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Assessing propensity to learn from safety-related events

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ABSTRACT

Most organisations aim to use experience from the past to improve safety, for instance through learning from safety-related incidents and accidents. Whether an organisation is able to learn successfully can however only be determined afterwards. So far, there are no proactive measures to assess whether an organisation will be able to learn from experience, meaning whether an organisation has the propensity to learn. In this study we aimed to develop a set of indicators for the propensity to learn as part of the leading indicators for safety. To assess the propensity to learn, the individual perception of learning from experience is measured, through a set of indicators. These indicators are validated through interviews on a French production site. This organisation showed a high propensity to learn, despite some minor weaknesses with respect to involvement of employees and sharing information. On an individual level, 17% of the employees had a very positive attitude towards each step of the learning process. The proposed indicators could support the identification of weaknesses with respect to learning on an organisational level and they could facilitate the identification of training needs of the employees. Further development and tests of the indicators are however needed to apply them on a wider scale.

1. Introduction

A key aspect of safety improvement is the use of past experience, such as incidents, accidents and good practices. An organisation could learn from warning signals, from mistakes, from incidents, from accidents, or to put it more generally: an organisation could learn from experience. Learning from experience means that relevant events are detected and analysed, and that lessons are determined and used for improvement of the situation and the organisation. The term "*learning from experience*" is often used after negative events, to claim that lessons will be learned from it, implying that such an event will not occur again.

Experience is sometimes difficult to grasp, especially when it concerns individual knowledge. This individual knowledge or experience often remains tacit inside working communities where a group of individuals experienced stressful situations together. Such a collection of experiences is an organisation's wealth available for managing difficulties but also innovation challenges. The aim of organisational learning is to identify this knowledge, to formalise it, and to create a momentum of progress based on three basic principles: respect individuals, trust their capacity to manage planned and unattended situations and make lessons learned available to every concerned person (adapted from Wybo, 2012).

With hindsight one can determine whether an organisation did successfully learn from experience. However, so far there is no model or a set of instruments available to predict if an organisation can learn in case an event happens. This paper aims to identify a set of indicators that enables managers or safety representatives to determine how likely their organisations are to learn from experience. In other words, this paper aims to determine a set of indicators to assess the propensity to learn. The word propensity means "*to be inclined*", it implies a natural tendency or disposition. An organisation with a high propensity to learn therefore means that an organisation is likely to learn in case an event happens.

Existing knowledge on propensity, on organisational learning and on safety is used in this study to propose a model for propensity to learn. Our objective is to define two sets of indicators, the first set related to propensity to learn at the organisational level and the second set at the individual level.

The objective of the first set of indicators (organisational level) is to help identifying strengths, weaknesses and ways of improvement as part of the leading indicators of safety. The objective of the second set (individual level) is twofold: to identify people who may play the role of "*learning agents*" by promoting the process in their area, and to identify groups of people that need specific

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training to improve their willingness, attitude, or skills to achieve the different tasks of the learning process.

2. The notion of propensity

The word propensity originates from the Latin word "*propensus*", meaning "*to be inclined*". Propensity generally means that there is a natural tendency or disposition: the aptness of iron to rust; the propensity of a disease to spread. Popper (1959) proposed an interpretation related to technology: probabilities measure propensities that tend to produce possible singular events; they belong to the physical world; they cannot be used to interpret conditional probabilities. At the individual level, propensity corresponds to a driving force influencing one's behaviour. At the group level, it is related to the group's culture and uses. The notion of propensity is used in a quite large number of studies. We briefly describe five of them here.

Serra et al. (2012) studied SME's propensity to export; he argued that it is possible to identify a profile associated with propensity to export, based on firm size, competitive advantage, or number of languages spoken. Keil et al. (2000) addressed the risk propensity related to the decision to continue a project. His study concluded that managers risk perceptions are more influenced by the amount of potential loss and that risk perception was more influential than risk propensity on decision-making. Sasidharan and Donnell (2013) studied the effectiveness of traffic safety countermeasures, based on propensity scores and potential outcomes. Among his results, he found that fixed roadway lighting reduced night-time crashes by 6%. Ryan and Tipu (2013) studied how leadership influenced innovation propensity in Pakistani firms. They identified two major types of leadership that influenced innovation propensity: active leadership, which had a strong influence, and passive-avoidant leadership, having a weak influence. Ryan and Tipu proposed an explanation for this non-intuitive finding "*Intrinsically satisfying tasks may act as a substitute for leadership in self-motivated subordinates who do not expect support from a passive-avoidant leader for carrying out innovative activities*". From a literature survey, Schnake (2007) proposed a model of effort propensity. Schnake identified seven direct positive effects: job satisfaction, job scope, organisational commitment, personality traits, ability to perform work related tasks, group performance norms and group size, moderated by evaluation apprehension.

