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EXPERIENCE OF INSURERS IN TAKING PREVENTIVE MEASURES

This paper deals with forms of mutual cooperation, liabilities and interests of the Insured and Insurer relating to the investment into the prevention measures, to improve protection of the insured property, decrease probability of insured risk occurrence (fire, breakage, burglary ...) and mitigate the possible adverse effects thereof. Within the scope of insurance coverage and depending on the condition of the insured object, equipment and stock, the Insured and Insurer agree on the necessary investments for the purpose of increasing safety. To that extent, depending on the amount of required investments and agreed insurance premium, the agreement is made regarding type of prevention, implementation dynamics and mutual relations of the parties in the investments.

Key words: *prevention, risk, premium, insured, insurer, protection, fire, breakage.*

1. Introduction

In developed countries, such as the USA, European Union, Canada, Japan, Russia and Australia, life and material property are most commonly pro-

tected through the insurance activity. Such protection is predominant in the sphere of industrial production which is, by its nature, hazardous to life and high value property and threatens to cause damages with adverse effects.

The beneficiaries under the insurance coverage are called the **Insured** and the companies providing the coverage, the **Insurers**.

Prior to underwriting an account, it is normal to inspect the situation and assess the risk, to determine the fair premium amount for the relevant hazard. During the insurance period, the risk assessment and control is performed at the insured location, per safety-relevant elements which can jeopardise the property and lead to the insured occurrence.

As the time passes, the insured building and equipment deteriorate; on the other hand, the age-long practice has shown that there is a lack of property maintenance. The change in the equity capital is often accompanied by a change of the type of industry; the risks, thus, change as well. The process of transition in Serbia has brought about deterioration in the state of industrial risks. Legal entities, which did not manage to keep pace with these changes and sustained significant reduction of capacities in all business segments did not pay enough (and/or any) attention to the condition of their property and invest in the preventive/protective measures. On the other hand, some companies did invest, but little, in the prevention.

Such position stresses the need to take preventive measures more seriously, since their implementation significantly reduces the probability of loss occurrence and creates the conditions for the preservation and development of material property.

2. Insurable Risks and Perils

Growing human activity of all kinds, accompanied by constant technological development, with the aim to create material property, caused the emergence of new hazards for human life, property and environment.

In general, risk can be interpreted as a degree of probability that a certain activity will, directly or indirectly, endanger human life, environment and property.

There are sources of perils all around us; most of them appear on a relatively small area, due to the generally high concentration of material values.

This is the reason of high exposure. We are speaking of densely inhabited cities with valuable buildings of public importance and different industrial plants, such as power producing complexes, thermal-power plants, hydro-power plants, mines and chemical, nuclear, petrochemical, wood processing and metal processing industries.

In this article, the author primarily deals with fire and explosion risk, although the insurance often covers other risks as well, such as natural catastrophes (earthquake, flood, drought...), machinery breakdown, theft and the like.

In insurance parlance, fire is defined as a flame occurring outside a particular fire-place and spreading on its own capacities. Fire is deemed a combustion, spreading without control, and a process characterised by heat release, accompanied by smoke and flame. By its characteristics (such as a constant potential peril and remoteness, capability of self-supporting, fast spreading, combustion products hazardous to human life and total destruction of property) fire represents major risk for human life and property. Characterised as above, fire is a major risk in property insurance. Since explosion often follows (causing potentially catastrophic effects for the Insured), preventive measures should be taken against it as well. They can be partially financed by the Insurer.

The explosion is deemed fast chemical reaction of oxidation and decomposing of explosive matter, accompanied by significant release in a short time period, causing the occurrence of a shock wave in the surrounding area. The reaction is so fast that the particles in the boundary layer of gas cannot be timely removed from the pressure-caused shock wave. Such shock waves are called detonations. The explosions can occur by activation of explosives or ignition of explosive mixtures of air and combustible gas, steams of easily inflammable liquids or dust. Explosive detonations may occur under particular conditions, in production or warehousing, due to the lack of implementation of adequate technology or protective measures (most often, in earmarked production, mines and on construction sites, etc.). The explosion of gas-steam-air mixtures is possible in various industrial branches and plants, hosting operations which include combustible gasses and/or inflammable liquids and dust (like petrochemical industry, furnaces and gas/heating oil boilers, textile industry, exploitation and oil processing etc.).

More than 80 percent of all fire and explosion in Serbia is caused by human factor, such as bad choice and/or irregular implementation of techno-

logical processes, lack of care or knowledge, operating negligence, non-implementation of protective measures and faulty design. This highlights the need to educate the Insured's employees and support them by implementing the protective measures on the part of the Insurer.

