go uncorrected. Instead, it is suggested that safety bonus systems should not focus on outcome, such as accident rates, but rather on the behaviors required to achieve those outcomes. The safer behaviors of the employees do then lead to a real achievement of desired safety outcomes (Cooper, 2001). Examples of behaviors that could be rewarded are participating in safety-related activities such as safety-training sessions, actively identifying risks, reporting near misses, and making potentially viable suggestions about how to prevent risk. Systems designed to reward safe behaviors in this way have proven to be more effective also by contributing to an increased interest in and awareness of safety (Lawrence & Flanders, 2000).

Something that most researchers seem to agree on is that a successful safety-focused bonus system has to be part of a more overall safety strategy from the management, which would typically also include measures such as safety-related education programs, monitoring and communication. A safety program that targets one area, without addressing the others, is less likely to succeed (Glendinning, 2001; Miozza & Wyld, 2002). In addition, it is vital that different elements in the strategy do not include conflicting goals (McLain & Jarell, 2007). If safety bonus goals come into conflict with production bonus goals there is a risk that rewards associated with production may override rewards associated with safe performance. This is particularly relevant in organizations with a less developed safety climate, where leaders often prioritize production goals over safety goals, thereby

making some outcomes more desirable than others. In fact, findings show that a leadership style using contingent rewards has been associated with reduced minor injury rates only when mediated by a general safety climate in the organization (Zohar, 2002). In organizations with a prominent safety culture, safety is considered a high priority by the management. Consequently, even supervisors view safety as a legitimate performance goal.

The purpose of this study is to explore into potential effects on motivation for safety behaviors associated with the bonus systems at use in the three Swedish nuclear plants.

2. Methods

2.1. Elaboration of a theoretical framework

As part of the design of our study, one aim was to first establish which role monetary rewards in general might play according to a broader spectrum of theories. Hence, an elaboration of theories on motivation, organizational perspectives and previous research regarding safety-related bonus systems was performed. The intent with such an eclectic approach was to produce a theoretical frame of reference through the generation of different themes that were considered to be relevant for the functioning of bonus systems and, more specifically, safety behaviors. The theoretical models selected to provide the themes for the study were those that could in some way be related to the effects from monetary rewards, and none of them were therefore given overall precedence. The emerging themes were then used as a platform, both for the interviews with the employees at the power plants and for the subsequent interpretation of the data obtained from the interviews and from the mapping of the bonus systems (see Fig. 1).

2.2. An eclectic framework for exploring potential effects of bonus systems

Various types of theories on the assumed effects of rewards on motivation, performance and safety have been brought together with the purpose of forming a broad and eclectic theoretical framework for the present study. Table 1 shows a variety of aspects of possible relevance for the effects of bonus systems as such aspects are derived from theories or empirical evidence. As the various motivational and organizational theories referred to in the table are basic and well known they are not described in the text but samples of general references are given in Table 1. Based on the aspects listed in Table 1, seven major key themes were identified and used as a platform and guide for both the interviews and the analysis of data. Table 2 shows the overriding themes and the types of theories from which they were extracted.

2.3. Setting

The study was carried out at all three presently active Swedish nuclear power plants. All three plants had approximately 1000–1500 employees each and were about the same physical size (3–4 reactors each). They had similar hierarchical structures in which the service and support staffs worked directly under the CEO's. Each reactor encompassed a discrete production unit that was comprised of several subgroups (e.g., operator shift teams, maintenance teams). Today, the plants are all incorporated companies.
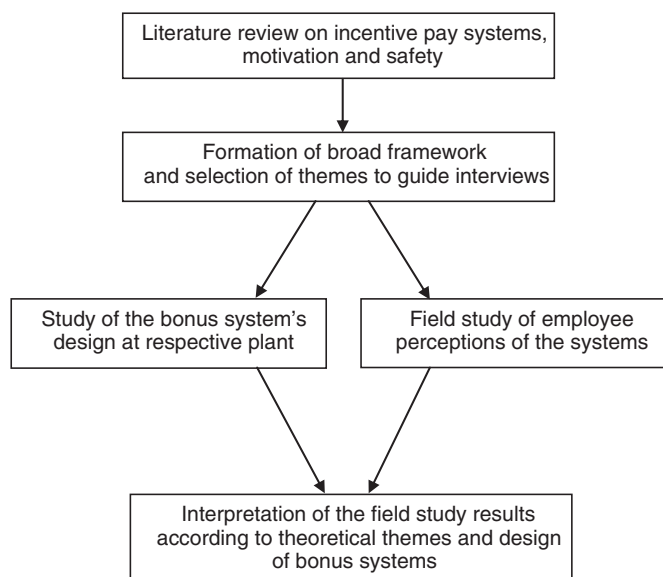

Fig. 1. Aim and procedure of the study.

Table 1
Key aspects of possible relevance for the effects of bonus systems according to theories and empirical evidence in the theoretical framework.

