ERM OF AN ADVANCED PHYSICS INSTITUTE: A CASE FROM THAILAND

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Abstract - This article presents a practical case of enterprise risk management (ERM) of an advanced physics institute from Thailand. The organization provides synchrotron light services to home, regional and international users from academics and industries. The article gives a summary of ISO31000 framework and bowtie representation. It further provides insight of risk management approach of the institute. The materials presented could serve as a good example for other institutes of similar missions.

Index Terms - Enterprise risk management, synchrotron, bowtie diagram.

I. INTRODUCTION

An old-fashion risk management focuses merely insurable risks. Enterprise risk management (ERM) is different. It considers both insurable and non-insurable risks. ERM is a process, and at the same time a discipline. It brings all workers and managers to do critical thinking of their organization's uncertainties, and how to handle them under their scarce resources. This is to ensure continuity and competitiveness of their businesses. For effectiveness, an organization should embed ERM in its culture.

ERM focuses internally, externally, and on strategic risks. It is a continuous process, and promotes dialogue among all levels of employees. ERM creates value for organization in the following areas: corporate strategy, marketing, HR, finance, governance, for instance. It has been worldwide implemented in all kinds of business and organization. Examples appear mainly in businesses and industries. When we decided to implement ERM several years ago up till now, we have not found any example or a case study like ours. Our case will certainly provide a good example to RM people who are working with highly scientific services companies, research laboratories, and the like. To keep our article in context, a brief introduction of our institute is hence appeared in appendix. Herein, readers can find short reviews on ISO31000 and bowtie diagram, respectively. Our implementation then follows.

II. A SHORT REVIEW OF ISO31000 AND BOWTIE DIAGRAM

Two international standards that have been widely recognized by RM practice are the COSO-ERM (The Committee of Sponsoring Organizations of the Treadway Commission-Enterprise Risk Management), and ISO31000 (International Organization of Standard-Risk Management Guidelines on Principles and Implementation of Risk Management). The ISO31000 is sometimes referred to as ISO31000:2009. The COSO and the ISO standards both have structural flexibility. However, we perceive that the ISO31000 has clearer procedures, and is more suitable to non-financial organizations. Since SLRI is a public organization of the Thai Government, by law it must have independent Audit Committee, and Internal Auditing Unit (IDU). The IDU evaluates the institute's RM system, while our ERM task force conducts all relevant works under the supervision of the institute's Sub-Committee on Strategy and Risk Management. The ERM task force follows the framework for managing risk recommended by ISO31000 being summarized in figure 1. RM process consists of 5 major steps as follows:

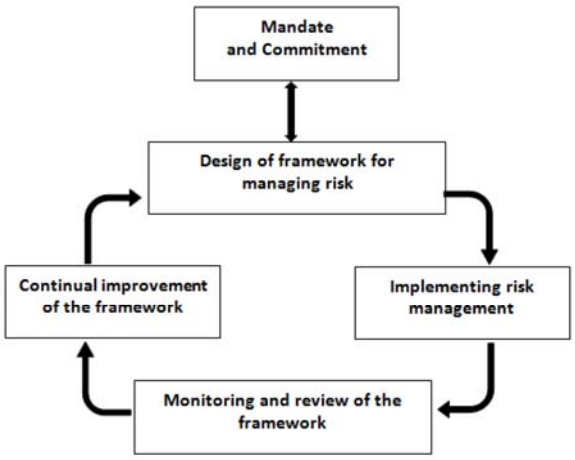


Figure 1 RM Framework (ISO 31000:2009)

- Establishing the context
- Communication and consultant
- Risk assessment: risk identification, risk analysis, and risk evaluation
- Risk treatment, and
- Monitoring and review.

Communication between the task force members, operators and managers are of prime importance. Once all elements are well established, we

contextualize our ERM process in a representation called "bowtie" diagram. Figure 2 shows a simplified bowtie representation. We create various safety barriers in order to decrease the chance of occurrence of all sorts of critical events, and to reduce the impact of such events. These are called proactive and reactive tactics, respectively. Readers can find detailed explanation of ERM, ISO31000 and the bowtie diagram in [1]-[3].

