Safety-Related Organizational Learning and Risk Construal in Shipping Companies

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L'auteur, de nationalité ghanéenne, est le premier « thésard » de l'Université maritime mondiale de Malmö qui a ouvert un cycle de doctorat en 2005. À cette occasion, l'Association des amis de l'Université maritime mondiale a mis à la disposition de l'université un équipement informatique dans la salle Pierre Houssin, du nom du premier professeur français de l'université, réservé aux doctorants. C'est parce que cette première thèse produite par l'Université maritime mondial, soutenue en 2009, porte sur le facteur humain dans la conduite du navire qu'il a été demandé à son auteur de bien vouloir en exposer les conclusions à l'occasion du colloque de Marseille. La Revue Maritime a jugé préférable de présenter la synthèse de cette thèse en anglais dans sa langue originale afin de ne pas trahir la pensée de l'auteur. Elle s'en excuse auprès de ses lecteurs ne pratiquant pas l'anglais. La bibliographie est en page 55 dans « 5stress + ennui des marins Jégaden.pdf »). La rédaction

Résumé (« Abstract » de l'auteur - traduit de l'anglais)

La répétition des accidents et de la dynamique qui les cause crée le besoin d'étudier ce que les organisations apprennent de l'expérience et comment elles comprennent la prévention des risques pour l'avenir. Cette thèse étudie sous tous ses aspects la façon dont les armements au commerce exploitent leur expérience, filtrent et prennent en compte les diverses approches de la sécurité et comment la dynamique de groupe et les motivations individuelles en sont influencées. Établie sur des bases théoriques en comportement humain, en apprentissage d'organisation, en dynamique sociale de groupe et d'organisation et en analyse de risque, cette étude utilise une approche multi-méthodes pour apporter des réponses pertinentes.

L'étude explique les corrélations significatives qui existent d'une part, entre la dynamique sociale de la psychologie de la sécurité collective et d'autre part, la variété des méthodes de commandement et d'exécution des ordres. Elle démontre que les deux problématiques sont des indices significatifs de l'apprentissage des organisations. Un certain nombre de thèmes théoriques et opérationnels se révèlent pertinents pour les armements maritimes au commerce eu égard à l'apprentissage des organisations. Au-delà de ces résultats, l'étude fait apparaître et discute quelques thèmes émergents qui montrent les rapports entre l'apprentissage des organisations et l'assomption des risques.

L'étude conclut qu'il y a une prédominance de l'apprentissage initial, la nécessité de faire confiance à la réglementation et une priorité à l'exploitation du retour d'expérience basée sur les rapports de quasi-accidents. Résultant de ces constatations, un certain nombre de recommandations sont faites comprenant celles que :
- l'industrie en général doit accentuer son effort de formation tant des officiers embarqués que des cadres à terre - en matière de risque - dans ses aspects socio-psychologiques et culturels ;
- les dispositions à la perception du risque chez les personnels navigants doivent être stimulées, encouragées et reconnues dans des procédures formalisés d'appréciation du risque.

En atteignant ses objectifs, on peut penser que cette étude apporte une contribution à la théorie du risque et à sa compréhension aussi bien qu'à la théorie de l'apprentissage des organisations. Des bénéfices pratiques peuvent être escomptés dans les domaines de l'éducation maritime, de la dynamique de groupe et de la pédagogie des journaux de bord combinée à la stimulation des initiatives en matière de sécurité dans la navigation maritime.

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We are captives of the moment. The slowness of our thinking and the smallness of information we can process at any one time, our tendency to protect our sense of our competence, the limited inflow capacity of our memory, and our tendency to focus only on immediately pressing problems – these are simple causes of the mistakes we make in dealing with complex systems.
Dietrich Dörner

Broad research issue

The importance of organizations, their behaviour and the effect of their cultures in accident causation as well as learning from accidents is a contemporary study focus. It is acknowledged that organizational factors are important in accident causation. However research into the exact processes involved in such learning and consequential and associated effects on workers in limited. In this study the broad research inquiry is into how shipping companies as organizations learn from, filter and give credence/acceptability to differing risk perceptions and how this influences the work culture with special regard to group/team dynamics and individual motivation. It explores learning processes and outcomes in shipping companies as well as emergent

themes that impact on these processes and outcomes and their effect on risk construal and management.