3. Prevention

3.1. General Information

Prevention is one of the most efficient and purposeful method for the reduction of various types of risks. Therefore, it has a constant and growing industrial and general social importance.

Prevention includes a number of activities taken to avoid the occurrence of natural, technological, health, financial and other risks jeopardising the individuals, companies and other social entities.

It is necessary to mitigate the adverse effects of occurrences (in spite of the preventive measures, it is not possible to completely avoid the risk occurrence; however, it is possible to mitigate and prevent the potentially destructive effects thereof).

Preventive measures are taken in every modern society, by governments and business entities, in order to reduce the probability of loss occurrence, and are largely financed by insurance companies.

The role of the government in the field of prevention is to adopt legal and other regulations and by-laws, with direct impact on the prevention of risk occurrences and, consequentially, mitigation and prevention of the adverse effects thereof. The government adopts laws and regulations regarding fire protection, health and environment, traffic safety, and the like.

3.2. Insurance and Prevention

The Insurer defines prevention as a method of risk reduction which needs to be directed towards a designated purpose. Special attention is dedicated to major industrial enterprises, as insured perils whose business is under

big fire load (such as processing and warehousing).

In both Europe and Serbia, there is a constant tendency of developing special national prevention and protection centres. These centres focus on environmental protection, operational safety, prevention of industrial and technological risks occurrence and protection against fire and explosion. Insurance companies are the most important partner of such institutions.

In its documents, the insurance industry gives a definition of prevention which, in a few words, explains its essence:

“Prevention is the avoidance of loss event by removal and/or prevention of causes which may result in damages and by taking measures for mitigation of the effects of already occurred perils and/or risks”

Prevention also includes the measures aimed at reducing the probability of loss occurrence to the minimum. Preventive engineering is a special scientific and technical discipline which studies the risk management and prevention.

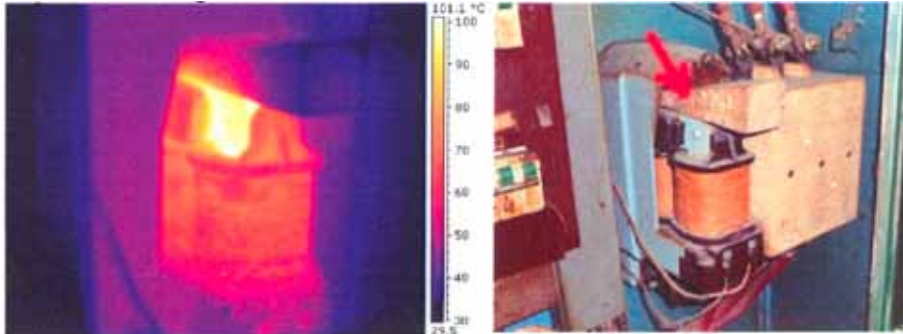
The insurance companies contribute to the implementation of preventive engineering in insurance, by hiring the risk managers (risk inspectors) and other relevant engineering professionals. Modern preventive engineering unifies the scientific and research achievements and professional knowledge in various areas, most of all technical, organisational, informational, economic sciences; the starting point are the achievements in fundamental sciences, especially physics, chemistry, mathematics.

Preventive engineering is a set of procedures and methods for implementation of the following activities (based on a multidisciplinary approach):

- risk identification and assessment
- defining measures and activities for preventive protection and controlling the realization of the agreed preventive measures
- installing the insured risk management systems for the insurance period
- preventive engineering diagnostics of industrial systems
- inspection of the complex damages and proposing measures for effects mitigation.

Average loss amount, especially when incurred due to fire and explosion, corresponds to the level of technological development. However, share of loss in the GDP is much higher in the underdeveloped countries; this is not a coincidence, but a consequence of the level of development of preventive engineering.

The insurers use up-to-date prevention diagnostic methods, such as thermovision survey, to discover the latent defects which can be manifested as „hot spots“(potential fire perils) and remove them in due time. The only dangerous spot (electric transformer heated to more than 100° C, fixed on a wooden base) is presented on the thermogram and photo – *picture 1*.



Pict. 1 : Thermovision photo of the transformer in distribution board

3.3. Attitude of Insurer and Insured towards Prevention

In Serbia, it often happens that the property changes its owners; consequently, the attitudes towards the maintenance of such property also change.

