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PREVENTIVE MEASURES IN FUNCTION OF FIRE INSURANCE COST

Abstract: The basic function of non-life insurance is protection of assets. The direct mechanism of the asset protection is referring on reducing the damage risk. In this sense, the insurance has a preventive function. On the other hand, the protection function is indirectly reflected through the indemnity, by disbursement of insured sum that is raised from paid premiums.

This paper reviews how preventive measures affect the technical result of insurance companies. One of the main products that insurance companies offer is the fire insurance. Using fire protection measures it could be achieved two goals. The first goal is increasing the technical result of insurance companies (enlarge profit) by reducing the risk of unwanted event realization through prevention. The second is creating an opportunity for policyholder to reduce insurance premium by implementation of fire protection measures.

Key words: fire, fire premium, insurance, prevention, protection measures

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1. INTRODUCTION

How to overcome the damages is a question that has been posed since the early days of organized human society. There are various causes of damage - natural disasters, human activities and negligence. Not only in history, but also today one of the most common cause of damage is a fire. Fires often, except damage, causes also human deaths. It is therefore essential to make a minimum possibility of fire occurrence.

In order to overcome the damage it is necessary to take appropriate protective measures before the accident occurs. Therefore, the answer to the question how to deal with the damage lies in the application of preventive measures. Prevention involves a set of activities that are aimed at preventing the formation of harmful events, IE. reducing the possibility of accidents to occur and reducing the consequences if the adverse event does occur. [1]

Important role in the implementation and enforcement of preventive measures have insurance companies. Insurers tend to decrease the price of their services in the case of the implementation of preventive measures, also to encourage policyholders to apply them. Prevention takes important role in the work of insurance companies. Resources invested in prevention can significantly inhibit the appearance of incidents. If an incident occurs, preventive measures that are taken can reduce the effects of harmful event. By investing in prevention other positive effects can be achieved. It creates the opportunity for reducing the amount of premiums and for increasing insurance coverage, that results in improved technical results of insurers. Also, increasing of the resources invested in prevention decreasing resources for recovery because in this case it is more likely that an adverse event will not occur.

2. CAUSES OF FIRES

During the history of mankind the fires were a major threat. Despite modern methods of fire extinguishing, as well as new technological solutions, fires still pose a great danger to the population as well as for material goods. To cope with this threat, first of all, it is necessary to assess the fire risk of the given area, building or group of buildings.

For the assessment of fire risk, as well as for the decreasing a risk of fire, it is necessary to examine the causes of fire occurrence. Causes of fire can be different: direct contact with open flames or glowing substances, explosive combustion of matter, chemical reactions, self-heating or self-ignition, electricity, mechanical causes.

The following parameters have an influence on the increasing of a fire risk: geographic location, level of economic development, the specifics of the national culture, etc.

One of the most common causes of fires is also a variety of natural disasters and phenomena such as earthquakes, volcanic eruptions, hurricanes, and lightning strikes. In this case the fire occurs as a secondary hazard. Accidents in nuclear power plants, drought

and heat are also often accompanied by wildfires. The special kind of danger is damage or destruction of a hot drive in factories, warehouses of flammable materials and liquids.

A large number of fires in business, public and residential buildings caused by old, unmaintained, damaged and unprofessionaly implemented electrical installations. As the number of residential, commercial and public buildings, as well as the total number of electrical appliances in them, growing steadily it increases the number of locations that can cause a fire caused by a malfunction in the electrical system. If we add the fact that at the markets of electrical components in the developing countries appear low quality products, and a large number of unauthorized persons perform installation, repairs and modifications of electrical installations and equipment, it can be concluded that the probability of fire due to faults in electrical installations in transition countries is higher than in countries with stricter legislation.

