

Will monitoring systems kill intrinsic motivation? An empirical study

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Abstract: The use of monitoring devices in business organizations is facilitated through New Information and Communication Technologies (NICT) such as fingerprint, facial or eyes biometric, time clocks, cyber surveillance, remote tracking of employees via GPS, and others. While standard economic theory advocates the use of incentive systems and monitoring to increase performance at work, some empirical studies show a fall in the level and quality of effort after the introduction of monitoring. Using self-determination theory (SDT), we explain this phenomenon by the negative impact of “monitoring systems extensiveness” on employees’ intrinsic motivation (IM). We hypothesize the mediation of this impact by the degree to which employees perceive their supervisors as being “autonomy supportive”. We also investigate the possibility of a moderating effect of “employees’ beliefs about the purposes of devices for monitoring” on the relationships between “monitoring systems extensiveness”, “perception of supervision” and “intrinsic motivation”. We test these hypotheses using a questionnaire, collected in France, from 579 employees having at least one supervisor. Developing a structural equation model, we find: firstly, a significant crowding out effect of IM by monitoring; secondly, this crowding out effect is significantly mediated by employees’ perception of supervision; thirdly, we confirm a strong positive relation between an autonomy supportive supervision and IM. Finally, we do not find any significant moderation by employees’ beliefs about the purposes attributed to monitoring devices.

Key words: Crowding-Out Effect; Monitoring; Intrinsic Motivation; Self-Determination Theory; Structural Equations Model.

Titre: « La surveillance peut-elle tuer la motivation intrinsèque ? Une étude empirique »

Résumé : Les NTIC facilitent dans les entreprises le recours à des outils de surveillance tels que les pointeuses biométriques, la surveillance informatique, la localisation à distance des employés par GPS sur leur véhicule ou leur mobile, etc. Tandis que la théorie économique standard préconise l’utilisation des dispositifs d’incitation et de monitoring pour accroître la performance des employés, certaines études empiriques montrent une chute du niveau d’effort et de sa qualité après l’introduction du monitoring. En prenant appui sur la théorie de l’autodétermination, nous expliquons ce phénomène par l’impact négatif des outils de monitoring (collecte de données) sur la motivation intrinsèque des employés. Nous émettons l’hypothèse d’une médiation de cet impact par le degré selon lequel les employés perçoivent leurs managers comme étant ‘autonomy supportive’ (sources de soutien pour leurs besoins d’autonomie, de compétence et d’affiliation). Nous étudions aussi la possibilité d’un effet modérateur « des croyances des employés sur les finalités poursuivies par les dispositifs de collecte de données » sur les relations entre « l’importance des dispositifs de collecte de données », la « perception des managers » et la « motivation intrinsèque ». 579 questionnaires ont été collectés en France auprès d’employés ayant au moins un manager. Un modèle d’équations structurelles montre un effet significatif d’éviction de la motivation intrinsèque (MI) par le monitoring. Cet effet d’éviction est significativement médiatisé par la perception qu’ont les employés de leurs managers. Les données montrent aussi un puissant effet de renforcement de la MI par un management ‘autonomy supportive’. Enfin, les croyances des employés sur les finalités des dispositifs de monitoring ne modèrent pas significativement les relations précédentes.

Mots clés : Effet d’Eviction de la motivation, Surveillance, Motivation Intrinsèque, Théorie de l’Autodétermination, Modèle d’Equations Structurelles.

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Introduction

With New Information and Communication Technologies (NICT) in business, new forms of monitoring have emerged: fingerprint, eyes or facial biometric time clocks, accounting of the computer work, location of the professional trips using GPS in one's work vehicle or mobile phone, etc. A recent study by the American Management Association (AMA, 2007) found that 66 % of employers monitored employees' Internet connections. Ball (2010) reports a survey of 294 US companies conducted in 2006, which found that “more than a third with 1000 or more workers employed people to read through other employees' outbound email in search of rule-breaking. Nearly seventy-five percent of US companies monitor worker communications and on-the-job activities” (Ball, 2010, p.88). Similarly in France, the “Commission Nationale de l'Informatique et des Libertés” (CNIL) reported 3054 implementations of video surveillance systems in 2008, up from 1317 in 2007, and 800 in 2006 (29th report, CNIL, 2009). Requests for authorization of biometric devices have increased tenfold in 2006 (27th report, CNIL, 2007). This strong increase in the use of sophisticated data collection may be explained by two factors. First, the use of NICT by companies increases the risk of data loss or divulgation due improper access or usage by malevolent individuals. Hence, there is a perceived need to monitor and trace the path of data and users (Oz, Glass & Behling, 1999; Stanton & Weiss, 2000; Vorvoreanu & Botan, 2000; AMA, 2000). Secondly, the strong competitive pressure is forcing companies to require their employees to commit to a high level of work involvement. This quest for ever-increasing competitiveness, coupled with a need to assess performance and competencies, encourages employers to use all forms of surveillance and data collection available (AMA, 2000; Ben Fekhi Aissi, 2010; Haley, Flint & McNally, 2012). In this second line of thought, monitoring

is used for its incentive effects and its power of surveillance (Boly, 2011). Employee monitoring has always been present at work, since the beginning of organizations, with the clocking in, the counting and weighing outputs and with payments by piece-rate. Since the earliest theories of management, monitoring has been understood to be a central part of the task of supervisors (Ball, 2010). This importance given to surveillance and monitoring can be explained by the major role played by opportunism in Theory of the firm (Minkler, 2004). Indeed, opportunism is a central assumption mobilized to answer the questions “why do firms exist?” and “how should we manage employees?” (Coase, 1937; Williamson, 1985; Alchian & Demsetz, 1972). Opportunism follows from two postulates. The first one conjectures that workers prefer leisure to effort (Minkler, 2004), while the second one supposes that workers’ behaviors are only driven by selfish interest and motives, without any moral consideration (Milgrom & Roberts, 1997). Adam Smith already reported in his famous “Wealth of Nations” (1776) the frequent ‘habit of sauntering and laziness’ which characterizes workers ‘obliged to change their work or tool’ very often. More recently, at the beginning of the twentieth century, in order to justify his scientific management, Taylor (1911, p.32) wrote that workers “deliberately work as slowly as they dare while they at the same time try to make those over them believe that they are working fast”. When it is easy to measure individual performance, piece-rate-payment schemes can be used to reduce opportunistic behaviours and boost workers’ productivity (Prendergast, 1999). However, when information on individual performance is costly or impossible to obtain (in the case for example, of team production or unobservability of workers behaviors), how can employers guaranty a maximal provision of efforts by workers in the direction of the firm’s interests? According to standard economic models, incentives have to be mobilized in order to facilitate the alignment of the employees’ interests with those of the firm, by increasing the marginal cost of opportunism and the marginal benefit of effort and compliance (Alchian & Demsetz, 1972; Milgrom & Roberts,

1997; Lazear, 2000). Monetary and non-monetary incentives can take the form of bonuses, piece-rate payments, salary increases, stock options, promotions, trainings, sanctions, etc.