Research aims and objectives

In seeking to answer the global question, this research effort has had the following aims:
- Finding out how shipping organizations give hierarchical credence and acceptability to the risk perceptions of the various actors in the industry;
- Examining whether any such hierarchical acceptability of risk perception influences team psychological safety and worker engagement in the shipboard context;
- Reviewing the effects of the above in accident causation, recovery and prevention;
- Making a contribution in terms of optimising the support context for team work - organizational behaviour, structure, resources and training;
- Helping to stimulate the consistent evolution of maritime organizations into learning organizations;
- Discussing the effect of better team climate on attrition rates of seafarer numbers;
- Contributing to the enhancement of maritime education and training both in the academic and industrial settings.

Research focus and questions

Based on specific theoretical foundations and considering the gaps in the literature linking concepts that are germane to the research issue at hand, the following specific questions are explored:
- What are the relationships between team psychological safety, leader inclusiveness, worker engagement and organizational learning as regards the context of shipping companies and ship officers?
- How do the constructs of team psychological safety, leader inclusiveness and worker engagement, predict organizational learning?
- Are the predictive potential of team psychological safety, leader inclusiveness and worker engagement for organizational learning confounded by variables such as rank, age, nationality and time in company?
- What variables influence worker engagement in ship officers as regards safety?
- What are the processes that facilitate or limit organizational learning in shipping companies?
- What factors influence credence-giving as regards risk information from ship officers?
        Answers to these questions helps give insights into:
- how the relations between the constructs affect the construal of risk, teamwork and possibly predict organizational learning in shipping companies;
- to what extent the existence of learning organizations (characterised by double-loop and deutero-learning) is manifested in the shipping industry;

- what the key considerations, processes and emergent issues in organizational credence-giving of risk perceptions are;
- how the giving of such credence and acceptability to different perceptions of risks influences organizational learning;
- to what extent there is an awareness of these issues and the need to optimise processes for greater risk resilience[1] in shipping.

Research methodology: mixed-methods

The study draws its findings and the resulting conclusions and recommendations from a mixed-methods (multi-step) approach involving:
- A literature review
- Focus group discussion
- Use of an external reference group of experts
- A survey of ship officers (with quantitative analysis)
- In depth interview in the context of field visits to shipping companies
- Software and document analysis in the context of field visits to shipping companies

Research findings

Risk definitions

The pure objective definition of risk as probability multiplied by consequence is limiting. It tends to ignore very real risk issues which are more subjective and on which risk policy depends. The purely objective notion of risk does not subsume the elements of the sociology of risk (e.g. perceptions) as is the case taken for example in Renn's work on "risk governance" (Renn, 2005). The standard risk management process does not address sufficiently the issues of the acceptability of risk, risk policy setting and decision making.

Worker engagement

Not only is worker engagement positively correlated with perceptions of organizational learning and team psychological safety, the two are also significant predictors of organizational learning.

Worker engagement is influenced not only by direct solicitations to ship officers to be involved and participate in specific safety-related programmes, but also by more holistic factors that, prima facie, may not appear to be safety-related.

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1 Resilience is the ability of a system to revert to a stable condition after being upset by disturbing factors with respect to risk, safety and reliability Etymology - 1626, from Latin resiliens, «to rebound, recoil,» from re- «back» + salire «to jump, leap». Resilience. (n.d.). Online Etymology Dictionary. Retrieved December 11, 2008, from Dictionary.com website: http://dictionary.reference.com/browse/resilience.

Worker engagement levels for management level officers are moderately higher than those for operational level officers.

Based on manning/labour legislation from different countries, sometimes crew from different nations are paid different wages for same work done. While these actions may be administratively justified, they nevertheless generate perceptions of inequity and adversely affect motivation and engagement.

Team psychological safety and leader inclusiveness

Team psychological safety is positively correlated with perceptions of organizational learning, worker engagement and with leader inclusiveness.

Team psychological safety is moderately higher for OECD officers than for non-OECD officers and significantly higher for management level officers than for operational level officers.

Leader inclusiveness is positively correlated with perceptions of organizational learning and with worker engagement

Credence giving

The majority of officers (66%) think that their safety-related opinions are sometimes or always considered by shore-based management or that they have power to change a management decision. However, a significant 34% feel that their opinions are rarely considered, that they have no influence on management or were not sure.

Congenital learning

Congenital learning has a significant effect on the "knowledge corridor" that is created for subsequent learning in an organization and also has implications for organizational entities that have their origins in specific companies.