Theories/empirical evidence	Example references	Key aspects of theories	Keywords of aspects
Need theories	Herzberg (1966) Alderfer (1969) Hackman and Oldham (1976) Ryan and Deci (2000)	- Intrinsic rewards superior to extrinsic. - Rewards in accordance with needs of individual. - Aiming at commitment and satisfaction through participation and feedback.	Intrinsic/extrinsic Meaningfulness Satisfaction Participation Feedback
Equity theories	Adams (1965) Korman (1970) Ramaswami and Singh (2003)	- Size of bonus in relation to the rewarded task. - Size of bonus compared to significant others. - Perceived fairness in its design, criteria and potential and actual reward. - Its relationship to other goals, rewards and organizational activities.	Justice and fairness Interrelations
Value and expectancy theories	Vroom (1964) Porter and Lawler (1968) Locke and Latham (2002)	- Distinctiveness in the relation between work – result – rewards. - Information/feedback about results. - Perceived value of the reward.	Clarity Information Feedback Intrinsic/extrinsic
Reinforcement theories	Skinner (1938)	- Distinctiveness in the relation between behavior and reward/punishment. - Unambiguous and immediate feedback.	Perceived effects on performance Clarity feedback
Rationalist theories	Jensen and Meckling (1976)	- Size of bonus. - Proportion fixed vs. flexible parts of the bonus. - Power relations, authority, influence, legitimacy, and conflicting interests.	Intrinsic/extrinsic Clarity Feedback Interrelations
Systems theories	Katz and Kahn (1978)	- Coherence between the system and other strategies within the organization. - Coherence between goals. - Cooperation and dependencies between departments/functions. - Balance between demands of stakeholders.	Interrelations
Research/theories on bonus systems	Kerr (1975), Deci and Ryan (1985), Frank (1988), Elster (1989), Frey and Jegen (2001), Zohar (2002), Hertel et al. (2004), Cohen-Charash and Mueller (2007), McLain and Jarell (2007)	- Kind of behavior rewarded. - Rewarding desired behaviors instead of results. - Fair design, measurement and distribution of rewards. - Level of goals (individual-collective) - Participation in the design of the system. - Clarity of feedback on performance. - Confidence in managements concerns about safety. - Coherence between goals. - Part of overall safety strategy	Intrinsic/extrinsic Satisfaction Meaningfulness Perceived effect on performance Justice and fairness Interrelations Participation

Table 3 shows the percentages of maximum bonus for plants A–C contingent upon economic vs. quality goals, corporate vs. plant goals, and group vs. individual goals. Bonus goals related to production and economic results varied between 25 and 50% among the plants. The remaining portions of maximum bonuses were based on quality goals. The nature of these goals differed to some extent among the three systems but mainly focused on competence and process development as well as safety-related issues.

All of the three bonus systems applied to all permanently employed staff members (except the plant managing director and vice president). Any bonus was paid retrospectively on a yearly basis. At plants A and B, the potential bonus was limited to a maximum amount of 20,000 Swedish crowns (SEK) annually per person. At plant C, the quality goals also included certain individual goals. These goals were separate from those concerning regular work tasks and often focused on behaviors regarding safety awareness. The maximum potential bonus at plant C was limited to a certain percentage (10–30%) of the individual's yearly salary, which differed among staff categories (with higher percentages applying to higher positions).

The goals to be used in the systems were decided by the managing director after consultation with executives and operational managers. Generally, other employees were not able to influence the selection of goals, except possibly through the unions. However, at plant C, individual goals were set, and even evaluated, through a collaboration of the individual and his or her immediate supervisor. In this case, the individual part of the bonus was based on the manager's final evaluation of whether the criteria were fulfilled, on a scale between 0–110%. Otherwise, the goals, criteria, and estimated rewards of the bonus system were communicated continuously, for example, through the internal website. In some cases a method using balanced scorecards was used in the system. Scorecards of this kind generally apply to strategic and measurable goals that can be either of a financial or of a qualitative (e.g. learning in the organization) character. The bonus system had had these designs for about two to four years at the time of the present investigation. The specific goals of the systems are, however, revised yearly and the size of the bonuses often varies from one year to another. Employees usually end up earning some bonus, but they rarely receive their full potential bonus.

Table 2
Major interview themes reflecting relevant features of bonus systems and the theories from which they were derived.

Themes	Theories/empirical evidence
General satisfaction and meaningfulness of the systems	Need theories Research/theories on bonus systems
Intrinsic and extrinsic motivation	Need theories Value and expectancy theories Rationalist theories Research/theories on bonus systems
Perceived effects on performance	Reinforcement theories Research/theories on bonus systems
Employee participation and influence on the systems	Need theories Research/theories on bonus systems
Justice and fairness	Balance theories Research/theories on bonus systems
Clarity, information and feedback	Need theories Value and expectancy theories Reinforcement theories Rationalist theories Research/theories on bonus systems
Interrelations between goals and between functions	Balance theories Rationalist theories Systems theories Research/theories on bonus systems

As can be seen in Table 3, the three systems differed in the extent to which they emphasized goal achievement at the corporate, plant, and individual levels. At plant A, all of the goals were set at the corporate and plant levels and were thus the same for all employees. The system at plant B holds, besides a major share of bonuses related to plant level results, also a share (15%) set at a lower, group level. At plant C, as much as 40% of the maximum bonus was related to individual goals, but nothing to goals defined at group level.

In Table 3, each bonus system has been given a denotation or keyword indicating to what degree they emphasize collective or individual goals. The keyword does not mention the systems' design on the economic-quality goal dimension, but is only intended to facilitate the further reading by offering a short denotation of one of the main characteristics of each system.