The Insured (property owner) implements the prevention directly through the following activities:

- finding the most suitable solution for the risk carrying (self-retention or insurance)
- introduction of modern scientific and technical innovations in business procedures
- improvement of the current technologies with the aim to increase the level of safety
- keeping stocks at the optimum level, thus reducing the probability of their total destruction
- modernization and tailoring the protection services by hiring private companies with the relevant certificates
- acting by instructions and removing defects found by the inspection authorities
- performing periodical check-ups of pressure vessels, electric installations, lightning-rods and similar activities prescribed by law

- recording the events which affected the risk condition
- training the personnel whose work influences the industrial safety.
 - Preventive measures are adopted in the following areas:
 - technique and technology (implementation of modern technical systems for timely identification of the peril and its automatic connection with the removal systems)
 - defining work procedures regarding the compliance with mandatory technologies (especially procedures in case of incidents)
 - video monitoring of the premises where risk carrying processes are performed (video-surveillance)
 - maintenance of machinery, devices and equipment (application of modern diagnostic methods: ultrasonic testing, thermovision survey, etc.).

When hiring an enterprise to implement preventive measures, the Insured often chooses by price, instead of quality of service; on the other hand, the providers are dumping the prices at the cost of quality of equipment, which directly influences the quality of preventive measures. When business is done on the basis of such attitudes, safety is most endangered; the realized profit can, thus, be lost in a second, following the occurrence of a loss event.

Since prevention is complex and calls for professional and technical competence (in informatics, electro-technics, mechanical engineering, technology, civil construction), its implementation calls for hiring certified companies which employ licenced and experienced professional engineers of relevant expertise.

The Insurer's interest is to reduce the outflow of money from his own funds. Therefore, he needs an accurate estimation of actual perils in order to determine adequate premium amounts and earmarked investments with a view of reducing possible loss occurrences.

Therefore, the Insurer tends to:

- estimate and identify the actual value of risk he is about to underwrite
- constantly develop own tariff system to secure that the level of premium is adequate for the assessed risk
- find the most favourable portfolio solutions to allow for the risk balancing in space and time, using the coinsurance and reinsurance
- monitor the taken steps, their changes and implementation of the agreed preventive measures
- take part in the creation of statistical basis, in cooperation with government

authorities, that will be open for various kinds of research

- investigate into the causes and amount of loss and/or effect of preventive measures, as much as possible in harmony with the Government and Ministry of the Interior – Emergency Section (with greatest effect immediately upon the occurrence).
- identify his own interest in investing into preventive measures, by:
 - mutual financing of projects with the Insured, in production plants and service facilities
 - supporting the construction and equipping laboratories where the means of protection are tested and certified
 - proposing regulations, laws and standards
 - supporting various levels of education
 - supporting the book writing and material printing.

Depending on the insured subject matter and perils that are being economically protected by means of certain lines of insurance business, different preventive measures can be taken. Premium rate (or premium) should reflect the risk degree; in many lines of insurance, this depends on the protective measures taken by the Insured.

For example, in fire insurance, the premium rate can be significantly reduced by taking the following protective measures: permanent guard service, video-surveillance, automatic fire alarms and/or extinguishers.

The Insured and Insurer should be aware of the above and actively participate in solving the prevention problems. Following the changes in ownership structure, the property became privately owned, in general; this caused changes in the attitude towards buying the insurance coverage. In our time, the attitude of the property owners towards insurance has changed a lot.

It is easy to conclude that prevention is obvious and inevitable form of present and future cooperation between the Insurer and Insured.

4. Practical Prevention

The following practical experience of insurers can serve as example of preventive measures implemented in industrial plants.

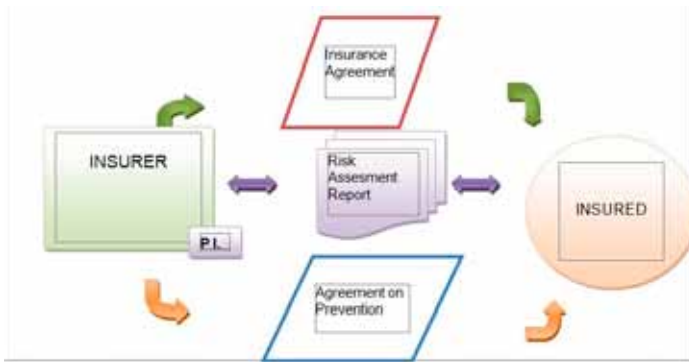
The condition of insured industrial risk depends on numerous factors, such as: the age of building and equipment, degree of maintenance, level of

technological development, pre-definition of production and other processes, professional staff, the fact that the procedures for both regular and extraordinary circumstances are in place and obeyed (in extraordinary circumstances, it is necessary to know precisely who, what and when should be done). When a risk is insurable, following specific indicators (such as a class of peril and class of protective measures), it can be changed in time, under the influence of the named, also variable indicators. The insured and insurer have a mutual interest to prevent the condition of property (buildings, equipment and stocks) from deterioration to such an extent as would allow for a high probability of occurrence. In order to avoid this, preventive measures are taken. The implementation of preventive measures, primarily on major insured risks, is in the interest of both the Insurer and Insured. The mutual interest is fundamental for joint investments in the prevention projects implementation. The Insurer expects positive effects in the form of risk reduction and the Insured in lower insurance premium. The insurance premium is reduced by granting discounts for the implementation of preventive measures.