2.1. Statistical indicators of the causes and frequency of fire

In Europe, during the period of 1990-2011. years, a total of 72 fires that have occurred had catastrophic consequences. The largest number of catastrophic fires recorded in Russia (21 fires) and Spain (10 fires). [2]

Table 1: Statistics of fire frequency on the territory of Europe in the period 1990-2011. years [2]

Country	Number	Simple %	Country	Number	Simple %
Albania	1	1.39	Poland	1	1.39
Bosnia & Hercegovenia	1	1.39	Macedonia FRY	2	2.78
Bulgaria	4	5.56	Portugal	5	6.94
Canary Is	1	1.39	Russia	21	29.17
Croatia	5	6.94	Serbia & Montenegro	1	1.39
France	5	6.94	Slovakia	1	1.39
Greece	8	11.11	Spain	10	13.89
Italy	6	8.33			
			TOTAL:	***72***	***100.00***

If we observe the territory of the Republic of Serbia, in the period since 1990. by 2009. year, about 200 000 fires occurred. Since 1990. to 2000. Year the annual average of about 5000 fire was happening, that in the period since 2001. to 2005. that number nearly tripled. Total number of fire and explosion increases in the year 2007, when the part of the territory of the Republic of Serbia, as well as most of the surrounding countries were affected by numerous fires in the open air, mostly in remote forests and mountain complexes. If we take into an account the number of registered fires and explosions in this

time period, it can be said that 2000. year is the year with the largest number of fires and explosions. [3]

Despite the large number of the forest fires and fires in the open space (25%), most of the fires are still occurring in buildings (57%), and only 13% of the fires were registered in transport. [3]

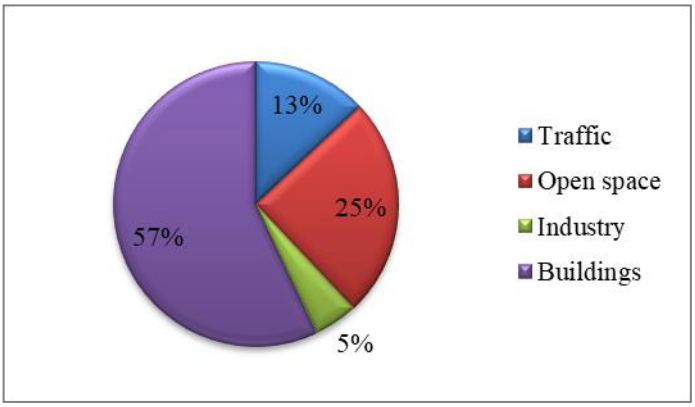

Figure 1: Structure of fire occurrence in Serbia by location for the period 2001-2009 years

The most common cause of fires in buildings is the human factor, such as: errors in the design, unsuitable choice of technological processes or improper conduction of that processes, ignorance, carelessness, negligence, non-observance of protective measures etc.

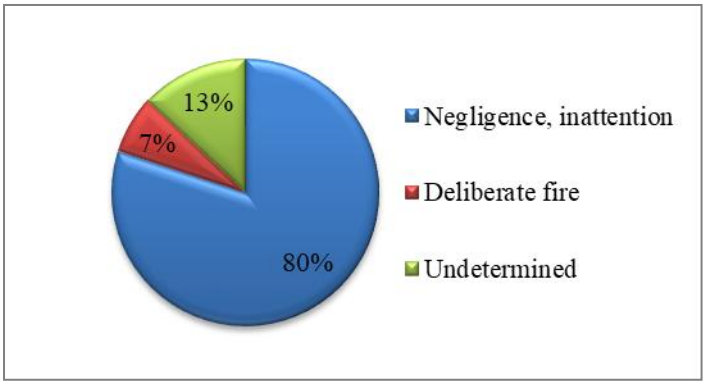

Figure 2: Structure of fire causes [3]

3. PREVENTION AND ITS IMPORTANCE

Prevention has its social importance from the earliest time of community until today.

Fundamental goals of prevention are reduction of adverse events and minimizing the economic consequences. [1] Prevention leads to avoid the realization of the damage, or at least to reduce its effects in the case of its realization. To achieve these goals, it is necessary to analyze the phenomena of risk throught all its aspects, as well as testing and finding adequate way for neutralizing the tendency towards losses.

An ideal goals in preventive activities cannot be achieved, but there is possibility of some protection against possible hazards. The protection can be achieved by removing some causes of damage, for example, a fire can be prevented or, significantly reduce the possibility of its occurrence, removing flammable and explosive materials from vulnerable facilities or rooms.