2.4. Sample

Five employees from each of the three nuclear power plants (A, B, and C) were selected to participate in the study. To obtain this sample, one of the interviewees at each plant was first selected as a contact person for the study, based on advice from the Swedish Radiation Safety Authority, the public authority in charge of controlling the nuclear plants. The contact persons in turn proposed four additional employees at their plant for participation. The contact persons had been prompted to select employees who could have varied views and experiences of the systems and who represented different functions and positions in the organization. Four of the participants were middle level managers, four were lower level managers (operational) and seven were workers. Of the workers, five worked in production shift teams (e.g. control room personnel) and two worked with maintenance. None of the participants were top-level managers, such as CEO or vice president. The final sample consisted of two women and thirteen men, which corresponds fairly well to the general proportion within the plants. The age range of the participants was 32–63 years.

Table 3
Percent of maximum bonus for plants A–C contingent upon economic vs. quality goals, corporate vs. plant goals, and group vs. individual goals, and in addition a keyword for each of the systems.

Plant/system (keyword)	A ("collective system")	B ("group system")	C ("individual system")
Economic goals			
Corporate level	15%	40%	20%
Plant level	10%	10%	20%
Quality goals			
Plant level	75%	35%	20%
Group level		15%	
Individual level			40%
Total	100%	100%	100%

2.5. Data collection

A semi-structured interview guide was the main tool for data collection. All participants received a letter with information about the aim of the study. The interviews were carried out during the informants' paid working day and lasted between 25 and 90 min. The interviews with the contact persons also included questions about the construction of their bonus system. These interviews were performed jointly by two of the authors, while the other participants were interviewed individually by either of the authors. All the interviews were carried out in November 2008.

The descriptive information regarding the organizational structure and the designs of the bonus systems was obtained through documents made available to us and through interviews with our contact persons at the plants. The interview guide regarding the experiences of the systems was reflecting the themes in the theoretical framework. Most of the questions were open ended in order to prompt the participant to express their views and experiences as openly as possible (e.g. What does it mean to you personally to receive a bonus? Do you think that the system has affected the level of stress in work? If yes: how? What is your general opinion about the management's ways of handling safety issues? What mainly motivates you to perform well at work?). Even though the questions were formulated in advance, there was still flexibility in the interviews, which allowed for changes in the order of the questions and for appropriate follow-up questions when interesting and sometimes new topics appeared in the interviews. According to Kvale (1996), this way of adapting to each interview is necessary to achieve a fruitful interchange between the interviewer and the interviewee and to maintain the flow of communication.

The interviews were audio recorded and held in an undisturbed environment, either at the employees' workplace or in especially assigned conference rooms located near the plants. At the start of the interviews, the participants were informed about the purpose of the study and how the material was to be used. They were also informed about the confidentiality of the study, and their consent to record the interview was requested.

2.6. Analyses

The recordings from the interviews were transcribed in full text. A theory-led thematic analysis was used according to Hayes (2000). A thorough review of the literature within the field before the analysis has the advantage of sensitizing the researcher to more subtle features of the data at hand (Tuckett, 2005). In an initial stage of the analysis, each transcript was read through several times in order to identify all of the statements which related to each of the seven themes established in the theoretical framework. The statements within each theme were then analyzed in terms of their actual meanings and implications. A pattern eventually emerged within each theoretical theme, which shed light on the most relevant aspects of that specific theme, as experienced by the participants. The resulting aspects were summarized under each theme along with selected data excerpts that constituted illustrative examples of these aspects, consistent with convention as outlined in Braun and Clarke (2006). Investigator triangulation, as described by Denzin (1978), was used in that both the structuring and the analysis of the material were carried out by two of the authors independently from one another with concordant results. Investigator triangulation is considered to guard against the risk of bias associated with the point of view of only one analyst (Fitzpatrick & Wallace, 2012; Patton, 1999).

3. Results

3.1. General satisfaction and meaningfulness of the systems

In general, the respondents at all three plants expressed either rather content or neutral attitudes towards the systems. Gratefulness over the possibility of receiving a bonus was expressed, but at the same time the interviewees admitted that they take it more or less for granted. This attitude had, however, weakened in plants where bonuses were only received on occasional years. Still, in general, the bonuses were at best considered to be a welcome economic contribution and a token of appreciation. Most of the participants claimed that they did not expect much of it: "Personally I am quite indifferent toward the system", "it is not all wrong", "nice, but nothing you personally expect", "the present system is acceptable, but I'd rather have a higher salary".

With regard to the designs of the systems, similar opinions were reported from employees working under the same type of bonus system. At plant A (collective system), a general indifference about the system was expressed, while those at plant B (group system) perceived that their system had improved significantly during recent years because of more realistic and better specified criteria for goal achievement. The bonus was perceived as more meaningful when it was clearly related to specific goals denoted by scorecards. As one respondent put it:

> Now it [the system] has more meaning. Now it is more realistic — in recent years. […] It stimulates the development, and this is a small spur. Everything that you follow up this way is easier to get results on […] and if you have no such goal, which is not followed up and no carrot, then you don't take so hard on it.

