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Can Standard Operating Procedures be Motivating? Reconciling Process Variability Issues and Behavioural Outcomes[1]

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ABSTRACT *It is generally agreed that requiring employees to perform their tasks according to Standard Operating Procedures (SOPs) can improve production outcomes in the context of repetitive manufacturing. Attempts to link SOP use to intrinsic motivation – a requirement for creativity – have, however, resulted in controversy. In this paper, we discuss the relationship between required SOP use and worker creativity, as mediated by worker intrinsic motivation, and suggest that the relationship between required SOP use and intrinsic motivation and creativity is moderated by (a) availability of accurate process documentation and (b) employee participation in developing of process documentation.*

KEY WORDS: Standard operating procedures, intrinsic motivation, creativity

Introduction

It is generally agreed that use of Standard Operating Procedures (SOPs) – which play an integral role in Total Quality Management (TQM) – can improve the output consistency, efficiency, and learning rate of a given process (Edelson & Bennett, 1998; Imai, 1986; Monden, 1983; Suzaki, 1993). Even champions of exploration, Levinthal & March (1993) acknowledged the ability of SOPs to facilitate the accumulation and transfer of knowledge acquisition, leading to variability reduction and organizational effectiveness. Efforts to explain the relationship between the requirement that employees follow SOPs in completing a task – which we will refer to as required SOP use – and worker intrinsic task motivation have, however, resulted in controversy. Work motivation, job design, and creativity literatures have suggested that SOP use causes a reduction in autonomy, which

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hypothetically reduces the sense of having experienced responsibility or self-determination in the task, thus reducing intrinsic task motivation and creativity (see Amabile, 1997; Hackman & Oldham, 1976, 1980; Spreitzer, 1995; Thomas & Velthouse, 1990).

The operations management (OM) literature, however, has suggested increased worker intrinsic motivation and morale under required SOP use (Imai, 1986; Monden, 1983; Suzaki, 1993) leading to more meaningful working conditions (Monden, 1983). Adler (1993a, 1993b, 1996, 1999) stated that SOP use could be either controlling or enabling, and proposed that enabling SOP use could result in increased self-efficacy beliefs (i.e. the conviction that one is capable to achieve a given goal, see Bandura, 1977) on the part of workers. Rao *et al*. (1997) found an increase in workers' sense of empowerment (i.e. intrinsic motivation, see Conger & Kanungo, 1988) in companies receiving ISO 9000 series certification, which has as its primary goal that all tasks are documented and performed according to SOPs. Both OM and job design theorists have agreed, however, that the motivational implications of SOP use are moderated[2] by workers' ability to participate in SOP development (e.g. Adler, 1993a, 1993b; Edelson & Bennett, 1998; Hackman & Wageman 1995; Klein, 1989, 1991).

In this paper we focus on the context of repetitive manufacturing characterized by a number of sequential operations that require synchronization and for which consistency and predictability of output is essential to competitiveness. In this type of context, learning efforts are centred on variability reduction or exploitation rather than exploration (see Levinthal & March, 1993). We begin with a review of current best practice SOP use in comparison with SOP use under Taylorism. We then review intrinsic motivation and its implications for creativity. Finally, we discuss the relationship between SOP use and intrinsic motivation/creativity and develop a set of testable propositions to build a model of required SOP use, intrinsic motivation, and creativity.

Standard Operating Procedures

A SOP is a process document that describes in detail the way that an operator should perform a given operation. According to Edelson & Bennett (1998, pp. 45–46), SOPs include the purpose of the operation, the equipment and materials required, how to perform the set-up and operations required for the process, how to perform the maintenance and shutdown operations carried out by the worker, a description of safety issues, trouble-shooting, a list of spare parts and where to find them, illustrations, and checklists. The SOP is one of several process documents required for consistent operation of a given process, with other documents including process flow charts, material specifications, and so forth (Edelson & Bennett, 1998; see also Suzaki, 1993).

Although process documentation played a major role in Taylorism (Taylor, 1911/1998), the ways in which SOPs are developed and used today has changed radically. For example, Taylor (1998/1911) believed that workers were incapable of designing efficient processes, hence the need of management to design operating procedures. Best practice SOP development, in contrast to Taylorism, calls for the active involvement of workers in development and refinement of SOPs (Adler, 1993a, 1993b, 1996, 1999; Edelson & Bennett, 1998; Imai, 1986; Monden, 1983; Suzaki, 1993). The objective of SOPs under Taylorism was to have industrial engineers determine 'scientifically' the 'optimal' way to perform a given process. The objective of SOPs today is to ensure that all workers are performing tasks in the same way, which is a necessary condition to obtain consistent output from

the process. When all workers perform their tasks consistently, it becomes possible to run controlled experiments to test the impact of changing various process parameters. When a process change is shown to improve process performance, SOPs are updated and workers are trained to the new procedures. Throughout the process, it is desirable to include workers in SOP development and to encourage worker ideas (for SOP improvement).