Do we have to consider monitoring – defined as any “automated collecting of information about work, regardless of purpose” (Vorvoreanu & Botan, 2000, p.3) – as an incentive? In other words, should we confer to monitoring an incentive effect, whatever the purposes pursued by the data collecting devices? Even if the terms “monitoring” and “surveillance” are often used interchangeably (Ball, 2010, Vorvoreanu & Botan, 2000), we want to highlight that data collecting can be intended in an organization for several reasons: security and safety, data traceability, cost control, performance and competencies measurements, fraud detection or prevention, observation and control of employees behaviours, etc. Following the definition given just before, monitoring can be considered as an incentive each time it is used “to induce agents to raise their effort level in fear of punishments” (Boly, 2011). Monitoring can also be considered as a tool expected to improve the effectiveness of the other incentives such as pay-for-performance incentive schemes, by permitting a better evaluation of the quantity and quality of individual and team work. Monitoring is thus expected to improve productivity and performance at work, like the other types of incentives, by raising the marginal cost of shirking and the marginal benefit of effort. This disciplining effect is demonstrated by some empirical studies (Prendergast, 1999; Lazear, 2000; Demougin & Fluet, 2001; Nagin & al., 2002). Conversely, many experimental studies show a decline in work performance following the introduction of monetary and non-monetary incentive systems – a phenomenon called ‘hidden costs of incentives’ or ‘crowding out effect’ (Frey & Jegen, 2001; Fehr & Falk, 2002; Fehr & Gächter, 2002; Gächter & Falk, 2002; Fehr & Rockenbach, 2003; Fehr & List, 2004; Fehr & Schmith, 2007; Ploner, Schmelz & Ziegelmeyer, 2012). In the same vein, several experimental studies show a crowding out effect generated by monitoring, higher than its disciplining effect, which results finally in a decrease in the level of effort of an agent. (Frey,

1993; Falk & Kosfeld, 2006; Dickinson & Villeval, 2008; Boly, 2011 ; Von Siemens, 2011; Riener & Wiederhold, 2012). All these authors explain the negative impact of incentives and monitoring on performance, by the decrease in intrinsic motivation of individuals. Mainly studied by the Self-Determination Theory (Deci & Ryan, 2000a, 2000b; Gagné & Deci, 2005), intrinsic motivation comes from the pleasure to perform a task and not from its expected consequences. This motivation – desirable to achieve high levels of creativity, innovation, learning, and effectiveness at work (Amabile, 1993; Vallerand & Bissonnette, 1992) – sometimes fails when the incentive system is strengthened (Harackiewicz & al., 1984; Reeve & Deci, 1996). Supervision methods and monetary incentives have been studied repeatedly to understand their respective impact on employees' intrinsic motivation (Deci & al., 1989; Baard & al., 2004). However, the links between monitoring and intrinsic motivation (IM) remains largely unexplored. Indeed, none of the experimental studies quoted above, directly measure IM. They only observe the drop in effort after the introduction or the increase of monitoring, and hypothesize a crowding out effect in IM to explain this phenomenon. Moreover, this is probably more the propensity to reciprocate and the sensibility to fairness of an employee toward his employer which are tested, rather than the intrinsic motivation (Dickinson & Villeval, 2008; Boly, 2011; Von Siemens, 2011). Using the theoretical framework of the SDT, four experimental psychological studies show a crowding out effect of monitoring directly on intrinsic motivation (Lepper and Greene, 1975; Pittman & al., 1980; Plant & Ryan, 1985; Enzle & Anderson, 1993). The first study explores this effect on children, while the other three explore it on adults, asked to solve a puzzle, under monitoring, during an experiment. Consequently, none of these studies explores the impact of monitoring in real work settings. This is what our study aims to do.

The main purpose of this article is to build a theoretical and conceptual understanding of the impacts of monitoring on employees' IM, then to test empirically this model. We start

with a brief overview on monitoring systems, exposing their different characteristics, justifications, perceptions, and the way they are studied in the literature review. Next, we explore the theoretical framework of the SDT and its main empirical findings concerning the impacts of the use of incentives and of management methods on IM, in order to better conjecture on a theoretical analysis level, what may be the effects of monitoring on employees' IM. After that, we formulate a set of hypotheses, based on our literature review and our theoretical exploration. We describe the design of our empirical study, the scales selected and their psychometric characteristics. Then we develop a structural equation model to test our hypotheses. Finally, the results are analyzed, discussed, and managerial implications are exposed.

A brief overview on Monitoring: conceptual understanding of data collecting devices and empirical investigations of their impacts on employees.

As already mentioned in the introduction, monitoring can be defined as any data collecting action or process, intended in an organization for several reasons, ranging from reasons of surveillance and punishment, to reasons of security and safety of data, assets and persons. Given this variability of finalities, monitoring systems or tools should not be systematically considered as containing the dystopian characteristic of “surveillance” (Ball, 2010). Nevertheless, some authors use the terms interchangeably and associate to “monitoring” some expressions like “feeling of being watched”, “Big Brother” and the “Panopticon” (DeTienne, 1993; Griffith, 1993; Bain & Taylor, 2000; Ben Fekih Aissi, 2010 ; Moore, 2010; Pauli & Arthur, 2011). Indeed, monitoring is often accused to generate stress at work, to increase musculoskeletal disorders, fear of losing one's job, turn-over intentions, etc. (Oz & al., 1999; Stanton & Weiss, 2000; Ben Fekih Aissi, 2010; Haley, Flint & McNally,