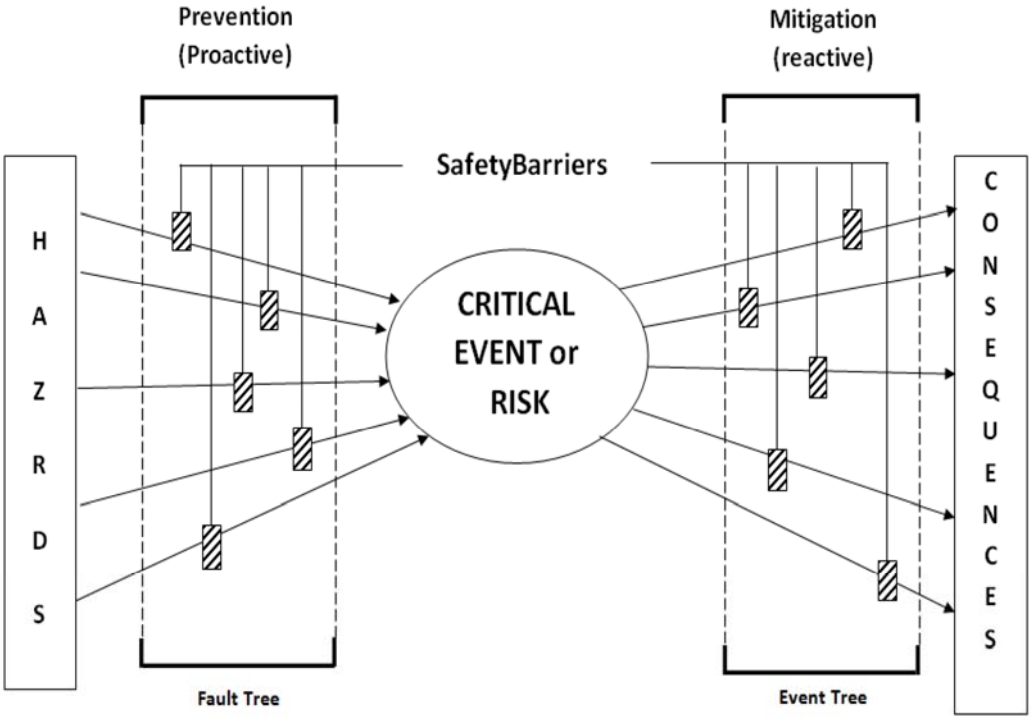


Figure 2 A simplified bowtie diagram [3].

III. OUR PRACTICE

This section describes a specifically practical case of Synchrotron Light Research Institute (SLRI), Thailand. We believe that our case is a good example of ERM of an advanced scientific organization. As mentioned above, RM promotes communication across entire organization. From brainstorming, our RM task forces reached for 5 categories of risk factors (list of possible risk categories may be found in [1]-[3]). Ours cover business strategic risk (BS or ST), financial risk (F), operational risk (O), legal and regulatory risk (R), and health and safety risk (HS). After extensive risk analyses, the task forces summarized their approach by following the bowtie style by CSIRO (Commonwealth Scientific and Industrial Research Organization). As an example, in 2017 the task forces concluded the following risk factors (RFs), and internal control factors (ICFs) tabulated below.

Correspondingly, scales of impact and likelihood are 1-to-5. Our team agreed on that the weight of an impact of at least 2.5 could damage our business, and the probability of an event to occur at least 0.8 is high. Therefore, if impact is greater than or equal to 3, and likelihood is greater than or equal to 4, we register that particular RF for proper RM. Otherwise, they will be regarded as ICFs. Tables 1 and 2 show the details of the example.

Table 1 Risk factor (RF) with associative impact and likelihood.

RF		Type of Risks	Impact	Likelihood
RF1	Level of radiation in the work-place is higher than standard.	HS	5	4
RF2	Turnover rate of talents is high.	ST	4	4
RF3	Number of industrial project is low.	ST	4	4
RF4	Budget from the government is inadequate.	F	4	4

Table 2 Internal control factors (ICF) with associative impact and likelihood.

ICF		Type of Risks	Impact	Likelihood
ICF1	Economic value added is low.	ST	4	3
ICF2	Number of journal publications is low.	ST	4	3
ICF3	Losing of existing customers.	ST	3	3
ICF4	Availability of the light source is low.	O	3	3

The task forces further worked on the design of preventive and reactive controls as safety jackets for causes and impacts of an RF, respectively. There

might be several causes and impacts much more than we could handle. In this case, ranking them, and select some with high priorities for treatment are possible. One good example is a RF called "level of radiation in the work place". If the level is higher than standard, it could trick a health problem, and even worse trick a chaos among workers. The risk treatment of this example is illustrated by the bowtie diagram in figure 3. The diagram serves as a management tool. It summarizes all controls and mitigation tasks, causes, impacts and scores. The keys for success of ERM are communication, and collaborations among workers and task forces.