For continuous organizational improvement (i.e. the Kaizen philosophy), established procedures need to be continuously enhanced, thus requiring ideas from those individuals using those procedures. Ideas are not creative simply because they deviate from established knowledge; ideas are creative when they are novel and appropriate to the task at hand (Amabile, 1997; Sternberg, 2001). Workers may have many ideas; however, what they choose to do with their ideas (i.e. whether the course of action taken is constructive or unconstructive) will depend on various organizational and individual-difference factors. For example, if work conditions are such that creative actions are encouraged, that knowledge is available to all, and that individuals feel motivated and efficacious in performing a given task, then the probability that a constructive course of action emerges is high (see Sternberg *et al*., 1997). The most important factor, however, for the development of innovative behaviours is worker intrinsic motivation (see Amabile, 1997; Spreitzer, 1995) – a sine qua non of worker creative contribution.

When a worker has an idea – which can be viewed as a potential creative contribution – to improve a process, the worker is confronted with three courses of action (see Figure 1): (a) suggest that the idea is implemented, (b) independently implement the idea, thus deviating from the SOP, or (c) forget the idea.

Making a Suggestion

If the worker submits a suggestion, the company can respond by testing and eventually implementing the idea, or by rejecting it. An idea that is tested, refined, implemented,

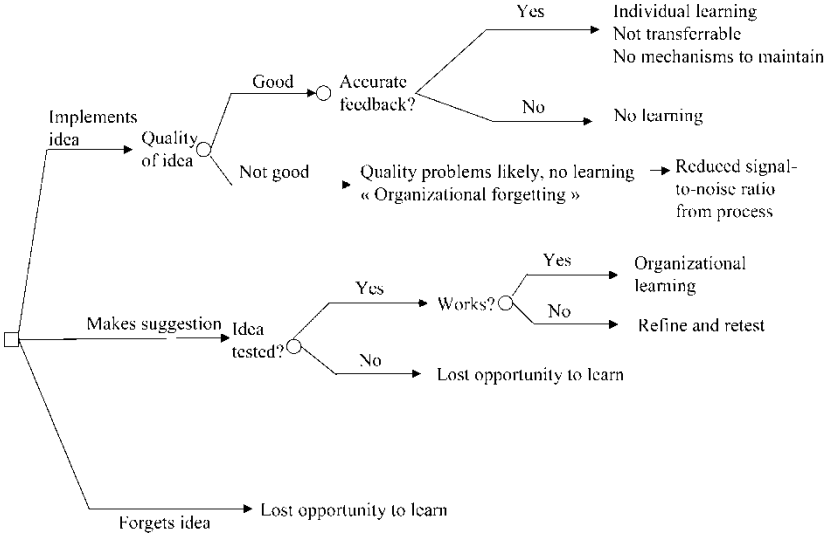

Figure 1. Idea implementation decision tree

and becomes part of the SOP results in organizational learning. The implication is that companies that test, refine, and implement worker creative suggestions are likely to end up with higher quality SOPs (Adler, 1993a; Imai, 1986; MacDuffie, 1997; Monden, 1983).

If the worker implements the idea without testing and it turns out to be a bad idea, then quality problems will be created. An example of this dynamic can be found in the classic Fabritek case (Holstein *et al.*, 1969) in which a machinist deviated from the SOP in order to increase throughput from his workstation. Unbeknown to the worker, the decrease in quality for the output coming from his workstation forced the next worker to operate at a slower speed and resulted in an increase in defective parts and a reduction in the production line capacity. Quality problems arising from untested ideas are often extremely difficult to find because the lack of consistency makes process data more difficult to interpret. If several workers are implementing ideas simultaneously, it will be impossible to use statistical process control techniques to detect these quality problems (see de Treville & Edelson, 1994; Edelson & Bennett, 1998). The objective, for example, of statistical process control charting is to determine whether the process is running consistently or if something has changed. If workers are running the process in different ways it is clear that the process is not running under statistical control.