2012). According to empirical studies conducted by Nussbaum (1989), Clement & McDermott (1991), Smith & al. (1992) and Aiello & Kolb (1995), monitored employees report higher levels of stress, tension, anxiety, fatigue, depression, anger, back problems, headaches, and arm soreness than the self-monitored. Ottensmeyer & Heroux (1991) found that monitoring leads to a drop in employees' desire to engage in work and increases stress over fear of losing their jobs and from loss of control over their own tasks. Some authors found a decrease in pro-social behavior (also called "citizenship or extra-role behavior") when intensified monitoring was implemented (Moorman 1991; Niehoff & Moorman, 1993; Moorman & Wells, 2003), and a diminished quality of social relations at work in addition to a drop in employee morale and job satisfaction (Irving & al., 1986). Grant et al. (1988) found in their empirical study that even when monitoring is on the quantitative aspects of work, it causes a drop in quality of work. Aiello & Svec (1993) found that surveillance results in performance levels lower than those of unmonitored employees. Inversely, other studies found no correlation between the presence or absence of surveillance and the level of stress and health problems (Attewell, 1987). Grant and Higgins (1991) did not empirically confirm that a drop in work quality occurs when a monitoring device is put into place. Why in some cases does monitoring boost productivity, and in other cases, decrease performance and well-being of employees? To address this question, we propose to build a theoretical and conceptual investigation about monitoring, by studying first the intrinsic characteristics and forms of the different tools and systems of data collection (Ball, 2010). As a second step, we propose to explore the different finalities and employers' justifications for monitoring in order to understand better its effects on employees (Haley, Flint, McNally, 2012). As a third step, we will explore the characteristics retained by employees to build their perception of data collecting devices.

Characteristics of tools and devices of monitoring.

Some authors link the recent explosion of information technology with the increase of employees' *surveillance* in the workplace (Ball, 2010; Vorvoreanu & Botan, 2000; Moore, 2010). In this sense, authors make the distinction between traditional forms of monitoring (the presence of a supervisor watching employees, the primitive forms of counting devices as time clock or number of pieces produced), and electronic and computer monitoring. These latest forms answer the needs of new jobs such as computer work (keystroke counting and web access monitoring software) or call center activities (listening or recording phone conversation). NICT also allows new types and techniques of data collection for a lower cost, in situations where it was costly and difficult by the past to monitor employees' behaviors. For example, itinerant jobs of salespersons can be monitored by the location of their professional trips using GPS in their work vehicle or mobile phone. Modern forms of monitoring are characterized by their propensity to be instantaneous and constant (Vorvoreanu & Botan, 2000), invasive (Ball, 2010), to evaluate a large number of employees in the same time, and record big amount of data (Ben Faikhi Aissi, 2010). Based on the literature review, we propose the following criteria to characterize the different tools and systems of monitoring (Griffith, 1993; Arnaud, 2006):

- the qualitative or quantitative aspects of the worker activity monitored,
- the type of personal data collected (behaviour, competencies, biometric data),
- the frequency for each form of monitoring compared to the whole working time,
- the nominative feature of data,
- the recording of data, and particularly, of personal data,
- the length of keeping of data recorded,
- the individual or collective feature of data (individual or team performance).

These criteria and their different possible combinations can be used to describe and understand the "objective extensiveness of monitoring systems". Nevertheless, the empirical

studies exposed at the beginning of this section – which analyse the computer monitoring for most of them – show that different employees’ perceptions and consequences in terms of organizational behaviour variables can be associated to a same tool or system used in different work settings. This means that the objective extensiveness of a monitoring system is not the whole story to explain its impacts on employees. That’s why, we propose also to study the different finalities of monitoring to better understand its impacts on employees motivation.

Employers justifications for monitoring.

Monitoring systems can be distinguished according to the use made of data collected and their interpretation techniques by supervisors (Griffith, 1993). More precisely, following the survey conducted by American Management Association (2000), and the works of Nagin & al., (2002), Arnaud (2006, 2007), Ball (2010), Haley, Flint & McNally (2012), employers justifications for monitoring can be :

- to acquire information for individual and team performance reviews,
- to improve feedback systems about employees performance,
- to reduce legal liability, security breaches, negative publicity,
- to protect business information, for security and safety of person and data,
- to measure and reduce costs,
- to increase productivity and quality of work by improving the use of monetary and non-monetary incentives, and by reducing the level of cheating and shirking by employees,
- to investigate personal characteristics, in order to improve competencies management and recruitment procedures.

Whatever are the finalities communicated by employers to justify the necessity of a monitoring system, the literature review presents it as a potentially conflicting object which raises tensions and critical perceptions by employees.

Employees perceptions of monitoring.

According to the theoretical investigations of Chalykoff and Kochan (1989), Niehoff and Moorman (1993), Arnaud (2006, 2007), Ball (2010) & Moore (2010), acceptance of monitoring devices and systems by employees should vary according to the following characteristics:

- The degree of invasiveness of privacy. For example, biometric devices can be perceived as crossing the bodily and personal boundaries.
- The degree of adequacy between the extent of the monitoring system and the employers' justifications. For example, a constant video surveillance on employees to simply measure their working time would be judged as unreasonable and illegitimate.
- The degree of control and surveillance versus autonomy and trust, perceived by employees as generated by monitoring systems and the use made by managers of data collected.

Stanton and Weiss (2000) conducted a qualitative exploratory study in the USA on the use of electronic monitoring to identify employees' perceptions and the reasons for these perceptions. They show that monitoring matters if it is perceived as increasing the probability of sanctions. In this case, tools for collecting data are interpreted as evidence of distrust, hostility, a breach of privacy, and a source of motivation loss. In contrast, monitoring might be seen as legitimate when employees believe that the devices for data collection are established to protect computer data, the assets of the company, and worker safety. Wells, Moorman and Werner (2007) studied the relationships among the perceived purpose of electronic performance monitoring and an array of job attitudes. Their results indicate that "when monitoring is viewed as developmental, it is judged as fairer than when it is perceived as a deterrent to future behavior and is also associated with higher levels of job satisfaction, organizational commitment, and felt obligation" (2007, p.121).

We next build a theoretical framework using the self-determination theory (Deci and Ryan, 2000a, 2000b; Gagné & Deci, 2005) in order to better understand the central role played by employees perceptions of monitoring and its impacts on employees motivation and performance.

Self-Determination Theory (SDT): a theoretical framework to understand the impacts of monitoring on intrinsic motivation.

Impacts of work environment on intrinsic motivation (IM).