On the other hand one opinion was that the goals on the scorecards were too many: "I don't even remember all the goals, they were too many, and so it makes you lose a little of… it's not that good." At plant C (individual system), a few of the supervisors perceived the procedure of coming up with appropriate and measurable goals to be so complicated that the whole purpose of the system was questioned: "I'd rather see that we did not have a bonus system, at least not at the individual level. I mean, I don't mind receiving a little extra money, but sometimes it feels like it is simply too much trouble."

3.2. Intrinsic and extrinsic motivation

The results did not indicate any major differences between the three systems regarding the employee's motivation. The money potentially obtained through the bonus systems was not considered a driving force in itself. Several comments indicated that the amount was considered insignificant: "It's just a question of working overtime a couple of days and you get basically the same amount." Some of the interviewees claimed that the bonuses would have a greater impact on motivation if there was a possibility of obtaining a larger amount and if there was greater opportunity to influence the amount received depending on one's performance. Still, another opinion was that the size of the amount was unimportant since they believed that it did not affect performance in any case. A couple of the participants referred to earlier employers where they had received higher bonuses. As one of them put it:

> It was very much lucrative back then. It really was. At least at [earlier employer]. We received shares in [a big group]. So it was a lot of money. We often received about 20,000–30,000 (SEK). But we did not work harder because of the higher amounts. We definitely did not.

Instead, motivation was mainly held to come from other, more intrinsic, aspects. Some examples are:"My own inner feeling of having done a good job", "The pride in working with something that is important for other people and for society", "Pride in doing a good job", "To be able to handle a heavy responsibility", "To develop my own competence", "To always learn something new", "Satisfaction with co-workers", "Appreciation from colleagues and managers", "Helping others to grow", "Participation in an important activity" and "Fellowship in a good shift team". Receiving bonuses and money in general was largely considered motivational in that it reflected the employer's appreciation. Some criticism concerned the fact that, in some cases, bonuses were being given for good performance that had occurred far back in time, which was believed to undermine the potential motivating effect of the system.

3.3. Perceived effects on performance

In all of the plants, the bonus systems were hardly considered to provide incentive, seeing as the employees neither thought about it in connection with their everyday work nor discussed it much with colleagues.

> I have no feeling that people think about the bonus when they work. It is not like it is easy to influence in everyday work. But it is more of a statement afterwards: "ok, so this was how this year turned out".

The general view was that there were plenty of things in the daily operations which were more important than the possibility of obtaining a bonus. For example, the moral obligation to always keep safety in mind was considered far more important than the bonus: "Working at a nuclear power plant is rule driven", "We are strictly raised here", "When something unexpected happens the safety values take charge", and "Here human beings are the most important barrier [against accidents]".

Common sentiments included that if you work in a proper and safe manner, it will pay off in the long run and that there are no shortcuts. The interviewees did not consider safety to be negatively affected by the bonus systems and several of them gave examples of situations in which decisions had been made despite the awareness of its negative effects on their bonus rewards.

> As we sat in some meeting, there was someone who was well read on the content of the index who said "Are you aware of when you make a decision about this that it will affect our bonus negatively?". "All right, but now this is actually our conviction on this matter". So I think there is a very high morale when it comes to this.

The bonus systems were considered to affect the work situation by encouraging employees to participate in and also share in the responsibilities related to company activities. The systems also appeared to affect employee attitudes towards work since the rewards received from the systems were often seen as a sign of appreciation from the employer and created a feeling of being part of something important in the wider society. According to some respondents, the bonus systems were held to have indirect effects on work behaviors in so far as they gave clear indications of what was prioritized by management. This may have increased quality in areas that would otherwise have been neglected.

> The bonus goals laid out by the management often focus on areas which are not working properly and need attention. So they might capture issues such as house-keeping and orderliness. As a result there might be a little quality increase. Perhaps you would have done it anyway, but this becomes an additional trigger. A trigger which might make you change your behavior a little.

Most of the respondents, especially at plant A (collective system) and plant B (group system), stated that their level of stress had decreased as a result of the quality goals emphasized in the systems. As one participant described it:

> It has become clearer in recent years, that the ones who order the operations say: "Take all the time you need to do a good job". […] That is something we have never heard before. And they preach it at every Morning Prayer, as we call it, the audit meeting, that: "Do a good job. Don't haste it. Take all the time you need in order to ensure safety".

Similarly, another participant said: "It is not the same stress any more, but now you pull the breaks. […] You don't think as much about keeping the plant in constant operation as you did before. But… it may take the time it requires".

At plant C (individual system), however, one respondent suggested that the bonus system could at times bring on more stress by making employees feel like they needed to work extra and, also, by driving them to put aside regular work tasks in order to have time to fulfill individual bonus criteria. Some managers also expressed that the procedure of formulating adequate individual goals was somewhat demanding and stressful.

> Interviewer: How do you feel then, when you find yourself in such a situation [when other, more important tasks have appeared so that the participant hasn't had time to fulfill the bonus objectives]?
> Participant: Stress! Panic. Especially if you have been assigned to a group goal, when a whole group should accomplish something.
> I: That you would affect the bonus for other people negatively?
> P: Yes. Exactly. So therefore it becomes both an individual stress plus a… yes, a pressure is put on you from outside as well.

