Needs for resilient fire safety management on land and sea

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THE WORK IN CONTEXT

Fires are associated with potentially large consequences for life, environment and property and are therefore an important aspect in workplace design. This article summarises two case studies, examining the preconditions for a well-functioning fire safety system on land and at sea respectively, applying a systems perspective on work and safety. Today's fire safety management is mainly focused on technical installations, constructional and building measures, control plans and evacuation routines. Fire safety installations could meet all regulative requirements and still create problems for production, sometimes to the point where fire protective routines or installations are bypassed. A common answer to such issues is to strengthen administrative barriers such as rules, safety information and training. However, in tightly optimised organisations like heavy industries or shipping, more checks and routines will only run the risk of aggravating the problem at hand. The problem could instead be viewed as an effect of poor design. Flaws in fire safety design can be traced to the processes of ship and industrial workplace design, building and revision. In the observed fire safety design processes, there are no established ways to ensure that end-user needs are taken into account, and the construction project's main incentive is to keep the construction cost down. Instead, costs are pushed to the operational phase in the form of reduced production and lower safety levels. Safety management in general, and fire safety management in particular, needs to be further developed from a systems perspective.

KEYWORDS

Resilience engineering, fire safety management, human factors, maritime safety, industrial safety

A brief outline of the work carried out

The projects investigated preconditions for effective fire safety management, applying a systems perspective on work and safety. Two case studies were conducted individually, one in Swedish industry, and one on RoPax ships in Swedish waters. In the industry case four larger and smaller industries were studied. In the RoPax ship case two shipping companies were engaged and four ships were studied.

Three main themes were explored through interviews and observations:
(1) How do operations and the staff interact with fire protection installations in everyday work?
(2) What is the main focus in fire safety design, how does it manifest and how do outcomes affect fire safety?
(3) What are the success factors behind positive outcomes from fire incidents?

Findings/solutions (the outcome)

Observations resulted in several findings of poor design of technology and organisational routines that 1) could undermine performance in the case of a real fire and 2) obstruct everyday workflows. Ship design and industrial construction processes are closely focused on cost and technical demands from a short-term project perspective, rarely concerned with user needs and characteristics in the long-term operative phase.

When a fire occurs at the workplace, a joint system of people and technology is activated. However, the present study shows that a systems perspective is rarely applied. Formal fire safety management focuses primarily on construction, regulatory compliance and technical installations. Success factors such as the personnel's professional knowledge, experience, adaptability, collaboration and creativity are largely made invisible.

Key factors for effective fire safety performance are working conditions that fit the needs of the personnel. Both on land and at sea, a combination of fire knowledge and process knowledge is critical for effective firefighting. These aspects are often not parts of formal fire safety management.

Fire protection regulation on land assumes that the personnel evacuate the industrial building, but the study shows that that is rarely the case. Even in industries without an internal industrial fire brigade, the personnel stay and fight the fire, which means that they are in a legislative void. At sea, evacuation is not the safest action, and therefore the human contribution in firefighting is regulated, catered and trained for. However, even though fire preparedness is enforced by regulation, the actual readiness and effectiveness of firefighting can still vary greatly.

Impact

The case studies provide a new perspective on why fire safety installations and routines are bypassed. The actors need to develop ways of understanding and incorporating long-term operative needs in short-term construction projects, so that safety can be more closely fitted to the circumstances and demands of operative personnel. This could lead to more sustainable fire safety management process.

Future research is needed to strengthen organisational learning processes and to give usability a more prominent role in fire safety management, integrating it in as a key value in ship and industrial design.