As mentioned in the introduction, many authors hypothesize a crowding out effect of IM to explain the decrease in the level and quality of individuals' effort after the introduction or increase of monitoring systems. Intrinsically motivated activities are defined as “those that individuals find interesting and would do in the absence of operationally separable consequences” (Deci & Ryan, 2000b, p. 233). A person is intrinsically motivated when she engages in an activity for pleasure, interest, or curiosity because s/he enjoys the activity in itself and not due to any external control or obligations (Amabile, 1993; Arnaud & Wasieleski, 2013). This is very important, for employers, to foster their employees' IM, because – as it was demonstrated theoretically and empirically – this type of motivation generates high levels of creativity, innovation, learning, flexibility, well-being, task-involvement, and effectiveness at work (Vallerand & Bissonnette, 1992; Amabile, 1993; Amabile & al., 1996; Hayamizu, 1997). Consequently, it is important for employers and managers to understand how to foster high levels of IM at work. Following SDT, IM comes from the feeling to be self-determinate (Deci & Ryan, 2000a, 2000b ; Gagné & Deci, 20005). IM is an expression of self-determination, a process consisting of a person's search to feel a growing sense of choice in one's life, and to feel more and more like him/herself. “The self-motivated person acts on his/her own volition and not through external forces. The person has

an internal locus of causality (De Charm, 1968)” (Arnaud & Wasieleski, 2013). As a consequence, once the feeling of being self-determinate decreases, IM falls. SDT demonstrates theoretically and empirically (Baard, & al. 2004; Deci et al., 2001) that self-determination is enhanced by the satisfaction of three fundamental basic needs: (1) autonomy (the need to have the feeling of self-organizing experience and being able to initiate ones’ actions, and to have the choice); (2) competence (the need to have the feeling of self-efficacy, to copy effectively with challenges, to be able to exploit and develop ones’ talents and competences); (3) relatedness (the need to be integrated in social relations based on mutual trust, respect and recognition). To sum up, the satisfaction of the three fundamental needs enhances the feeling of self-determination, which in turn generates IM. In addition, Deci & Ryan (2000b) and Gagné & Deci (2005) explains that the satisfaction of the three basic needs allows and facilitates the internalization of norms; values and constraints of the person’s environment (the work environment, for example).

Managers and organizational contexts which foster the satisfaction of the three basic needs, and thus employees’ feelings of self-determination and expression of IM, are called “autonomy supportive” (Gagné & al., 2000; Deci & Ryan, 2000a). They are characterized by: 1- giving people empowerment over work activities, 2- giving encouragement for personal initiatives and individual choice, 3- offering employees an explanation of the logic behind the activities in which they are asked to participate, or behind the constraints they are asked to respect, 4- fostering positive and constructive feedback between employees and their supervisors, 5- respecting and listening to the feelings the individuals have toward a task or a situation, 6- building relationships on trust and mutual respect. Several experiments and field investigations confirm that an “autonomy supportive” work environment fosters high levels of IM, performance, involvement, trust in one’s supervisor, and loyalty towards the firm (Blais & Brière, 1992; Deci & al., 2001; Gagné, 2003; Baard & al., 2004).

Conversely, managers and organizational contexts which do not support the satisfaction of the three basic needs are called “controlling”. Empirical studies show that any time incentives (threats of punishment, strict and rigid procedures, deadlines, directives, pressured evaluations, imposed goals and tangible rewards, compensations) are perceived as a source of control, distrust, hostility, lack of recognition of ones’ competences or involvement, the result is a reduced feeling of self-determination, which in turn decreases IM. This generates a drop in performance, flexibility, learning, involvement at work, trust toward supervisors, loyalty, etc. (Deci & Cascio, 1972; Lepper & Greene, 1975; Amabile, DeJong & Lepper, 1976; Fisher, 1978; Zuckerman & al. 1978; Harackiewicz & al., 1984; Reeve & Deci, 1996). Instead of being motivated by the task itself, people become extrinsically motivated by the constraints and incentives (Gagné, 2003; Gagné & Forest, 2008). Their locus of causality becomes external (De Charm, 1968). This generates also a lack of internalization of constraints, norms and values of the work environment, which has to be compensated by more external incentives, to stimulate extrinsic motivation by a disciplining effect (Sherman et Smith, 1984; Gneezy & Rustichini, 2000; Gneezy, 2003).

Impacts of monitoring on employees’ perception of supervisors as being “autonomy supportive” versus “controlling”.

What are the consequences of monitoring on the employees’ perception of supervision? Drawings on Blau’s (1964) social exchange theory, when one entity treats another well, the norm of reciprocity applies. Conversely, if the employee feels a breach of an implicit contract due to the implementation of monitoring, he will react by downgrading supervisor evaluation. Building upon Aryee, Budhwar & Chen (2002), McNall & Roch (2009) point out that social exchange may be initiated by the way the organization treats employees in electronically monitored environments. They propose a model of employees’ reactions that draws upon social exchange theory and justice based models (Ambrose &

Alder, 2000) to explore how practices associated with electronic monitoring may be related to interpersonal and informational justice perceptions, which in turn may influence other organizational attitudes and outcomes such as trust in the manager. Similarly, Morrison & Robinson (1997), using the theory of psychological contract, explain that employees might perceive extensive monitoring as a deliberate renegeing of previous work conditions, generating a feeling of anger and betrayal. These theoretical conjectures are corroborated by some empirical studies which demonstrate a decrease in employees' levels of satisfaction – in terms of feelings of autonomy and trust – toward their managers when monitoring is introduced or strengthened (Smith & al. 1981; Grant & al., 1991). Therefore, the perception of a manager as being autonomy supportive might be negatively affected by the extensiveness of a monitoring system, specifically when this system has not been properly justified.

Impacts of monitoring on intrinsic motivation (IM).

The study of 'autonomy supportive' versus 'controlling' work environment consequences on the satisfaction of the three basic needs, feeling of self-determination and IM, offers an explanation to understand why monitoring was found to impact negatively task performance in some experimental studies (Frey, 1993; Falk & Kosfeld, 2006; Dickinson & Villeval, 2008; Boly, 2011; Von Siemens, 2011; Riener & Wiederhold, 2012) and in field studies (Grant et al., 1988; Aiello & Svec, 1993). Monitoring was found in many field studies to decrease workers feeling of autonomy (Irving & al., 1986; Rogers & al., 1990; Smith & al., 1992) and feeling of relatedness (Aiello, 1993; Aiello and Kolb, 1995). Using the terminology of SDT, these empirical studies show that monitoring decreases the level of satisfaction of the basic needs of employees, which in turn, affects IM. Indeed, monitoring raises questions of choice and empowerment: "If an automatic upgrading of an access control system to biometrics is perceived by employees as an intensification and extension of control, their attitude and motivation to work will be adversely affected. (...) Finally, excessive monitoring

can sometimes produce the behaviours it was designed to prevent. If workers perceive surveillance practices as an intensification and extension of control, it is likely that they will try to subvert and manipulate the boundaries of when, where and how they are measured” (Ball, 2010, p.98). As we said earlier, data collecting devices and systems can generate feelings of invasiveness of privacy, of illegitimacy, of hostility and distrust, of being under surveillance and being controlled. Even when monitoring is used for security and safety purposes – and not for its disciplinary (incentive) effects – if it is constant and records personal data, it might generate these negative feelings, which are responsible of a decrease in self-determination feelings, and thus in IM. Four experimental studies demonstrated this phenomenon on children and adults asked to solve puzzles under monitoring (Lepper and Greene, 1975; Pittman & al. 1980; Plant & Ryan, 1985; Enzle & Anderson, 1993). In this paper, we want to explore this phenomenon in the workplace and propose to test the following hypotheses.

