



Knowledge exchange and learning from failures in distributed environments: The role of contractor relationship management and work characteristics



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ABSTRACT

Learning from failures is vital for improvement of safety performance, reliability, and resilience in organizations. In order for such learning to take place in distributed environments, knowledge has to be shared among organizational members at different locations and units. This paper reports on a study conducted in the context of drilling and well operations on the Norwegian Continental Shelf, which represents a high-risk distributed organizational environment. The study investigates the relationships between organizations' abilities to learn from failures, knowledge exchange within and between organizational units, quality of contractor relationship management, and work characteristics. The results show that knowledge exchange between units is the most important predictor of perceived ability to learn from failures. Contractor relationship management, leadership involvement, role clarity, and empowerment are also important factors for failure-based learning, both directly and through increased knowledge exchange. The results of the study enhance our understanding of how abilities to learn from failures can be improved in distributed environments where similar work processes take place at different locations and involve employees from several companies. Theoretical contributions and practical implications are discussed.

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1. Introduction

Learning from failures is a key organizational process to improving levels of performance and ensuring safe work conduct [1–4]. Strong abilities to learn from failures are in this respect found to be a significant characteristic of high reliability organizations (HROs), referring to organizations operating under demanding conditions yet manage to avoid major accidents [5]. This underscores that gaining insights from past experiences and using this knowledge to design more reliable and effective systems are important facilitators for preparedness for both present and prospective crises [6–8].

Learning from failures requires sharing of information and knowledge about error experiences [1]. Efficient knowledge exchange between organizational members and units is thus regarded as fundamental for this type of organizational learning to occur, and designing a work climate that supports this objective is therefore important [9]. In this paper we argue that knowledge exchange is

particularly important in distributed interorganizational settings, where similar activities take place at different locations and involve employees from multiple companies. Supporting this argument, Wang and Wang [10] claim that knowledge exchange is of particular importance in emerging distributed organizations, as efforts of improvement like transfer of best practices [11,12] in these organizational settings are highly dependent on how well knowledge is shared between individuals in different units and at different locations.

Despite the growing acknowledgement that learning from failures is fundamental to organizational life, particularly in high-risk distributed environments [13], there is a scarcity of studies in this domain [14]. Investigations of antecedents of organizations' abilities to learn from past experiences and mistakes, and what conditions best facilitate such learning in distributed environments are therefore needed. In this respect, Carmeli and Gittell [15], argue that research focusing on relational foundations of failure-based learning is particularly important as interaction and knowledge exchange between organizational members are central in learning processes. In a work context characterized by diversity regarding organizational affiliations, emphasizing the interorganizational dimension is important when considering the relational foundations of learning. Factors

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concerning management of suppliers and contractors should therefore be emphasized in addition to internal work characteristics. Addressing this research gap, this paper seeks to throw light on how management of contractor relationships and work characteristics influence the degree of knowledge exchange in the organizational system, which again impacts on organizations' abilities to learn from failures.

The context of the study is drilling and well activities on the Norwegian Continental Shelf (NCS), which is a setting characterized by distributed interorganizational work. This means that similar work processes take place at different geographical locations and organizational units, and that employees from several companies are involved in the operations. Knowledge exchange within and between various units (e.g. offshore installations) is therefore important. Further, as it is a setting that involves high-risk operations [16,17], failure-based learning is highly relevant. The remainder of the paper is organized as follows: The theoretical background and hypotheses are presented first, followed by a description of the research methodology. The results are then presented and discussed, including theoretical contributions and implications for practitioners. The paper is ended with study limitations and directions for future research.

2. Theory and hypotheses

2.1. Knowledge exchange and learning from failures

Organizational learning represents an important mechanism through which organizations prosper [18], and learning from failures is recognized as vital for improvement of safety performance, reliability, and resilience [1,3,5,13,19–21]. A key theoretical and empirical question is therefore how such learning is enabled [8,15]. According to Tjosvold et al. [22], learning from mistakes involves recognizing undesired effects and reflecting on consequences of actions in order to reduce the probability of their future occurrence. Likewise, Hirak et al. [7], posit that “learning from failures occurs when unit members reflect on a failed experience, openly discuss why it occurred, and identify the work patterns that need be modified or changed in order to eliminate the root cause of the problem” (p.108). Knowledge in organizations is in this way continuously created, altered and discarded as organizational members gain experience and update their understandings of reality to reflect the lessons that can be drawn [4].