Temporal demarcation in safety data

The shipping companies have "calendar-based demarcations" or "organizational breakpoints" for safety information distribution, trending, analysis and discussion. This may introduce salient points that are not necessarily relevant or important to risk management. Salient features in a stream of information affect managers' perceptions of causality, relevance or importance. Segmentation of safety information may influence how risk and solutions are framed and how resources are allocated.

Top-down appraisal of risk associated competence

Information acquisition about risk associated with crew competence, is primarily derived from top ship-board management concerning lower level crew.

Ship visits

Some companies place very highly the visiting of ships by very senior management. Indeed it is a requirement for tanker-owning companies subscribing to TMSA (Tanker Management Self Assessment). However, there is an obvious assumption that people who visit the ships are equipped to appreciate the differences of context, an understanding of what constitutes normality in safe ship operation as well as the learning processes involved and a double-loop inquiry mindset. This assumption is not necessarily always authentic.

Vicarious learning

The shipping companies place value on vicarious learning. However this is not as systematised as learning from the organizations' own experiences which is covered by many safety management systems. Neither is the issue of contextualisation of vicarious learning systematised.

External databases

At the level of shipping companies, the IMO database GISIS (global integrated shipping information system) and FSI (flag state implementation) circulars are not an immediate point of reference for lessons learnt. The IMO database is not publicised enough and its merits not sufficiently apprehended by companies and their crew. The databases are also almost exclusively and necessarily computer and web-based. Therefore the (acknowledged) severe limitation of internet services for crew on board ship is a very significant setback for direct crew reporting. The research found that the limitation of internet service is increasingly proving to be an issue/problem with seafarers (especially those from more developed countries) not just regarding reporting but as a social amenity onboard.

Experiential learning and near-miss reporting

Knowledge acquisition in the context of experiential learning is very biased towards the reporting of near-misses. The quality of near-miss reporting is not such as is supportive of optimum proactive management of risk.

Trend analysis

In the information interpretation phase of organizational learning, trend analysis, though mentioned by many research participants, was still very much an accounting approach, what Woods and Cook call "counting failure" (Woods & Cook, 2001) and not very focused on deeper level analysis nor sufficiently on precursor analysis in the anticipation of risk. The full potential of information technology in the interpretation of data is yet to be exploited by the company.

Voice and silence in leaders

The research found cases where key policy-setting or policy-influencing personnel articulated positions contrary to the existing organizational policy (theory-in-action), and yet showed no previous action or inclination for future action to change the status quo. This reflects the restriction of voice even in leaders. The literature often views the issue of voice and silence in organizations as an issue with subordinate communication with superiors (upward communication). The finding shows that issues of voice and silence are not restricted to upward communication but even to lateral communication.

Transactive memory

For good and practical reasons, training ship teams (off-ship) together for the purpose of improving transactive memory is difficult and perhaps unattainable.

Ship-shore communication

Semantic differences in language and differences in risk perspectives inhibit risk communication between ship and shore.

Hierarchical structures

Management structures on board remain significantly hierarchical and there is resistance to the concept of flatter hierarchies. However the strict hierarchy and current understandings of responsibility and rank, detract from optimum team psychological safety. The research suggests that the strict hierarchy (in the way it is operationalised today), constitutes more of a challenge to increased team psychological safety than do nationality differences. There is however more awareness and emphasis placed on nationality issues by the companies.

Research-practice gap

Industry does not appear to view the discussions in academia regarding e.g. accident causation and modelling as practical. Intuitive modelling is done with no recourse to contemporary critiques in the literature. Industry in general and the maritime industry in particular, place an emphasis on simplicity and practicality. These are not necessarily characteristic of academic debates. It has been noted that daily decision making by individuals working in complex organizations is "shaped more by power structures, ingrained routines, and established resource configurations than by current scientific findings" (Rosenheck, 2001).

Productivity/safety

Both in academia and in industry, there is a tendency to view productivity and safety goals as incompatible and irreconcilable. This leads to questionable practices of resource

allocation and utilisation that compromise safety in the name of productive efficiency.

Training

There is an increasing burden of training being placed on the shipping companies. Those who can afford it are even establishing training centres that function almost like the traditional Maritime Education and Training Institutions (METI). This would suggest a deficiency in the work of traditional METI or could be due to a lack of communication between industry and METI (academia). Generally speaking, traditional METI appear to be completely out of the loop when it comes to current and dynamic risk information distribution.