Research Hypotheses and proposition of model

We hypothesize that monitoring might decrease IM at work, because of its negative impacts on employees’ satisfaction of their basic needs, and thus on their self-determination feeling. We conjecture that the more important the extensiveness of monitoring systems is, the more important employees’ feeling of being controlled, and the lower their IM will be.

H1: The extensiveness of monitoring systems has a negative effect on employees’ intrinsic motivation.

As widely studied theoretically and empirically by SDT, the “autonomy supportive” versus “controlling” style of management plays a key role to determine the level of workers’ IM.

H2: The perception of the supervisors as being “autonomy supportive” has a positive effect on the employees’ intrinsic motivation.

As we mentioned earlier, some authors used social exchange theory, justice based models and theory of psychological contract, to better understand impacts of monitoring on employees’ perceptions of supervisors. On the basis of their works, we hypothesize that:

H3: The extensiveness of monitoring systems has a negative effect on the perception of the supervisors as being “autonomy supportive”.

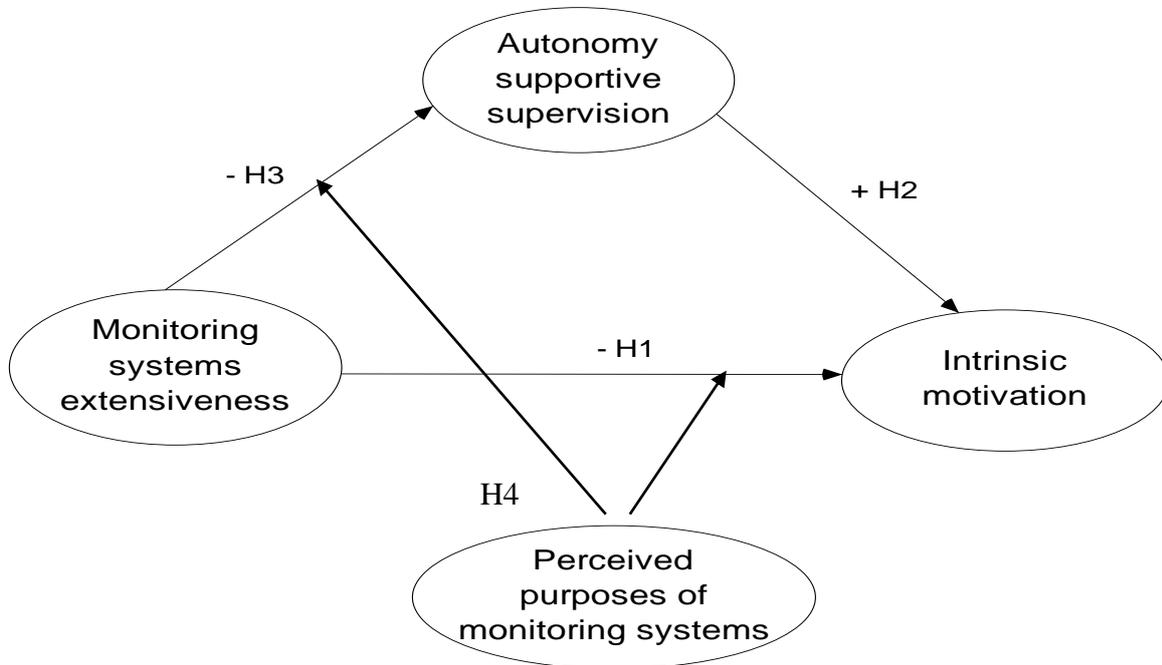
The combination of H1, H2 and H3 creates a mediating effect, played by the “perception of supervisors”, as showed by the conceptual model presented in Figure 1. This means that, in addition to its direct impact on IM, “monitoring systems extensiveness” has also an indirect negative impact on IM, by affecting negatively the perception of managers as being “autonomy supportive”. After having tested each hypothesis, we will be able to test this indirect effect to evaluate its importance.

Finally, from our theoretical background, we can suppose that the negative impacts of monitoring should be *more / less* important if employees believe that it is implemented for “controlling”/ “autonomy supportive” finalities. This result is put in evidence for the case of monetary incentives, by a meta-analysis of the literature conducted by Gagné and Forest (2008). As mentioned before, Stanton & Weiss (2000) found also results in this sense, for the case of monitoring, in their qualitative empirical investigation. Thus, we hypothesize that monitoring systems would lead to different levels of employees’ perception of their managers, and different levels of IM, depending on their perceived goals.

H4: Employees’ beliefs about the purposes behind monitoring systems have a moderating effect on H1 (the relationship between “the extensiveness of monitoring systems” and “IM”) and on H3 (the relationship between “the extensiveness of monitoring systems” and the “perception of supervisors as being autonomy supportive”).

The conceptual model is summarized in Figure 1.

FIGURE 1: Conceptual Model



Research Methodology and Model Development

Methodology

A self-administered questionnaire was used to estimate the four latent constructs. This questionnaire emerged from our literature review, the semantic analysis of respondent verbatim in the pre-test and was approved by three experts in the field of HRM. Respondents are employees having one or more supervisors, invited to participate in a study about their work experience. The questionnaire was distributed mobilizing all our social networks, our business contacts, in public spaces and to employed students (employees following a training program at university). Using the “snowball” distribution method, we obtained a convenience sample of 579 employees (52 % answered by electronic mails, 32 % by post and 16% were collected next to “workers students”). This method does not produce a perfect representative sample of the whole French population of “employees having at least one supervisor”, but our

sample is adequately diversified on several demographic variables (age, gender, income level, type of position, etc.) as shown in Appendix n°1. The questionnaires which had not been properly completed were dropped. We finally obtained 554 respondents. We verified the randomness of missing values and imputed them by the “hot deck” method (Goldberg & Velicer, 2006). Exploratory factor analysis was conducted with a random subsample of 254 respondents – keeping the remaining 300 respondents for the confirmatory factor analysis (Roussel & al., 2002). We followed the Gerbing & Anderson paradigm (1988) to assess dimensionality and scales convergent and discriminant validity. The exploratory factor analyses made it possible to purify scales by deleting items with loadings lower than 0.5. Then, we ran a confirmatory factor analysis for each scale separately, and evaluated their convergent validity and their internal consistency.