Implementing the Idea

If the worker implements the idea without testing and it turns out to be a good idea, then individual learning might occur. There is no mechanism for the worker to transfer this information, no mechanism to capture and retain what has been learned – in case the worker has a bad idea the next day – and the process is again not running under statistical control. No organizational learning takes place under this scenario, which can even be considered as one type of 'organizational forgetting': the organization had knowledge about how to run the process contained in the SOPs that was not put to use. There is no opportunity to test and refine the idea. Finally, even if the piece emerging from that workstation is 'better', the change might create problems at later workstations. In all cases where the worker deviates from the SOP there is likely to be less emphasis on improving the quality of the SOP. Berggren (1994), for example, noted that workers at Uddevalla were limited by a vicious circle concerning SOPs: because of the emphasis on autonomy, engineers, management, and workers had little incentive to invest in SOP development. Lack of high quality SOPs then discouraged workers from turning to the SOPs for help in improving their competencies. Adler & Cole (1993, p. 90) referred to the resulting lack of SOPs as 'more like abandonment than empowerment'.

Forgetting the Idea

Finally, if the worker decides to forget the idea, the opportunity for organizational learning is lost.

Intrinsic Motivation

An outcome of SOP use is intrinsic motivation; however, there is disagreement between OM and organizational behaviour theorists concerning whether the relationship is positive

or negative. Intrinsic motivation reflects a self-fulfilling experience stemming from self-regulated value-congruent action that is largely independent of external influence, causing internalized commitment to performing a given task (de Treville & Antonakis, 2002). Hackman & Lawler (1971) originally proposed that much of the variation in intrinsic motivation relative to a given task could be explained by employee perceptions of job characteristics. This proposition was subsequently developed into the Job Characteristics Model (JCM) by Hackman & Oldham (1975, 1976, 1980), in which employee perceptions of the job characteristics of skill variety, task identity, and task significance were translated into the critical psychological states (CPS) of (a) experienced meaningfulness; (b) knowledge of the results of the work (resulting from feedback); and (c) experienced responsibility – defined as autonomy or freedom concerning the procedures to be used and timing in the work (Hackman & Oldham, 1975). These three CPS's were hypothesized to combine multiplicatively to produce intrinsic motivation. The multiplicative form assumed by Hackman & Oldham (1975) predicted a dramatic reduction in intrinsic motivation from required SOP use – apparently resulting in a reduction of autonomy – even if other job characteristics were conducive to intrinsic motivation.

Conger & Kanungo (1988) proposed that intrinsic motivation was essentially the same as empowerment. They agreed that job characteristics and leadership played a major role in determining worker intrinsic motivation/empowerment, and proposed that self-efficacy beliefs (see Bandura, 1977) be added to the construct of intrinsic motivation. Stajkovic & Luthans (1998) demonstrated that self-efficacy is strongly related to performance as tasks become increasingly less complex. Thus, they suggested that task complexity increases the need for clear and concise descriptions, and that accurate descriptions of tasks (i.e. SOPs) should be provided to workers.

Thomas & Velthouse (1990) extended the JCM and Conger & Kanungo's (1988) model by adding other main-effects variables (e.g. leadership) and mediators in their interpretive model of empowerment. In the Thomas & Velthouse model, the JCM CPSs were redefined as dimensions of intrinsic motivation, combined additively – rather than multiplicatively – into intrinsic motivation by the employee. The CPS knowledge of the results of the work became the dimension of impact, and experienced responsibility became self-determination, which were added to meaning and competence (i.e. self-efficacy belief). Using confirmatory factor analysis, the Spreitzer (1995, pp. 1464–1465) construct validated the four dimensions of intrinsic motivation (i.e. psychological empowerment): (a) Competence (example item includes 'I am confident about my ability to do my job'); (b) Meaning (example item includes 'The work I do is very important to me'; (c) Impact (example item includes 'I have a great deal of control over what happens in my department'; (d) Self-determination (example item includes 'I can decide on my own how to go about doing my work'). Furthermore, Spreitzer argued and empirically established that an antecedent condition to innovation (i.e. creativity) and effectiveness is intrinsic motivation.

The Impact of SOP use on Intrinsic Motivation

What is the expected relationship between best-practice SOP use and each of the four dimensions of intrinsic motivation? The relation between SOP use and intrinsic motivation, and how it is moderated is discussed below and is depicted in Figure 2.