3.4. Employee participation and influence on the systems

Reported participation in the formation of the bonus systems and the possibilities of influencing the amount of the bonus rewards varied widely within the organizations. While the managers, HR professionals, and staff who were involved in the design of the bonus systems naturally felt they had an influence on it, lower level employees said that they had very limited or no influence at all on its development and, especially, the potential rewards. The systems were, above all, seen as systems for profit sharing and their goals were considered difficult to fulfill in the course of everyday work. Perceived participation did, however, also seem to differ even between individuals at similar levels. Some of the respondents reported a high degree of participation despite being at a low hierarchical level; they considered themselves to be important "cogs in the machinery" and believed they could indirectly affect the amount of bonus they received by always performing at a high standard.

Reported participation and the possibility of influencing the bonus system and its rewards also to some degree varied at the plant level. At plant A, where the system was based on plant-level collective goals, participation was very low. Some of the interviewees expressed a wish that more of the bonus criteria should be aimed at individuals: "The scorecards should be formulated so that you as an individual can influence the fulfillment of the goals." The interviewees at plant B (group system) stated that the sense of involvement had improved since the goals had been changed and been made more realistic compared to earlier goals:

> Earlier when the goals were more unrealistic, e.g. goals related to cash-flow, then you were thinking: "Oh well, there is no way we could influence the outcome anyway. We can just as well stop trying".

At plant C (individual system), those with individual goals perceived themselves to be relatively highly involved in the setting and fulfillment of these goals. However, criticism was expressed at this plant regarding difficulties to reach the top level of goal fulfillment (within 100–110%), as they were unsure about what was expected of them: "The goals are quite ambiguous… it is more of a lottery."

3.5. Justice and fairness

The general view at all three plants was that the systems were fair on the whole, but the interviews indicated certain differences between plants. The plant at which the system was perceived to be most fair was plant A (collective system), where collective quality goals were prioritized and where everybody received an equal bonus amount. The system was considered fair since it gave a sense of belonging to a company run through cooperative effort.

> Previously, one unit could receive higher bonus than another. And then it could be a little friction between them, since the goal fulfillment was nothing you could influence at all on the low level. It felt very unfair. So I think the system has become much better now that it is collective. It strikes at everyone. It is more equal.

At plants B (group system) and C (individual system), on the other hand, where the design of the systems often resulted in different bonus rewards for different groups and individuals, the notion of injustice was mentioned more often. Much of the unfairness perceived at these plants was mainly associated with the inconsistencies in how the supervisors evaluated the fulfillment of individual- and group-based goals. At plant C (individual system), where the 0–110 per cent scale was used, some of the supervisors treated '110%' as if it were what would be considered 100% on a 0–100 per cent regular work scale, while others saw 110% as representing that extra 10% beyond normal work expectations. One respondent put it this way: "It is very unclear what they actually value… so I think it is very ambiguous; it is badly defined and above all it is unfair." Perceptions of unfairness mostly arose in situations where members of different groups compared their bonus earnings with each other. In such a situation, some supervisors perceive their own situation to be unfair, as they try to follow the rules of the system but still receive reactions of disappointment from subordinates who have compared their results with those who work for more "generous" supervisors. At plant B (group system), it was considered difficult to compare achievements between groups, since the degree of ambition differed in respect to setting goals. Certain groups were more ambitious than others and set goals higher, which often resulted in lower bonus earnings. This is illustrated by the following comment: "There are quite big differences in levels at which departments choose to set their bars. Some want to show their worth… and others just kind of slide along." This problem appeared to produce negative reactions against this system.

Another situation reported to produce unfair bonus rewards concerned the maintenance staff at plants B (group system) and C (individual system). When production was low due to technical problems, lesser bonus amounts were earned despite the fact that they worked harder than usual during such periods: "When there have been rough years and we make a lot of efforts, then the production is usually low. At these times it strikes back at you". This could give rise to feelings of bitterness towards the company.

At plant C (individual system), the fact that the bonus goals were based on the fulfillment of extra tasks that were not requisite for ordinary operations was also seen as unfair; they felt like they were being "punished" in a way if they dedicated their efforts to completing ordinary tasks rather than prioritizing the bonus goals.

Another condition reported as unfair at plant C concerned the fact that those in higher positions (and hence with already higher salaries) received bonuses that were based on higher percentages of their salaries:

> Why does a senior manager merit a higher bonus than a cleaner or whatever? She has been working just as hard as the manager. So that's something I don't find fair, that you get different percentages of your salary.

3.6. Clarity, information and feedback

Opinions about the adequacy of the information received about the bonus systems differed widely within and between the organizations. Most of the respondents at the three plants seemed to have little knowledge about the goals and criteria of the systems. Generally, knowledge about the systems was better among the interviewees who were in higher positions and whose system utilized more individual goals. The lack of knowledge was most evident at plant A (collective system), where no individual goals were used. Here many of the respondents were under the false impression that the bonuses were almost exclusively based on economic results at the corporate or plant level. The following comment illustrates this: "Certain years you could understand that if several production units are temporarily shut down… then you could expect to get a lower bonus. Otherwise I don't know. We just receive information about the amount we will obtain."