Psychometric analysis of the scales

Monitoring systems extensiveness

To evaluate the extensiveness of monitoring systems, we used a list of 12 devices¹. This list emerged from our literature review, using notably AMA’s surveys and CNIL’s reports which explore all existing forms of data collection used in organizations. As studied in the first section of this paper, different criteria must be used to evaluate the “objective extensiveness of monitoring systems”: the nominative (or not) feature of data, the individual or collective feature of data, the mere observation or the recording of data, the punctual, frequent or permanent presence monitoring devices. Respondents indicated their presence or frequencies of use on a five responses categories scale: No / Do not know / I suspect / Yes

¹1- Physical presence of a supervisor near your work station. 2- Monitoring of the work station by video camera. 3- Time clock of work hours. 4- Fingerprint, facial or eye biometrics time clock. 5- Tracking of the Internet connections globally throughout the company. 6- Tracking of the Internet connections at your work station. 7- Monitoring your computer work. 8- Reading and/or recording the contents of your emails. 9- Tracking of the amount of time that your phone is used. 10- Tracking of the telephone numbers that you dial. 11- Listening to and/or recording the content of your phone calls. 12- Using GPS in your work vehicle or in your mobile phone to track your professional trips.

sometimes / Yes often. We decided to merge the answers "No" and "Do not know" giving them a mark of 0, while grading 1 for "I suspect", 2 for "yes sometimes" and 3 for "yes often". We created an index variable by summing the degrees of presence of each device and the number of devices weighted by their magnitude of screening information. For example, listening to and recording telephone conversations is a higher level of monitoring than the mere track of the time spent on the phone. A biometric time clock is more invasive for privacy than a classic time clock. The variable "data collecting and monitoring systems extensiveness" is thus considered as formative². For each respondent, the variable provides the logarithm³ of the weighted sum of monitoring features present at his job.

Beliefs about the purposes of monitoring devices

This moderator variable has been measured by the question: "In your opinion, what are the purposes of the data collecting and monitoring devices present in your workplace? The list we proposed emerged from our literature review about "employers' justifications of monitoring" and from the semantic analysis of respondent verbatim in the pre-test : 1- To evaluate your performance. 2- To establish penalties and rewards. 3- To assess your skills. 4. To measure your actual working time. 5- To measure company expenditure. 6- To ensure safety. 7- To ensure data security and protect business assets. As Stanton & Weiss (2000) observed in their qualitative study, monitoring matters when it is perceived by employees as increasing the probability of sanctions. In addition, theoretical and empirical works in the field of SDT demonstrated that the use of monetary or non-monetary incentives can generate a negative feeling of being controlled by contingent rewards. Consequently, we discriminate respondents according to their answer to the second option "establish penalties and rewards".

² The indicators are not exchangeable and do not necessarily share common aspects because each one represents a distinct feature of the formative variable. Therefore, they are not supposed to covariate strongly like reflective items. The causality runs from indicators to the formative concept. The measures of reliability (internal consistency) and validity usually used for reflective constructs are not relevant to assess the robustness of formative constructs (Jarvis, Mackenzie and Podsakoff, 2003).

³ We take the logarithm of the weighted summative index to achieve a better approximation to normality

The 124 respondents answering yes to this second option form the group with a “negative” belief about the purposes of data collection. The 169 other respondents form the group supposed to have a “non-negative” perception of the purposes of monitoring and data collection.

The autonomy supportive supervision scale

Items are derived from the Work Climate Questionnaire which assesses the perceptions of employees about the degree to which their work environment is “autonomy supportive” *versus* “controlling” (Deci & al., 2001; Baard & al., 2004). We elaborated 6 items to capture and evaluate each aspect of an autonomy supportive work environment (trust, autonomy, feeling of competence, recognition, etc.). The employee answers using statements on a 6-points Likert scale: 1- My supervisors recognize the true quality of my work. 2- In general, I can really trust my supervisors. 3- My direct supervisor gives me autonomy. 4- Overall, I feel that my supervisor understands me. 5- My supervisor regularly helps me to evaluate my skills. 6- My relations are not good with my supervisors.

The exploratory (principal component) factor analysis gives one dimension, with a Cronbach alpha equal to 0.841. The confirmatory factor analysis gives a Jöreskog ρ equal to 0.873. The scale achieves a satisfactory level of internal consistency. Standardized loadings are significant ($p < 0.001$) and ranged from 0.52 to 0.89. Following Fornell & Larcker (1981), the convergent validity was assessed by computing the amount of variance extracted ($\rho_{vc} = 0.54$) which is correct. The psychometric quality of the scale is satisfactory ($\chi^2/dl = 2.223$, RMSEA = 0.064, AGFI = 0.949).

The intrinsic motivation (IM) scale

This construct deals with the extent to which employees feel pleasure, interest, enjoyment, and importance of their work. We used items adapted from the Intrinsic

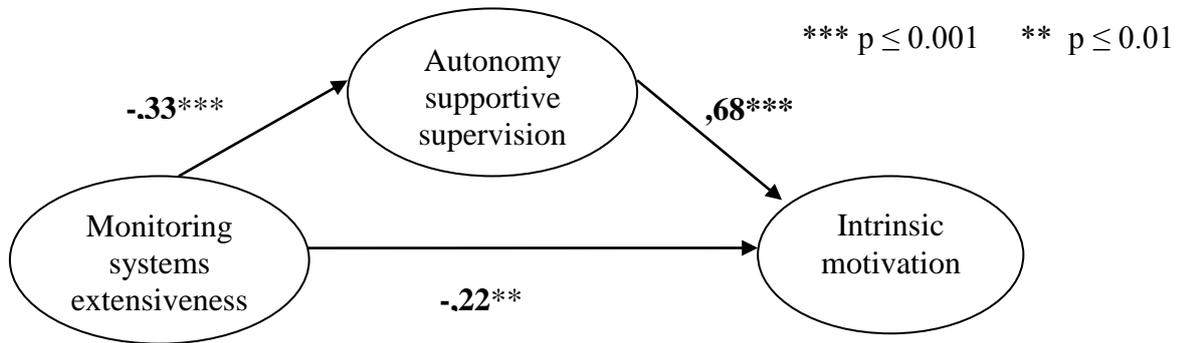
Motivation Inventory (Amabile & al., 1994). Our initial version contained 12 items, using statements on a 6-point Likert scale designed to capture different types of “autonomous motivation” (Gagné & Deci, 2005) which illustrate an internal locus of causality. Exploratory factor analysis eliminated 6 items based upon low factor loadings and/or high cross loadings. With the remaining 6 items, we obtained a bi-dimensional solution for the autonomous motivation. The first dimension is composed of three items assessing IM; while the second dimension (3 items also) deals with another type of autonomous motivation about which we decided not to speak, as we want to focus specially in this paper on IM. Consequently, we retained only three items: 1- I really enjoy doing my work. 2- Overall, my work is really interesting. 3- My work is very important and very useful. The confirmatory factor analysis gives a Jöreskog ρ equal to 0.833. Standardized loadings are significant ($p < 0.001$) and ranged from 0.60 to 0.88. To assess the convergent validity, we obtain a ρ_{vc} equal to 0.631. Concerning the psychometric quality of the scale, we obtain: $\chi^2/df = 2.223$, RMSEA = 0.064, AGFI = 0.949.