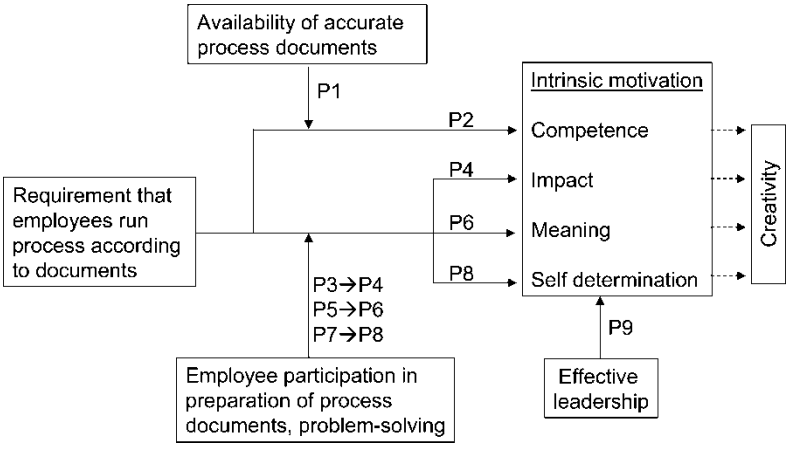

Figure 2. A model of SOP boundaries and outcomes

As mentioned earlier in the paper, several authors have suggested a positive relationship between SOP use and the employee's sense of competence (i.e. self-efficacy beliefs, see Adler, 1993a, 1996). It is generally agreed even among critics of standardization that having high quality SOPs available increases the sense of competence (and actual competence) of the worker (e.g. Berggren, 1994). Indeed, experiencing success and mastery modelling raises self-efficacy belief (see Wood & Bandura, 1989; Bandura, 1977) and hence work performance (Stajkovic & Luthans, 1988). Our experience has been that workers and management invest in SOP development only when SOPs are actively used, which usually requires management enforcement. Worker adherence to SOPs does not happen automatically and ensuring worker adherence to SOPs is one of the primary jobs of management (Imai, 1986). Following SOPs does not come naturally to workers and requires discipline and management intervention (Edelson & Bennett, 1998). As long as SOPs are accurate (i.e. reflect a standardized and effective process) and generate worker competence then their impact will be positive. However, in the event that SOPs are inaccurate their required use will be negative.

Proposition 1

The availability of accurate SOPs moderates the relation between SOP use and the sense of competence experienced by workers.

Proposition 2

Required SOP use will be positively related to worker sense of competence and self-efficacy belief.

Allowing workers to participate in development of SOPs increases the workers' sense of being able to make a difference (i.e. have an impact). Klein (1989, 1991) proposed that participation might be able to compensate for reduced freedom in task execution. Adler (1993a, 1993b) and Adler & Cole (1993) observed a high level of motivation among workers who participated in SOP development. Monden (1983), Imai (1986), and

Suzaki (1993) emphasized worker participation in procedure development and refinement as a way of giving workers a chance to have an impact in an appropriate manner. Hackman & Wageman (1995) acknowledged that participation in SOP development could lead to motivation, but expressed concern that few workers actually have a chance to participate. This concern is acknowledged in much of the lean production literature. Although worker participation is a basic tenet of lean production, most of the cases in the literature have indicated a lack of follow-through on the part of management, primarily due to production pressure and workers not having enough time to invest in participative activities (Babson, 1993; Graham, 1993; Rinehart *et al.*, 1997), thus leading to negative consequences. Furthermore, as discussed earlier in the paper, workers are unlikely to invest in SOP development and refinement in the absence of required SOP use.

Requiring that workers perform their tasks to the SOP increases the potential impact of a given suggestion, because good suggestions are implemented. Suggestions that have been tested, refined, and used to update the process documents impact the actions of all workers carrying out that process. Furthermore, following SOPs that result in effective performance further augments the sense of impact a worker experiences.

Proposition 3

Worker participation in SOP development and refinement moderates the relation between required SOP use and the sense of impact experienced by workers.

Proposition 4

Required SOP use will be positively related to the sense of impact experienced by workers.

Hackman & Oldham (1975) proposed that increases in skill variety, task identity, and task significance would lead to increases in meaning. High quality SOPs would be expected to facilitate learning of new skills and understanding of how the tasks fit together, leading to increased skill variety and task identity. Adler (e.g. 1993a; see also Adler & Cole, 1993) suggested that the improved performance and learning – and the resulting increase in competitiveness of the company – could make work more meaningful to employees. We would expect these positive results in conditions where workers have actively participated in the development of SOPs. In the event that they have not, then the experienced meaningfulness of the work is reduced or may be negative. A second factor concerns how workers feel about other workers following SOPs. Barker (1993) and Graham (1993), for example, recorded worker frustration with colleagues who reduced the performance of the team by neglecting to follow SOPs, implying that when some workers do not follow procedures, the work of their colleagues becomes less meaningful.