The Insured increases the safety level of his property and protects himself against other major consequential losses (such as the interruption of production and loss of market position, the consequences of which can often exceed the material damage itself) at a lower insurance premium.

The Insurer reduces the probability of loss occurrence and/or the possible amount of loss in the event of occurrence, which should have a positive effect on the „net premium “and, consequentially, on increased profits. Moreover, the conditions are met for keeping the Insured as a client, by gaining trust, nurturing and competent price offer for the insurance product.

The price of the implementation of preventive measures has to be optimal, pro rata the effects that are expected of it. In practice, it is often much lower than the price of possible adverse effects, which is one additional indicator of pure economic feasibility of the prevention. The *picture 2* represents a simple scheme of mutual relations of the Insurer and the Insured in the application of „preventive engineering“.



Pict. 2: Insurer – Insured relation

5. Scheme of Potential Perils and Damages

5.1. Storage of Material

We shall present several examples from the wood processing and food industry, as well as from the coal mining and processing industry. *Picture 3* shows faulty system of conveyance and disposal of wood saw-dust, deposited outside the silo, near the production plant, which represents the explicit fire peril. The *Picture 4* shows a major damage on the concrete silo wall caused by fire and consequential explosion due to a self-combustion in the grain storage. *Picture 5* shows a self-combustion of coal on the waste dump and *Picture 6* fire (in the extinction phase) on the conveyor bridges in the coal processing plant. The fire was caused by a short circuit on the electric installations in the presence of coal dust.



Pict. 3: Wood saw-dust outside silo



Pict. 4: Silo cell after fire



Pict. 5: Self-combustion of coal on waste dump



Pict. 6: Fire on conveyor bridges

5.2. Electric Installation

Below are two examples of electric installation not mounted in line with the Rulebook on technical norms for the low-voltage electric installations (*Official Gazette of the SFRJ* Nos. 53/1988 and 54/1988). *Picture 7* shows cables directly fixed to the wooden ceiling girders and boards by plastic and improvised tin clips. This represents the explicit fire peril, because the ceiling is covered by a highly combustible evaporation products from the production process in the food industry. *Picture 8* shows cables installed in bundles, with no space in-between, which makes cooling difficult and increases the hazard of short circuit.



Pict. 7: Irregularly laid cables



Pict. 8: Irregular cable management

5.3. Explosions

Picture 9 shows damaged inox vessels after explosion in chemical industry, caused by failure to obey by the required technology. *Picture 10* shows a pipe (placed as exhibit) after a hydrogen plant explosion in the oil refinery. The explosion was caused by a latent defect in material; it was of such a power that

it caused a part of pipe to fly around a production plant and tie itself around another pipe.



Pict. 9: Vessels after explosion in chemical industry



Pict. 10: Exhibit – pipe after explosion, in the oil refinery

6. Implemented Prevention

The Insurer and the Insured start with the implementation of the prevention projects by working together on the identification and assessment of the present hazard. Below are the examples of implemented preventive measures, characteristic for various areas.

Picture 11 shows final repair work on the process furnace in the vacuum distillation plant in the oil refinery. The works included the replacement of pipes in the convex area and the replacement of brick lining. These works removed the peril of emission of gasses of irregular parameters, which could cause fire and explosion. *Picture 12* shows a part of the repaired automatic sprinkler system. Its purpose is fast extinguishing of fire in a closed space, containing valuable electronic and telecommunication equipment.



Pict. 11: Oil refinery furnace repair



Pict. 12: Automatic sprinkler system

Picture 13 shows a place of installation of atmosphere structure controlling device in the induction oven in the metal processing industry plant. The constant supervision and control of the structure of atmosphere in the oven is a form of prevention against the rise of explosive concentration in the interior of the oven; in case the conditions are met for the appearance of such concentration, the process is automatically stopped. *Picture 14* shows a control panel of a video surveillance installed in a building of social importance.



Pict. 13: Atmosphere structure controlling device



Pict. 14: Control panel of a video surveillance

Conclusion

Investment into prevention adds to the reduction of loss occurrences and their adverse effects. This is important for the economic and social development, in general. The Insurer investing into prevention can expect lower claims expenses and operating costs, at a lower premium. Lower insurance premium adds to higher acquisition, resulting in better business results.

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