Results

The Structural Equation Model (SEM)

To examine the discriminant validity of our latent variables, we used the most rigorous criterion put for by Fornell & Larcker (1981). The smallest extracted variance ($\rho_{vc} = 0.54$ for the “autonomy supportive supervision scale”) is higher than the shared variance (0.46), shared between “autonomy supportive supervision” and “IM”. Therefore, the discriminant validity of our scales is satisfactorily achieved. We now present the analysis of the mediation model. Based on a sample of 300 respondents, the fit of the SEM is satisfactory, as shown in Figure 2. Furthermore, all estimated paths have the expected sign and are statistically significant ($p < 0.01$). Hence, we can examine our hypotheses (Figure 3).

FIGURE 2
The estimated mediation model with results and fit indexes



X ²	DF	P	X ² /DF	PCLOSE	RMSEA	RMSEA high	AGFI
53.29	33	.014	1,61	.434	.051	.076	.928

FIGURE 3
Unstandardized Regressions Weights of the Model

	Relations	Unstandardized Regression weights	S.E.	C.R.	P	Bêta
H1	Monitoring systems extensiveness → Intrinsic motivation	-0.222	.080	-2.781	.005	-0.160
H2	Autonomy supportive supervision → Intrinsic motivation	0.683	.077	8.820	***	0.631
H3	Monitoring systems extensiveness → Autonomy supportive supervision	-0.326	.087	-3.732	***	-0.254

The unstandardized regression weight from the “monitoring systems extensiveness” to the “IM” is negative as expected and significant ($\gamma = -0.222$; $p < 0.005$). Thus, our data support H1 which assumes a crowding out effect of IM by monitoring. The unstandardized regression weight from the “autonomy supportive supervision” to “IM” is strong and significant ($\gamma = 0.683$, $p < 0.001$). As a result, our data support H2 which postulates that a positive perception of work supervision as being “autonomy supportive” has a crowding in effect on employees’ IM. The unstandardized regression weight from the “monitoring systems extensiveness” to the “autonomy supportive supervision” is negative as expected and significant ($\gamma = -0.326$; p

< 0.001). Thus, our data support H3 which posits that monitoring extensiveness downgrades employees' evaluations of their managers as being autonomy supportive.

Test of the mediation.

Our conceptual model postulates that the “perception of supervisors as being autonomy supportive” mediates partially the relationship between “monitoring systems extensiveness” and “IM”. We scrutinize the strength and significance of the indirect and direct effects of this relationship. To this end, we compute, following the Preacher and Hayes’s (2004) procedure, the bootstrap confidence intervals with bias correction. Figures 4 and 5 present the unstandardized coefficients of indirect and direct effects while Figure 6 shows the results of the total effect.

FIGURE 4: Indirect Effect

Indirect Effect	Monitoring systems extensiveness	Lower limit	Upper limit	Zero Included
Intrinsic motivation	$(-0.326 * 0.683) = -0.223$	-0.371	-0.109	No

FIGURE 5: Direct Effect

Direct Effect	Monitoring systems extensiveness	Lower limit	Upper limit	Zero Included
Intrinsic motivation	-0.222	-0.391	-0.054	No

FIGURE 6: Total Effect

Total Effect	Monitoring systems extensiveness	Lower limit	Upper limit	Zero Included
Intrinsic motivation	$(-0.222) + (-0.223) = -0.445$	-0.626	-0.228	No

Both indirect and direct effects are significant at the 5% risk level, since the 95% confidence intervals do not contain the value “zero”. The total effect is also significant. Following the Shrout and Bolger’s (2002) procedure, the indirect effect represents 50.6 % $(-0.223/-0.445)$ and the direct effect 49.4%. In consequence, our data support our conceptual model which posits that the perception of supervisors as being autonomy supportive mediates partially the relationship between monitoring systems and employees’ IM.

The moderating effect of the employees' beliefs about the purposes of data collection and monitoring systems.

In order to test H4 – which postulates that the relationships concerned by H1 and H3 are moderated by employees' beliefs about the purposes of data collecting and monitoring systems – we run a “two groups analysis” (Subhash, Durand & Gur-Arie, 1981). Group 1 is composed of the 124 respondents who believe monitoring is done to establish penalties and rewards. Group 2 contains the 169 respondents who do not believe that monitoring is done for this purpose. We compare the relevance of three models. A moderating effect (using the delta X^2 test) is demonstrated when the metric invariant model is not significantly worse than the unconstrained model (thus demonstrating scales stability in the two groups) while the structural invariant model is significantly worse than the metric invariant model. The results (Figure 7) show no significant differences between the three models. Thus, H3 which posits a moderating effect by employees' beliefs about the purposes of monitoring is not supported.

FIGURE 7. Testing for a moderating effect of the purposes of monitoring

Models	χ^2	Df	P	χ^2/df	pclose	$\Delta\chi^2$	Δdf	Significant difference
Unconstrained	119.565	80	.003	1.495	.927	-	-	-
Metric invariant	129.268	87	.002	1.486	.940	9.703	7	No
Structural invariant	138.676	93	.002	1.491	.944	9.411	6	No

The fact that the mediating model is not moderated by the purposes attributed to monitoring does not imply that the means of our constructs are equal in the two groups. To investigate further this question we ran an ANOVA on the respondents with at least one form of data monitoring. Our data show that respondents who see monitoring as a way to establish penalties and rewards have a significantly lower intrinsic motivation ($F = 4.51$; $p = .036$) ; but we observe no effect on autonomy supportive supervision ($F = 2.76$; $p = .099$).

However, our results ought to be interpreted by taking into account the limits of our empirical study. The data collection was made through a one shot mail questionnaire, so we

cannot really test for the causalities hypothesized theoretically (Kline, 2011). Only a longitudinal analysis will be able to provide a clear-cut answer. Moreover, data collected consisted in self-perception and intention statements, which could be affected by a social desirability bias (Amabile & al., 1994). It would be more rigorous to investigate observed behaviours. To end, our measure of the perceived purposes attributed to monitoring need to be improved.