At plant B (group system), the respondents seemed better informed about the group-based goals than about the plant and corporate goals. Knowledge of the bonus criteria and of the threshold values (i.e., the values that need to be reached in order to meet a goal) was, however, very limited. Many claimed that information was available for those interested: "If you want information, it is available… but what you do with it is what varies." This low interest was thought to be due to the fact that the potential bonus rewards were small and that employees had little opportunity to influence how much they earned.

At plant C (individual system), there seemed to be a relatively good knowledge of the content of the individual goals. However, as mentioned earlier, clarity was lacking regarding what was required for individual goal achievement (110%). Moreover, the distribution of bonuses was rarely accompanied with an explanation of why they received the given amount. When such explanations did turn up, according to one respondent, it was either too late or too unclear to learn anything from — and was therefore of little use for improving their future performance and possibilities for earning a larger bonus. Several managers also expressed criticism over the lack of clarity in defining the goals, especially in terms of their measurability, relevance, and time frames. The following comment is one such example: "When they [the management] tell us about new directives and goals, they also have to tell us how to measure them. It has been done poorly in this case". Furthermore, discontent was expressed over receiving delayed information from management about the directives regarding the next year's individual goals. Last minute changes made by top management sometimes led to unnecessary extra work for supervisors who had already set up their goals for the coming year.

3.7. Interrelations between goals and between functions

Employees at all of the plants reported that there was a good balance between safety- and production-related goals. These two types of goals were seen as interconnected and supportive of each other in the long run. Safety was seen as an inherent part of production, and safety concerns took precedence over concerns related to business competition. All of the interviewees reported having a great deal of confidence in the management's methods of handling safety issues and said that improvement had been seen in this area in recent years: "Safety has always been important, but now there are fewer doubts about it I think. Management gives the impression that safety is what's most important, that it is really number one. It doesn't feel like lip service." The management's interest in safety issues and, in particular, its decision to include more bonus goals regarding safety than regarding production was considered to clearly reflect this prioritization.

At plant A (collective system), where mainly quality goals were used, the goals were rather seen as reinforcers of safety values, as evidenced by the fact that employees could receive full bonuses even when their production unit was not in operation.

> It [earlier system] was more related to availability and operations. While today it is more important perhaps to do the physical work, that is, operations may not be as important as the real safety updates that you are doing today. The safety system you know. So even if all three reactors are temporarily shut down, you can still receive the bonus. Before it was actually the opposite.

At plant B (group system), previous bonus systems had resulted in conflicts that stemmed from the use of differing sets of evaluation criteria as well as from the work of one group negatively affecting the bonuses of another group: "If maintenance carried out work which resulted in the temporary close-down of a production unit, that unit did not receive a bonus, while the maintenance staff, on the other hand, who had done a poor job received a bonus." However, according to the respondents,

changes in the design of the system had resulted in fewer conflicts. The main reasons for this seemed to be improved goal-setting and more collectively based goals. The employees here saw themselves as being more dependent on each other's performances than prior to these changes and their sense of being a team had become stronger. One person stated to this effect: "We are depending on the cooperation of many. We feel somewhat like a big family." There was no sense that the possibility of receiving differing bonus sums was giving rise to competition or conflict between the groups.

At plant C (individual system), the criteria of individual bonus goals were intended to be supplementary so that "they in no way pose a risk to safety" (according to documents regarding the system) by influencing workers to neglect their regular tasks. However, some respondents were of the opinion that this conflict was present and that the individual goals should rather be integrated into the regular work in order to avoid this risk to safety: "So in order to be able to focus on the individual part of my bonus goals I may have to skip something I usually would have done".

4. Discussion

According to value and expectancy theories (Locke & Latham, 2002; Vroom, 1964), agency theory (Eisenhardt, 1989; Jensen & Meckling, 1976), and empirical research (Arnold, Cooper, & Robertson, 1998; Cooper, 2001) the motivational effect should be fairly low in the systems, due to the interviewees' low expectations of the systems, the small size of the rewards relative to their salaries, and the perceived limitations in their possibilities of influencing the structure and rewards of the systems. This suggests that all three systems have low incentive intensity (Rynes et al., 2005; Zenger & Marshall, 2000) and that the effects of the systems on behavior in general are small. This line of reasoning is also supported by our results.

4.1. Relative impact of different designs on motivation

The results from the present study seem to suggest that the effect a bonus system may have on behavior is dependent on the assumptions on which it is based and how the system is designed based on these assumptions. This becomes evident from how the fundamentally different bonus systems at the three nuclear power plants were perceived differently by the participating employees. Although all the systems were generally found to provide limited incentive, they could be considered to affect motivation to a varying degree and in different respects. The various circumstances surrounding this at the different plants are outlined in Table 4, where their strengths and weaknesses are shown in relation to the theoretical themes of the study.

From a reinforcement perspective, the system at plant A (collective system) would be expected to have the lowest incentive intensity of the three systems, due to the weak and unclear links between performance and reward. The incentive intensity could also be considered very low due to the employee's lack of possibilities to participate in goal setting and to influence the system. This is also supported by the interviews, which indicate a more or less indifferent attitude towards the system as such (even if the possibility of receiving a bonus was appreciated). Although the employees did not perceive any effects of the system on their own behavior, the collective design had the advantage of being perceived as fair and the goals supporting each other rather than being in conflict. Possible effects on behavior in systems designed in this way, involves the management signaling their priorities or indirectly by giving the employees a general sense of being appreciated. Still, in order for the former to have effect, information about the content of the goals needs to be clearer than in the present case.