Every preventive measure needs to reduce the possibility of damage to a particular object or group of objects. All legal measures serve to that intention . For example, regulations that are connected with constructions and design of buildings, building materials, electric installations, heating and ventilation, the classification of the devices in production, etc. aim to reduce the possibility of damage and reduce the damage to a minimum, if it has occurred.

The principle of economy requires that coasts for protection from harm must justify the value preserved, which means, that the scope of preventive measures depends on the importance of the facility and the type of the risk, as well as of the relationship between the necessary coasts of preservation and achieved good effects to reduce the risk.

So preventive measures would not be too expensive ,an expert analysis is suitable from the perspective of the benefits that brings preventive measures. That type of analysis, performed on the basis of prior risk assessment, must show that the optimum measures to prevent damage to the facility or group of facilities .

Due to lack of knowledge of the dangers that treat today, appropriate preventive measures are ignored where with minimal devices and measures could be prevent the occurrence of serious damages, for example, regular inspection and maintenance of electrical installation in good condition would greatly reduce the possibility of fire.

4. INSURANCE AS A WAY OF MANAGING RISK

Insurance is the science that studies the effects of risk realization, economic consequences and study ways to prevent and decrease possibility of risk.

Insurance is an institution that compensates damages that have been caused in the society, in its economy and among people, by the action of destructive natural disasters or accidents

Scientific basis of insurance is based on the knowledge that in terms of elemental events caused by natural or artificial destructive forces coming to accidents, there is a certain legitimacy (based on actuarial probability calculus).

By the insurance, all those who are exposed to the same danger are joined, in order to submit together all the damage that will happen only to some of them. The basis of insurance lies in the principle of reciprocity and solidarity.

The premium is the amount paid to the insurance fund. It is an essential element of insurance, and basically is the creation of funds for the reconstruction of damaged property ,or for the payment of the sum that are insured. Premium rates, but also the premium, should be a reflection of the risk ,and the risk of some hazards, in some types of insurance, measurable depends on the measures of protection. Thus, for example, for insurance against fire and other hazards the basic premium can be reduced in this case up to 50%, if the insured person took certain preventive measures (by guards, video surveillance, stable fire extinguishing systems, fire alarms, etc.). Insurers increasingly economically stimulate certain preventive measures to lower or higher premium rates, insurance premiums. [5]

5. ROLE OF INSURANCE IN THE IMPLEMENTATION OF PREVENTIVE MEASURES

The fundamental basis of insurance is an existence of "risk", the risk of an unexpected loss or event. Term of risk in insurance refers to the amount of damage that harmful event may cause and it is different from other interpretation that can be found in the scientific literature. [6] Possibility of greater damage implies greater risk for Insurers.

Prevention in insurance has role to control risk. Purpose of prevention is to reduce probability occurrence of harmful events or to reduce potential damage that can ensue. Total elimination of risk is unwanted, because that would be opposite to the fundaments of insurance. Insurance, as a prevention measure, loose its purpose if there is no risk to be insured.

The essence of insurance in the economic sense is an economic compensation of damage in case of realization of harmful events. For this reason, the Insurer must undertake a wide range of preventive measures to reduce the potential damages as well as its obligations to policyholders. In developing insurance markets, like Serbia is, property insurance is not still on adequate level. Due to the lack of development of the insurance market, preventive measures are necessary to ensure a balance in the Insurer's portfolio, because collected premium, even using the spatial dispersion, isn't enough to cover indemnities to policyholders without risk transfer to reinsurers.

5.1. Fire insurance

The risk of fire has always been one of the greatest threats since the early days. The great fire that occurred in London in 1666, burned down 13.200 houses [7] and it has been the initiator of the modern property insurance industry of today. In those days, fire was the

only thing you could insure your home against. By time, the insurance industry has grown into a large and complex system, but damage from home and industry fires today are still enormous.

Insurance price dependents of the risks those are included in an insurance policy. If some additional risks are included, the price is higher. Also, the price of insurance dependents of customer (policyholder) behavior in the past and preventive measures that he has taken. If an insurance customer hasn't applied preventive measures, that are obligatory in Insurer terms and Conditions, he will pay some penalties. But, if he applied some additional measures, he will be regarded with some bonus (discount). Those are the measures of stimulation and destimulation of customer.