Discussion and Implication for Managers: What should be done to prevent the hidden costs of monitoring on employees' IM ?

The fact that autonomy supportive supervision has a positive impact on IM in our data, corroborates for France, a crowding in effect on IM already demonstrated in other countries (Deci & al., 1989; Deci & al., 2001; Baard & al., 2004). Numerous empirical and experimental studies demonstrate also a crowding out effect of IM by supervision methods perceived as controlling (Deci & Cascio, 1972; Harackiewicz & al., 1984 ; Reeve & Deci, 1996 ; etc.) ; but as we said earlier, the impact of monitoring on IM in work settings stays largely unexplored in the existing literature. Current monitoring research studies its impacts on employees' well being, stress, satisfaction at work, but not on their IM. Our finding that extensiveness of monitoring systems has a negative impact on employees' IM", confirms – for the workplace – the four experimental studies conducted on children and adults asked to solve puzzles under surveillance (Lepper and Greene, 1975; Pittman & al., 1980; Plant & Ryan, 1985 ; Enzle & Anderson, 1993). Our empirical results give also an explanation to the decrease observed in some experimental studies of the level and quality of effort after the introduction of monitoring (Frey, 1993; Falk & Kosfeld, 2006; Dickinson & Villeval, 2008; Boly, 2011; Von Siemens, 2011). In addition, our study corroborates empirically the

theoretical studies developed in the fields of social exchange theory, justice based model and psychological contract, which hypothesize a negative impact of monitoring on employees' perceptions of their supervisors (Morrison & Robinson, 1997; McNall & Roch, 2009).

Even if our results show that IM is significantly lower when employees believe that purpose of monitoring is “to establish penalties and rewards”, we could not demonstrate that employee's beliefs about the purposes of monitoring moderate the relationships among the constructs of our model. Thus, we cannot clearly confirm the results found by Stanton and Weiss (2000) in their qualitative exploratory study. It would be interesting to conduct a longitudinal study, with a better indicator of the employees' beliefs about the purposes of monitoring, in order to question this mitigated result.

The strong relationship found in our study between employees' perception of supervision and IM put in evidence the central role played by managers on employees' motivation. George (1996) found in an empirical investigation developed by in the United States that employees' perceptions of monitoring devices depend on the attitude of the managers who use these devices, as well as the organizational culture and on the work organization: “Managers at Company A were careful to place monitoring in the context of the overall job experience. At Company B, monitoring seemed to have been grafted onto an existing job, with little thought apparently given to how monitoring should actually fit into the existing work flow...It is but one piece of a large puzzle that includes such crucial factors as the job itself, how data collected through monitoring are used in employee evaluations, and managerial attitudes...Management has a key role to play in designing systems that are effective yet are not viewed as too onerous or invasive” (George, 1996: 475 - 478).

To conclude, a key element – in order to understand how monitoring systems impact employees' IM – is to know whether or not monitoring is viewed as a basic, normal and legitimate part of the work activity. The organizational culture has to be taken into account

before changing or creating a data collecting and monitoring system – the work supervision being an important vector of agreement of these changes, and a key explicative element of the employees' perceptions of the existing devices (Stanton, 2000; Ball, 2010). To sum up, the role of managers is to :

- recognize that monitoring systems extensiveness has a negative effect on their subordinates' IM, which has to be compensated by deploying the following means :
- lead employees to participate in the implementation and design of monitoring systems as much as possible, in order to reinforce their appropriateness and acceptance,
- establish a clear communication about the finalities of a data collecting system, to strengthen its perceived legitimacy,
- prove to employees that monitoring – when considered as indispensable by employers – can be useful for them thanks to a better recognition of their efforts and performance, compensation for their extra working hours, a better feedback built on objective elements monitored and not only on subjective appraisals, and a better protection of health and safety.

Conclusion

Researchers in the Organizational Behavior field have grappled with the impacts of incentive systems on the intrinsic motivation of employees for decades. However, most of the work has centred upon the effects of compensation systems and style of management on the inherent motivation of employees. Modern-day developments in information technology have facilitated the ability of managers to monitor employees' productivity at work and to collect data. The proliferation of ubiquitous technologies in the workplace has increased the breadth and detail of management's ability to gather information about employees. In this day and age, it is highly relevant to examine the outcomes of these cyber devices on individuals' intrinsic motivation. Our study expands on previous empirical research about the impact of

incentive systems by specifically examining the effects of monitoring techniques on employees' intrinsic motivations on the job. We hope it will contribute to the developing incentive literature.

Our empirical investigation supports Self-Determination Theory for employees in France. It would be interesting to replicate our study to other countries in Western Europe. Showing a significant mediation effect played by employees' perception of supervision on the relation between monitoring and IM, offers important managerial implications as well. Managers must be conscious of the fact that the implementation of monitoring systems will decrease the way employees perceive them as being "autonomy supportive". It is therefore important that the managerial discourse provides convincing explanations about the useful, non-coercive purposes these devices are designed for. The employees should have their voice in the management of the data generated and should be listened to by their managers, on the basis of a relationship built on mutual trust, respect and constructive feedback.

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Appendix 1: Sample Description

<u>Variables and modalities</u>	<u>Employees</u>	<u>%</u>	
<u>Age</u>	Under 25 years old	115	20.8
	between 25 and 39 years	252	45.5
	40 years and over	187	33.8
<u>Salary</u>	Less than 1500 euros	271	48.9
	Between 1500 and 2000 euros	150	27.1
	Between 2000 and 3000 euros	100	18.1
	Over 3000 euros	33	5.9
<u>Current type of position</u>	Unqualified worker	2	.4
	Qualified worker	17	3.1
	Staff	123	22.2
	Agent C or D (public)	71	12.8
	Agent B or VRP (sales)	89	16.1
	Technician	48	8.7
	Engineer	55	9.9
	Management	149	26.9
<u>Gender</u>	Male	217	39.2
	Female	337	60.8
<u>Type of work contract</u>	Fixed term contract	80	14.4
	Permanent contract	310	56.0
	Training	5	.9
	Temporary	10	1.8
	Apprenticeship contract	75	13.5
	Assisted employment	5	.9
	Other	69	12.5
<u>Number of employees in the company</u>	Less than 10	76	13.7
	between 10 and 49	127	22.9
	between 50 and 200	81	14.6
	Over 200	270	48.7
<u>How many people do you have under your management?</u>	None	405	73.1
	1 to 5 people	83	15
	Over 5 people	66	11.9