The summary in Table 4 might indicate that the system with group goals and half of the goals being quality goals (plant B) would be the most successful in promoting motivation and safety. Employees at plant B were the only ones perceiving that the system had any effect on their behavior due to a clear link between behavior and reward of the group goals. The employees also had a rather good knowledge of the goals. The system could hence be considered to have relatively good incentive intensity. The extent of this, however, would depend on the degree to which the goals and their evaluation criteria are perceived as relevant, unambiguous, clear, realistic, and fair by the employees (Jensen & Meckling, 1976; Locke & Latham, 2002; Ramaswami & Singh, 2003). The system at plant B (group system) did in fact have certain problems with the setting and evaluation of bonus criteria at the group level. It also seemed to suffer from a time lag regarding the bonus feedback. This might reduce motivation due to a weak connection between performance and rewards (Logan & Wagner, 1966). Even if this reasoning was supported by most of the participants claiming that the possibility of obtaining a bonus did not influence their performance, many did consider the goals or scorecards to have somewhat of an impact since they highlighted what the company prioritized. This clarifying function of the

Table 4
The most distinguishing pros and cons of each system (plants A, B and C) in relation to the themes in the theoretical framework. A plus sign indicates a strength of a system, a minus sign indicates a weakness and the absence of a sign indicates neutral views or lack of sufficient agreement among respondents.

Plant	A (collective goals)	B (group goals)	C (individual goals)
General satisfaction and meaningfulness of the systems		+	−
Intrinsic and extrinsic motivation			
Perceived effects on performance		+	−
Employee participation and influence on the systems	−		+
Justice and fairness	+	−	−
Clarity, information and feedback	−	+	−
Interrelations between goals and between functions	+	+	−

scorecards could represent a way in which a bonus system can have direct positive effects on motivation and behavior (Hackman & Oldham, 1976). The absence of perceived conflicts between groups and goals is also an asset for this system.

The system at plant C (individual system) would also seem to have relatively strong incentive intensity, considering the clear link between behavior and reward of the individual goals. However, this system is the one receiving most criticism from the respondents. The system loses much of its potential effectiveness due to conflicting goals and perceived unfairness (cf. Ramaswami & Singh, 2003). The main problem with the individual goals was that they concerned tasks that were supplementary to the regular tasks. Theoretically, such goals may target "Organizational Citizenship Behavior" (OCB), sometimes defined as extra role behavior (LePine, Erez, & Johnson, 2002). As the individual goals are formalized, registered, and evaluated between the individual and his or her superior, goal-related performance essentially becomes a part of regular work. Therefore, the use of bonus goals concerning extra tasks may send contradictory signals that may produce perceived goal conflicts between regular work and individual bonus goals. As the latter are individual, such conflicts should be relevant on a personal level and also create a dilemma for the superior in charge of judging and giving feedback according to an evaluation scale ending at 110%. Besides problems regarding objectivity, comparability, and justice, which these kinds of goals can lead to, the use of such a scale also contributes to ambiguity and perceived unpredictability of the system for both employees and managers. These problems are likely to weaken the reinforcing effects of the system, or put in other words, the system may create an agency problem and thus interfere with the existing principal agency relationship (Eisenhardt, 1989).

4.2. Relative impact of different designs on safety behavior

The failure of the system at plant A (collective goals) to produce incentive and the indifferent attitudes the employees had towards it suggest that it posed no threat to safety. At plant B (group goals) as well, nothing in the design or in the interviews suggests that there were any potential dangers associated with their system. Rather, the system could be considered to be upholding and helping to reinforce a general concern about safety within the organizations by emphasizing safety aspects on the scorecards. The result indicating that the respondents at plant B (group goals) did hardly perceive any conflicts and were the most satisfied with their system could support other studies claiming that team based rewards may have positive effects on team members' motivation, performances, pay satisfaction and communication (Hertel et al., 2004; Rack et al., 2011). These positive emotions and behaviors among the employees can be presumed to also improve cooperative behaviors and should theoretically lead to safer behaviors.

The results from plant C (individual system), on the other hand, suggest that perceived unfairness and goal conflicts regarding the individual goals could theoretically constitute a safety concern. According to previous studies, individually based rewards run a higher risk of creating internal organizational conflicts, perceived unfairness, and reduce the motivation to cooperate (Gabor, 1990; Lazear, 1989). The results from the present study support the notion that an individually based system could lead to tensions, frustration and discontentment due to feelings of injustice. Envy due to perceived unfairness in the distribution of rewards could lead to counter-productive behavior among employees (Cohen-Charash & Mueller, 2007), which in turn could pose a threat to safety. However, considering the fact that the individual goals mainly concerned safety issues, that the size of the reward was regarded as small, and that the system itself appeared to play a marginal role in everyday work, any potential risk should presumably be small in the present case.