Proposition 5

Worker participation in SOP development and refinement moderates the relation between required SOP use and the sense of meaning experienced by workers.

Proposition 6

Required SOP will be positively related to the sense of meaning experienced by workers.

Some have argued that SOP use would be expected to reduce the worker's sense of self-determination or autonomy under the definition commonly used in the job design literature (e.g. Hackman & Oldham, 1975). Adler (1993a), however, suggested that the concept of autonomy might be causing confusion. Adler (1991) found that one group of workers with more standardized, formalized jobs rated their autonomy at the same level as another group of workers given substantially more freedom in performing their tasks. Deci *et al.* (1989) attempted to measure 'perceived freedom on the job' in an empirical study of self-determination, but the internal consistency of the factor was inadequate because some respondents interpreted the items from that factor as autonomy, whereas others perceived them as lack of support. It is also interesting to note that limited choice has been found to be more motivating than a great amount of choice (see Iyengar & Lepper, 2000).

In the OM literature, a different definition of autonomy is used, which includes elements such as discretion, decision-making authority, and responsibility (e.g. Chase *et al.*, 2001; Cheser, 1998; Rungtusanatham, 2001). Merriam-Webster (1995) defined autonomy as 'the quality or state of being self-governing; especially: the right of self-government; self-directing freedom and especially moral independence'. The philosopher Kant saw autonomy as self-government stemming from morality, with morality arising from knowledge and self-discipline (Schneewind, 1998). Conger & Kanungo (1988) noted that an appropriate level of authority, discretion, formalization, and rule structure is a requirement for worker empowerment, which we see as consistent with the concept of self-government. A worker who is committed to developing and following SOPs may earn the right of self-government and experience greater freedom from supervisory control. Thus, participation in designing SOPs, as discussed above, will augment feelings of self-determination. In situations where workers cannot design SOPs, the effects of SOPs on self-determination will be reduced or will be negative.

Proposition 7

Worker participation in SOP development and refinement moderates the relation between required SOP use and the sense of self-determination experienced by workers.

Proposition 8

Required SOP use will be positively related to the sense of self-determination experienced by workers.

Whereas the job design literature has limited self-determination to freedom concerning procedures and timing, there are many other ways to give a worker a sense of self-determination. Deci *et al.* (1989) found that managers who listened to and acknowledged subordinates' concerns, provided feedback as appropriate, and encouraged subordinates to actively participate in problem-solving, substantially increased the subordinates' perception of self-determination. Other examples include giving workers some degree of choice concerning their work environment (Davenport *et al.*, 2002), giving workers a budget (i.e. authority) to make improvements in their workplace (Adler, 1993a), and allowing teams of workers to find ways of reallocating tasks to make the work more comfortable (Rinehart *et al.*, 1997). Thus, effective leader behaviours (i.e. idealized, inspirational, considerate, challenging, facilitating, feedback providing) play an instrumental role in worker intrinsic

motivation and innovation (see Antonakis & House, 2002) and should theoretically augment the positive effect of SOPs.

Proposition 9

Effective leader behaviours are positively related to worker intrinsic motivation.

Conclusion

What happens to workers' intrinsic task motivation and creativity when they are required to follow SOPs in completing their tasks? Job design and work motivation theory literatures have suggested a negative relationship; the OM literature has suggested a positive relation. We suggest that the discussion has been hindered by differences in conceptualizing required SOP use (Taylorism versus best practice), by not explicitly incorporating the multidimensional nature of intrinsic motivation into the analysis, by an ambiguous definition of autonomy, and by ignoring important contextual moderators. When these three elements are included in the discussion, we showed that the relationship between required SOP use and intrinsic motivation could theoretically be positive. Finally, our model highlights the importance of worker participation. Production pressures, high capacity utilization, and lack of management – especially supervisor – support are likely to reduce opportunities for worker participation, and hence lower intrinsic motivation and creativity.

Notes

1. An earlier version of this paper was published in the conference proceedings of the EUROMA-POMS Joint International Conference, June 2003.
2. A moderator is a 'variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable' (Baron & Kenny, 1986, p. 1174).

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