This understanding of learning from failures implies that collaboration and interaction among individuals and organizations are fundamental conditions. Argote and Miron-Spektor [23] argue in this regard that the processes of knowledge acquisition, knowledge sharing and knowledge combination are central, while Edmondson [24] claims that organizational learning is a process of change and improvement in organizational actions through better knowledge and understanding. In addition to the proficiency of individual employees, the exchange of knowledge within and across units is thus a significant condition for experience-based learning to occur, and is related to the abilities of individuals to benefit from knowledge accumulated by others, and also influences coordination of activities in the organizational system [18]. Exchange of knowledge can in this respect be understood as the provision or receipt of task information, know-how, or feedback regarding a product or procedure [25,26], and may occur through formal and informal personal interaction or knowledge management systems. Further, the construct encompasses both the processes of knowledge sharing (i.e. employees providing knowledge to others), and knowledge seeking (i.e. employees searching for knowledge from others) [27].

Knowledge exchange thus appears to be critical for the ability of organizational members to reflect on their experiences, and can be a significant factor in explaining why organizations vary dramatically in the rate at which they learn from mistakes [18,28]. Supporting this assumption, studies and investigations of accidents have identified knowledge exchange processes as fundamental factors. According to Pasman et al. [29], major accidents recent years have occurred because of a lack of abilities to absorb unwanted and unforeseen disturbances, and in a study of how investigations of incidents and accidents in a high-hazard setting were analyzed by the involved companies, Doytchev and Hibberd [30] found that there was limited communication flow between key stakeholders in various parts of the work processes. Research on HROs also emphasizes that cognitive and organizational systems that promote situational awareness and knowledge sharing in complex environments can prevent the occurrence of dangerous situations. Knowledge exchange by use of incident reporting systems may be of particular importance as this may improve the processes of detection, reduction and mitigation of failure in safety-critical systems [31]. Weick and Sutcliffe [5] argue in this respect that “HROs encourage reporting errors, they elaborate experiences of near miss for what can be learned, and they are wary of the potential liabilities of success, including complacency, the temptation to reduce margins of safety, and the drift into automatic processing” (p. 9).

In distributed work environments, different units of the same organization may represent valuable knowledge sources. That is, geographically distributed units of the same company are likely to have similar problems, and exchanging solutions is therefore likely to benefit both the individual units as well as the larger organization [32]. Collection, storage and access to experiential knowledge acquired at one work site can thus be beneficial to other sites [33]. This underscores the importance of knowledge exchange both within and between units and work locations for organizational learning to occur. We therefore hypothesize that:

H1. Firms' abilities to learn from failures are positively related to knowledge exchange (a) within units and (b) between units.

According to Catino and Patriotta [1], failures often stem from sequential action chains concealed in habitual behavior. Likewise, Pasman et al. [29] claim that organizational erosive drift is shown to be responsible for complacent behavior and degradation of safety attitude. This implies that external knowledge (i.e. knowledge originating from outside the respective organizational units) may be necessary in order to enlighten local practices, and facilitate critical reviews of local work conduct. Knowledge exchange across organizational units may thus be of particular importance in order to avoid drift into failure and facilitate corrections of work. We therefore expect that:

H2. Firms' abilities to learn from failures are more strongly positively related to knowledge exchange between units than knowledge exchange within units.

2.2. Contractor relationship management and knowledge exchange

Organizational systems where multiple actors are involved in closely-knit work processes are common in several industries, and imply that tasks conducted by employees of one organization have to be synchronized with tasks wholly or partly executed by external actors [34,35]. In such organizational systems, exchange of knowledge across organizational borders is fundamental in an organizational safety perspective [36]. Scholars argue in this regard that communication and collaboration among supply-chain members can foster interorganizational learning [37], especially by exchange of tacit and critical knowledge [38–40].

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