Shore staff training

The emphasis on training is heavily skewed towards "seafarer training". The research suggests that in the area of communication, safety, risk construal and ship board operation, the industry would benefit significantly from the enhanced training of shore office personnel.

Motivation for safety action

The main motivation for safety action seems to be legal and/or commercial imperatives. Such actions in most cases cover things that are easily auditable. The research shows how less tangible constructs may play a role in the generation and maintenance of a safety culture. The companies however seldom attempt to formally measure these constructs, relying on intuition and gut feeling to assess this.
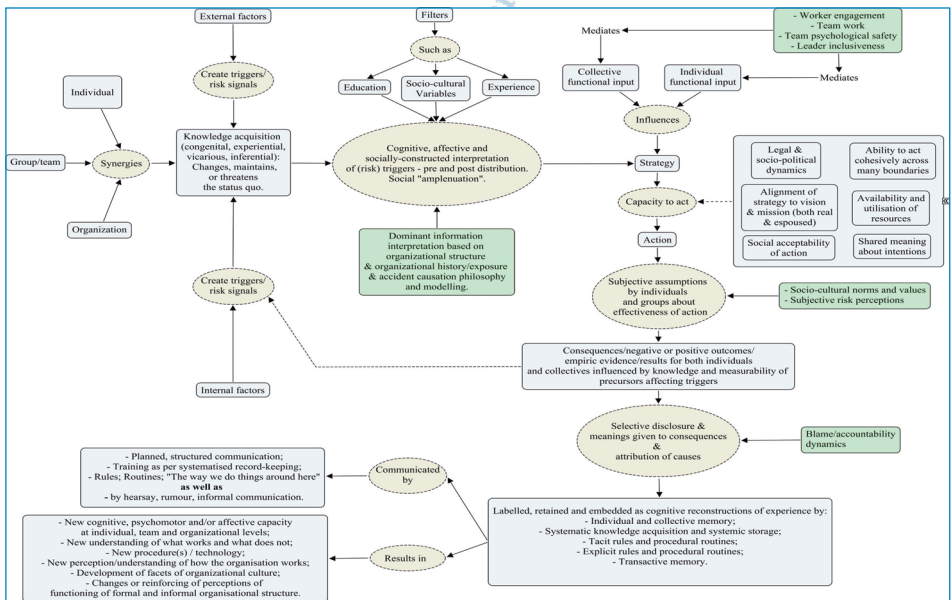

Figure 1: Conceptual representation of research findings.

The overall conceptual outline of the research findings is shown in the attached figure. It indicates:

- links between knowledge acquisition (congenital, experiential, vicarious and inferential) /interpretation/distribution and external/internal influences as per open systems theory,
- the synergies between individual/team/organization as per structuration theory,
- the mediating role of individual subjectivity/perception in the amplenuation[2] of risk signals,
- the mediating role of worker engagement, team psychological safety and leader inclusiveness regarding functional input in organizational safety strategy and action,
- factors that influence capacity to act at different stages of learning,
- the mediating role of socio-cultural norms,
- organizational memory and communication and
- organizational change/adaptation and the progressive development of organizational culture.

Further research

The research done in this work can be augmented by a replication using a larger stratified sample size with each strata of the sample having a significant size. When analysing the data for nationality e.g. one could only be restricted to differences between OECD and non-OECD because of the sample sizes involved. It would have been possible to explore more specific differences had the sample sizes for the different demographics (nationality/region) been greater. Further research that increase these sample sizes will make it possible to generalise findings to a greater extent, with respect to nationalities, than has been possible in this work.

It is recommended that future research seek to synthesise from the survey items a concise list of items - based on factor analysis or principal component analysis - that can be used as a quick assessment tool in organizations to measure the constructs covered in the questionnaire. This kind of analysis should address the high level of shared variance between the constructs of team psychological safety and worker engagement on one hand and leader inclusiveness on the other.

Another potentially significant research direction would be to apply the questionnaire items to ship officers in a single company and then investigate in-depth in that single company with interviews etc. If this is repeated across many companies, there will be significant data for critiquing/augmenting the findings of this research and for exploring patterns of data as indicated by companies with high levels of organizational learning compared to those with low levels of organizational learning.

A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions. Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.
Rajendra Pachauri

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2 A neologism introduced by the thesis in reference to the amplification and attenuation of risk. The intention is to limit the undue emphasis on amplification of risk signals and the relative ignoring of the attenuation of risk signals