Safety rules as instruments for organizational control, coordination and knowledge: Implications for rules management

Johann Weichbrodt *

ETH Zürich, Department of Management, Technology, and Economics, Weinbergstrasse 56/58, CH 8006 Zürich, Switzerland

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ABSTRACT

Recent research in the field of safety science on the limitedness of rules as a measure to achieve safety has coincided with new research in organization science on rules and routines, and their mutual relationship in particular. The present article is an attempt to uncover what the field of safety science can learn from the latter. It outlines three functions of rules in organizations (as a means for organizational control, as coordination mechanism, and as codified organizational knowledge) and applies these to safety rules in high-risk industries. Four common challenges of safety rules, as well as four typical measures of good rules management are illustrated by discussing examples from safety research. These challenges and typical measures of rules management are furthermore examined in terms of the three functions of rules in organizations. The article demonstrates how safety science, by taking a broader perspective, can benefit from organization theory.

1. Introduction

Safety rules are an indispensable part of safety management in high-risk systems. Whether in the form of rule books, checklists, or procedures, safety rules are abundant in industries like power generation, aviation, transportation, medicine, and other high-risk industries. Through prescribing human action and interaction (with other individuals as well as with machines), it is hoped to reduce errors and eliminate risks. Rules are thus usually designed and introduced by experts, based on risk and task analysis, intended to influence and control human behavior. This use of safety rules is ultimately rooted in Scientific Management and the idea of rationalization (Taylor, 1911). A core idea behind the design of safety rules is thus the assumption that work tasks are designable and controllable in a top-down fashion and that organizational control should therefore be used to identify and eliminate safety risks (Berman et al., 2007; Grote, 2009; Hale and Borys, 2013a; McCarthy et al., 1998).

However, there has also been a growing concern in the field of safety science that such an approach to safety may be flawed and that rules in the actual organizational context do not work in such a simplistic way (Amalberti, 2001; Dekker, 2003; Grote et al., 2009; Iszatt-White, 2007; Lawton, 1998; Rasmussen, 1997; Reason et al., 1998; Weichbrodt and Grote, 2008; Woods and Shattuck, 2000).

Most recently, Hale and Borys (2013a) presented an extensive review of the literature on the management of safety rules. They contrasted two paradigms of how rules are perceived, used, and managed. Model 1 is characterized by a top-down approach, based on rationality and control, where rules are made by experts and seen as necessary and binding. Accordingly, violations are seen as "bad practice" and are therefore to be sanctioned. In contrast, model 2 recognizes the impossibility of a perfect rules system. Rule violations are seen as inevitable, and should be dealt with by treating local operators as experts in improving the rules. In short, "model 1 sees the solutions in modifying reality to match the rules, while model 2 advocates changing the rules and their definition fundamentally to match reality" (Hale and Borys, 2013a, p. 14). In a companion paper (Hale and Borys, 2013b), the authors then make valuable suggestions for rules management in order to essentially move from model 1 to model 2. In other words, at the core of the issue thus lies the difficulty of differentiating between violations that truly are *bad practice* and violations that instead are the result of *bad rules*.

This difficulty is pinnacled in high-risk systems, where it can represent a matter of life and death. However, insofar as all organizations are rule-based systems, very similar questions arise in virtually all industries or public administrations. The question of how to deal with the gap between written procedures and actual practices is not only relevant to high-risk organizations. Indeed, there is a substantial body of literature in organizational and management theory dealing with issues akin to the ones outlined above (e.g.,

* Tel.: +41 62 957 24 83.
E-mail address: jweichbrodt@alumni.ethz.ch

Cardinal et al., 2004; Desai, 2010; Olin and Wickenberg, 2001; Ortmann, 2010; Reynaud, 2005; Silbey et al., 2009; Tyler and Blader, 2005). This gives reason to the assumption that there are fundamental issues about the functions of rules in organizations (e.g., how to prevent excessive bureaucracy, or how to deal with the inherent abstractness of rules), from which conclusions can also be drawn for the case of safety rules. Research endeavors crossing organization science and safety science have been called for by safety researchers in order to broaden the understanding of the role of humans in technologically complex systems – and ultimately also to increase safety in such systems (Bourrier, 2005).

In this paper, I therefore aim to bridge the two literatures: By discussing selected literature and examples from safety science, I re-examine common challenges of safety rules in high-risk systems, as well as measures intended to deal with these challenges. I apply theory about rules as organizational control, as a coordination mechanism, and as organizational knowledge to each of these issues of safety rules and rules management. By broadening the view and incorporating basic organizational theory, a more fundamental understanding of how rules work (and do not work) in high-risk organizations can be gained.

The paper is organized as follows: First, I briefly review the three functions of rules in organizations. I then discuss four typical challenges of safety rules in high-risk industries and their effect on rules as control, coordination and knowledge. In the third part, I describe four "good practices" of rules management, showing how these practices function in regard to organizational control, coordination and organizational knowledge. Additionally, I will explain how the challenges and good practices are related. The resulting juxtaposition of safety science with organizational theory provides safety researchers with a deeper understanding of the workings of rules in organizations, and helps rule-makers and safety managers in high-risk industries with useful guidance as to how typical challenges around rules can be dealt with.