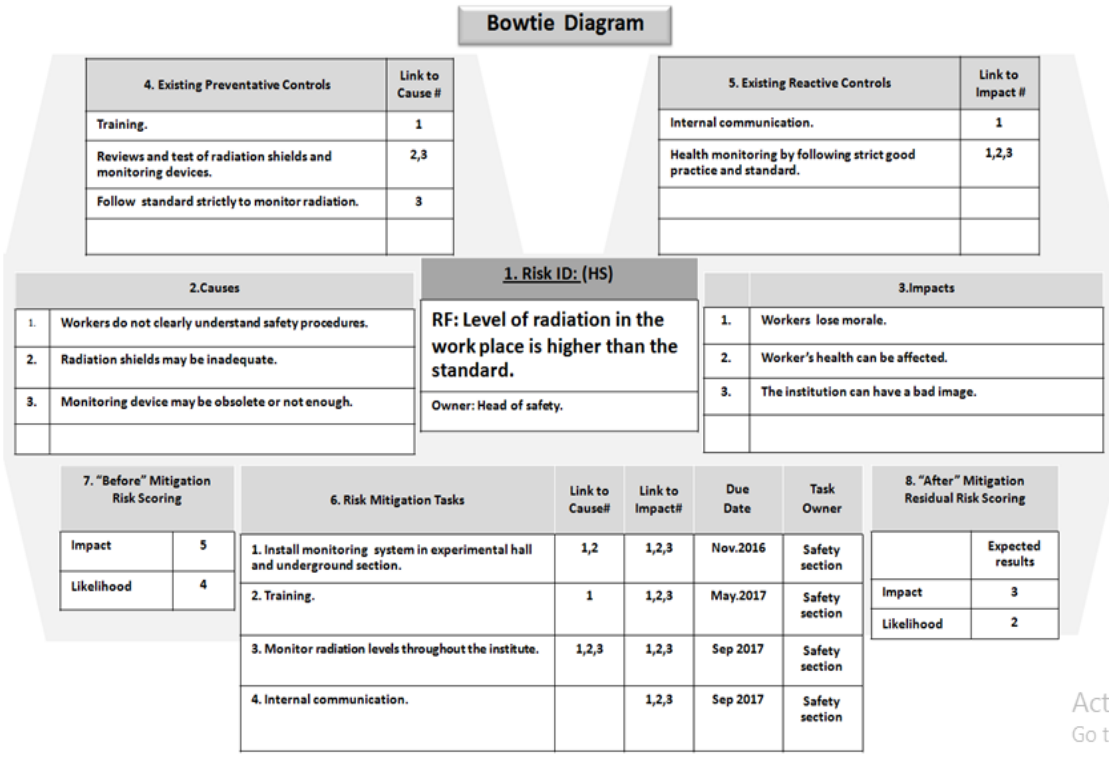


Figure 3 Bowtie representation of risk treatment.

CONCLUSION

Our article discusses the importance of enterprise risk management, and briefly reviews the framework of ISO31000 and the bowtie diagram. It further explains a practical case of an advanced physics institute in Thailand. Synchrotron Light Research Institute or SLRI is such a case. Our case provides insight of treatment of risk and internal control factors. The materials presented by this article could serve as a good example for other institutes of the like kind.

ACKNOWLEDGMENT

Effective implementation of ERM is a collaborative process throughout an organization. The authors' thanks are due to the institute's Sub- Committee on Strategy and Risk Management, the senior management team, the RM task forces, and all their colleagues. Without those, a good and thorough ERM would not be achieved.

REFERENCES

[1] M. Crouhy, D. Galai and R. Mark, The Essential of Risk Management (2nd. ed.), McGraw-Hill, 2014.

[2] J. Law, Enterprise Risk Management-From Incentive to Controls (2nd. ed.), Wiley, 2014.

[3] C. Jacinto and C. Silva, "A semi-qualitative assessment of occupational risks using bowtie representation," Safety Science, vol. 48, pp. 973-979, 2010.

APPENDIX

Synchrotron Light Research Institute (SLRI) is a public organization under the supervision of Ministry of Science and Technology, Thailand. Its organizational structure has 3 pillars, i.e. administrative and strategic group, light source and beamlines group, and engineering support group. It has 190 staff members. 70 percent of them are scientists, engineers and technicians. The rest are supportive staff. There are currently 12 beamlines covering infrared, and soft-to-hard x-ray radiations. The most famous technique is soft x-ray absorption spectroscopy. SLRI conducts 3 main missions: research and development, synchrotron services, and human resource development. While it is a not-for-profit organization, it is eligible to charge service fees. The institute has been well-known in the country for its outstanding industrial services as it was awarded a trophy by the Thai Government for this mission.