2.1. Propensity as an attitude

In studies by Hatfield and Fernandes (2009), Rohrmann (2005) and Smits et al. (2012), propensity is defined as an attitude. Hatfield and Fernandes (2009) studied risk propensity in driving behaviour for young drivers. They defined risk propensity as a positive attitude towards risk. Rohrmann (2005) also considers risk propensity as one end of risk attitude, whereas the other end is risk aversion. In his paper, he described four instruments to measure risk attitudes, amongst which the Risk Propensity Questionnaire. This questionnaire is composed of holistic propensity questions, in which a description of propensity is given and the respondent is asked to rate himself for this propensity. Smits et al. (2012) consider propensity as an attitude which contrasts the attitude 'resistance'. They base their study on that of Rohrmann (2005). They studied propensity as an orientation towards participative evaluation (PPE). To study propensity towards participative evaluation, they studied the propensity towards each of four components of PPE. Sharma et al. (2009) consider propensity not as a type of attitude, but they state that attitudes, consciousness and perception are manifestations of propensity. This concept was applied in a study of consumer behaviour, where propensity was considered to be the tendency towards either risk taking or risk avoiding.

Other approaches towards propensity are described by Gilliland and Schepers (2003), Fuller (2005) and Grabowski et al. (2007). Gilliland and Schepers (2003) for instance regarded organisational propensity as a form of culture, predicted by both organisational and managerial factors.

3. Learning from experience

We consider learning from experience as an organisational learning process. People within the organisation and the interaction amongst them are critical to this process, since they detect situations and events to learn from and collect related information. Their experience is captured, processed, transferred and shared through the organisation.

A definition of learning that is proposed by Carroll (1998) is: "*Organisational learning takes place through activities performed by individuals, groups, and organisations as they gather and digest information, imagine and plan new actions, and implement change*". In doing so, an important notion is that: "*Knowledge is more than lists of facts that can be summed together. Organisational knowledge is embodied in physical artefacts (equipment, layout, data bases), organisational structures (roles, reward systems, procedures), and people (skills, values, beliefs, practices)*" (Carroll, 1998).

There is a difference between deliberate learning and learning through experience. Lampel et al. (2009) described that when deliberately learning from experience, experiences – such as the events that are registered in incident reports- are retrieved and collected to search for valuable lessons. This learning contrasts with learning through experience, which occurs instantly when an event is experienced. This kind of learning is the main focus of our study and it starts if something is detected and noted by someone as interesting to learn from. Events, such as incidents or accidents are often easily detected. Weak signals or dangerous situations are however more difficult to identify. In our study, we therefore consider two processes of learning from experience: 'learning from incidents' and 'learning from weak signals'.

3.1. Learning from incidents

Several models exist that represent learning from incidents as a stepwise process (see for instance Drupsteen et al., 2013). In these stepwise processes, after an event occurs and is noticed, follow up steps are performed including the implementation and evaluation of actions. Successful learning in this approach means successful completion of the steps in the learning process. The learning from incidents process as described by Drupsteen et al. (2013) for instance, contains four phases in the learning process – investigation and analysis, planning of actions, intervening and evaluation, each consisting of several sub steps. They used the model of the learning from incidents process to identify weaknesses in learning and to study the difference between the formal and the actual learning process within organisations.

When learning from incidents, it is first of all necessary that an incident is noticed and recognised as a relevant situation to learn from. Mac Donald (1997) argues, "*The capacity to learn from accidents and develop preventive measures therefore depends on the ability to elicit information*". If the incident is noticed and considered relevant, it can be registered and reported in a system and/or shared through formal/informal communication. The ability to elicit information is however also relevant at other levels in the organisation. An HSE manager might for instance collect the report of an event (instead of the event itself) and start learning from that information. He might also assess and analyse the situation and