Throughout the paper, I will use the term "rule" to refer to any written, formal rule or procedure in an organization. "Safety rule" refers to any such rule that regards personal or process safety (Grote, 2012). Distinct from this are informal or so-called "unwritten" rules, which are instead part of organizational routines (Pentland and Feldman, 2005; Weichbrodt and Grote, 2010; as outlined below).

2. Rules as instruments for organizational control, coordination and knowledge

Formal rules in organizational theory are usually seen as a means for organizational control, as a mechanism for coordination, and furthermore as a form of codified organizational knowledge. These conceptualizations are generally based on a behaviorist approach to organizations (e.g., Cyert and March, 1963; March and Simon, 1958), often using the concept of organizational routines as a key element (Feldman and Pentland, 2003; Nelson and Winter, 1982). Organizational routines are defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland, 2003, p. 96). Although routines are "repetitive patterns", they are by no means mindless repetitions (Cohen, 2007; Essén, 2008; Parmigiani and Howard-Grenville, 2011). In the recent literature on organizational routines, they are seen as effortful accomplishments and even as a potential source for change (Feldman, 2000; Feldman and Pentland, 2003). Based on this understanding, routines are differentiated from rules, which are seen as formal, written artifacts (Pentland and Feldman, 2005). This has enabled researchers to study the relationship between the two (Becker, 2005; Bruns, 2009; Burns and Scapens, 2000; D'Adderio, 2008; Grote et al., 2009; Kieser, 2008; Reynaud, 2005; Weichbrodt and Grote, 2010). In this article I will build on

these ideas. In the following, I will describe the three functions of rules as control, coordination and organizational knowledge.

Rule-making is one form of exercising power and control in organizations (Clegg et al., 2006; Gouldner, 1954; Mintzberg, 1983). Rules function as mechanisms of control through their two-sided nature of restriction (by reducing freedom of action) and support (by providing solutions for known problems) for rule followers (Farjoun, 2010; Ortmann, 2010; Weichbrodt and Grote, 2010; Zhou, 1997). Rules as organizational control are often associated with bureaucracy, which constitutes a general scheme of control distinguished from others, such as markets (which use prices as an instrument of control) and clans (which rely on traditions; Cardinal et al., 2010; Ouchi, 1979, 1980). Characteristic of bureaucracies is their reliance on formal rules and aversion towards informal control mechanisms, such as traditions or other social norms. However, most organizations employ a blend of different forms of control. Cardinal et al. (2004) showed in a decade long case study of a moving company how organizations can shift between phases of low and high formalization, trying to find the right balance. Grote (2004, 2009) describes this balance in terms of the management of uncertainty, for which she distinguishes two general approaches: Uncertainty can either be minimized through rules, central planning and standardization (thereby reducing operative degrees of freedom), or be dealt with locally, which requires flexibility by maximizing operative degrees of freedom. In general terms, the approach of minimizing uncertainty means organizational control through restrictive, detailed rules and surveillance, whereas the approach of coping with uncertainty means generating less rules, or rules which are less restrictive and offer decision latitude (see below).

Rules are also a form of coordination. Coordination mechanisms in organizations can be defined as "the organizational arrangements that allow individuals to realize a collective performance" (Okhuysen and Bechky, 2009, p. 472). Rules are one type of coordination mechanism, whereas others are, for example, technologically defined processes, personal leadership, or mutual adjustment via reciprocal team interaction (Thompson, 1967; Van de Ven et al., 1976). Rules provide accountability and predictability by defining responsibilities for tasks, and help in achieving a common understanding by developing agreement between organizational actors (Okhuysen and Bechky, 2009). Interestingly, both following rules as well as collectively breaking rules can serve coordination: In a field study in a medical trauma center, Faraj and Xiao (2006) identified reliance on protocol as one among several coordination practices. They also found that, under certain unusual circumstances, collective protocol breaking was used as one of several ways to respond to time-critical or novel events.

Rules can furthermore serve as repositories of organizational knowledge (Kieser, 2008; Levitt and March, 1988; March et al., 2000). Organizations can learn by developing routines for solutions to recurring problems, and then codifying these routines into formal rules for later retrieval (Beck and Kieser, 2003). Instead of developing a new solution each time a problem occurs, organizational actors can apply the rule and thus draw from organizational knowledge. Formal rules can also be used to teach newcomers, and furthermore to replicate the underlying routines, for example, to a new factory of an expanding organization (Argote and Darr, 2000; Winter and Szulansky, 2001). A key point regarding rules as codified organizational knowledge is, however, that rules are naturally abstract and incomplete (Bourdieu, 2005; Ortmann, 2010). Tacit knowledge is knowledge that is tied to movement skills, intuition, or implicit heuristics (Nonaka, 1994; Nonaka et al., 2006). Such knowledge cannot be stored in formal rules, but is instead reliant on the continuing application of rules in the form of organizational routines (Lazaric, 2000; Reynaud, 2005). Nonaka and von Krogh (2009) theorized tacit and explicit knowledge along a continuum.