It is notable in Table 4 that no particular differences appeared between plants regarding intrinsic/extrinsic motivation. In fact, as seen in the overall results of our study, very little concerned the possible effects of bonus systems on the relation between extrinsic and intrinsic motivation. Generally seen this may only reflect the small size of bonuses, the dominance of group based bonuses and the fact that they were paid out on a yearly basis. Thus, the actual bonuses may have been perceived as only marginal or extras. In particular, nothing in the results indicates that extrinsic rewards, such as a potential bonus, would end up replacing intrinsic motives for safety, as would be expected according to need theories such as self-determination theory (Ryan & Deci, 2000), or crowding theory (Frey & Jegen, 2001). So far our results are in line with the empirical findings reported in the meta-analyses by Cameron and Pierce (1994) and Jenkins et al. (1998) and indicating that out-crowding may not be a generally relevant phenomenon regarding the relation between pay and performance.

From a psychological point of view, bonus systems such as the ones investigated may rather support the internalization of safety norms by the staff. Also, according to organizational theory, bonus systems emphasizing safety could facilitate the institutionalization of such norms into the organizations' safety cultures (Scott, 1995; Selznick, 1957). The development of such internal motives is thus likely to benefit safety-related behavior as "controlled motivation" (Ryan & Deci, 2000). As long as the internal motives remain in accordance with the behaviors rewarded by the system, and the individual shares the organization's goals and values, the effects of these kinds of systems could be expected to increase. However, in order to achieve this, it is essential that the system is perceived as fair (Adams, 1965) and that the staff is given the opportunity to participate to some extent in the design of the system and in the setting of its goals.

In sum, based on our results, none of the systems may be taken to pose a significant threat to safety. Rather, as all three systems mainly target safety goals, they may serve to support and expand the safety attitudes that are already to some extent in place at the plants. Still, it should be of interest for a system like the one at plant C (individual system) to improve clarity and to make sure that goal conflicts are not present within the system, in order to avoid feelings of frustration, unfairness and envy. By doing this, potential danger associated with the system would be avoided and instead the individual quality goals could not only be harmless but actually lead to enhanced safety behavior.

Even though all three plants used both economic and quality goals in their system, only the quality goals seem to have had any effect on motivation or behavior in the given plants. The result indicates that the economic goals were perceived as too distant and hard to affect on an individual level for most employees.

4.3. Methodological considerations

The fact that relatively few employees were interviewed in the study and that the geographical area of study was limited to Sweden, does of course restrict generalizability of the results. However, extensive generalizability was not the main purpose of the study, but rather to gain insights and a deeper understanding of the factors that may underlie changes in behavioral safety.

The qualitative and explorative approach of the study enabled an investigation of the employees' reactions to their bonus systems, which were then considered in terms of a broad framework based on several prominent theories of motivation. In addition, similarities in the organizational structures, functions, and operations of the three plants allowed the various designs of the bonus systems to be taken under consideration when evaluating the different patterns of reactions exhibited by the respective staffs. Our results bear witness to the subtle but nonetheless concrete results that can be gained from utilizing a qualitative approach to evaluate such systems.

When it comes to the validity of the results, a potential concern is whether our interviews may have produced biased answers. Since the interviewees appeared to appreciate the possibility of obtaining a bonus, according to the nature of things, their responses may downplay the potential negative effects of the bonus systems on performance. While the possibility of this having affected the results should be acknowledged, the authors' main impression is that the interviewees answered most questions very openly and honestly. The fact that many examples from everyday work appeared along with critical views also indicates that a bias of this kind may have had limited negative effects.

5. Conclusions

Drawing on general theories of motivation, our study presents a useful framework for examining the possible effects that bonus systems may have on employee motivation and safety behavior. Applying this approach as reflected in our interview guide and in the data obtained, nothing was found to indicate that the systems under study should negatively affect safety behaviors, for example, in terms of increased risk taking or underreporting. All three systems seemed to have problems achieving any significant effects on behaviors. They all lacked in incentive intensity and motivational effects due to different problems within their design. To the degree that the systems at all influenced safety behaviors, the effects appear to be positive and directly mediated by the bonus goals being related to safety issues and also indirectly mediated by the pronounced safety concerns framing the systems. All three systems also appeared to have some positive effects on the respondents' general work motivation, due to the system's role in clarifying priorities, creating a sense of participation, and bringing about appreciation and recognition for those involved.

The results indicate that group or team based goals seem to be a good middle way of avoiding unsafe competition and feelings of unfairness but still creating a clear link between behavior and reward. However, in order to achieve positive effects, the results imply that it is essential to set goals aimed at realistic quality improvements (such as safety issues) instead of economic achievements and to create feelings of participation among the employees. Clear information and feedback, a design that is perceived as fair and the avoidance of goal conflicts also seems to be of great importance in order to create incentives for safe behaviors.

The results of the present study can have practical implications in a number of ways. Bonus systems of different kinds are today a popular means of trying to achieve corporate goals. The possible negative impact that a badly designed system could have on factors such as safety should be of critical interest not only for power plants, but also for HRO's in general. Although the results from the present study do not indicate that the systems posed any significant risks to safety, it cannot be presumed that such bonus systems may not do so in other HRO's. Such a risk could arise even if many of the bonus goals were to relate directly to safety concerns, as was the case at the studied plants. Still, the results indicating that the three systems and their motivational effects were perceived in clearly distinct ways by the employees at the three nuclear power plants due to their differences, underline the importance of system design in preventing negative effects on safety.

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