6. PREVENTIVE MEASURES IN FIRE INSURANCE

The insurance premium is the price paid for insurance coverage against a defined risk for a specified period of time. [8] Those price is calculating using mathematical and statistical models for certain risk. But, when the risk is controlled with prevention measures, that also needs to be included in the price calculation.

On the price of fire insurance premium affects prevention measures that are used to prevent fire or to decrease the risk of fire. Those measures Insurers call "basics" for tariffing insurance premiums and their influence on the cost of insurance by the presence or absence of certain measures in the moment of contracting. That is passive fire protection [7] and according to the custom of business of insurance companies, they are divided into two categories:

- Construction Class and
- Fire protection Class

There is one more category that insurance companies use as "basics" for tariffing insurance premiums called "Fire Class of goods" and it depends on the natural properties of goods which are ensuring, its flammability. All goods are classified into three fire classes, first class is the least and third class is the most flammable. On this base for tariffing cannot be affected, thus about it will not be discussed further.

6.1. Construction Class

One of the main considerations in determining the risk of fire is assigning the proper construction class. From what materials are walls and roof made from? What percentage of the structure consists of each kind of material? Good identifying the construction class can help the underwriter to rate the risk more accurately.

Thus, Construction Class (type of construction) Insurers refer as:

- Massive Class (if the exterior walls are made of stone, sand bricks, concrete blocks; roof is made from tiles, concrete, sheet metal, reinforced glass or similar hard materials),

- Mixed Class (if the exterior walls have wooden construction, are built with lightweight concrete aggregates, like siporex, or with rammed earth; roof is made like in Massive Class or only partly with wood, reed, straw or plastic) and
- Light Class (all building objects that are made from different materials of the above mentioned or mixing first two classes).

6.2. Fire protection Class

The fire protection class is a measure of how fire-safe an Insurer believes that the policy holder's community is.

The most important factor in assessing a Fire protection Class (grade) is facts: Does the community have fire station? What is the number of its fire stations? How well equipped they are? Also, very important is the number of hydrants and how close they are to homes in the town, communications network and existence of telephone system.

Into the First Class belong all places that have a professional Fire Station that can respond within 15 minutes. Also, the community needs to have hydrants and telephone or some other fire alarm system. Into the Second Class belong all places that have a professional Fire Station that can respond within 30 minutes or volunteer fire departments and all above mentioned. And, in last, the Third Class belong all other places.

6.3. Measures of stimulations and destimulation of Insured

Construction Class and Fire protection Class influence on the cost of insurance through different rate that are applied on Sum Insured. Beside these measures, Insurer can use measures of stimulations and destimulation of Insured to force him to act preventively against risk. Those Insurer's rights are determined in General and Special Insurance Terms and Conditions in which are concretized and more closely specified provisions of The Law of Contract and Torts [9] and The Insurance Law [10].

Measures of stimulations and destimulation are actually bonuses (discounts) and penalties (extra charge) charged at the base of Insured history behavior and conducted prevention measures. Every insurance company has right to its Terms and Conditions define circumstances that will bring certain discount or extra charge, based on risk assessments of the insurance agent. In fire insurance those circumstances are related to active fire protection [7], to implementation of:

- automatically or manually actuated Fire alarm systems;
- heat detectors, smoke detectors;
- fire extinguishers, fire sprinklers or some other manual or automatic fire suppression tools;
- security guarding, etc.

7. FIRE INSURANCE COST

As it was several times mentioned, preventive measures affect insurance premiums. If they are implemented, the premium will be less. The facts of this claim will be discussed further in the text.

The insurance premium (P) is the price of risk, which incorporates the cost of the insurance acquisition (C_a) plus a certain accumulation amount - Security reserves (A) [8]:

$$P=R+C_a+A \quad (1)$$

As C_a and A are variable that are constant in certain time of period (depending on monetary politics of the country and other financial parameters), it could be said that insurance premium vary from risk that is assessing.

According to the most acceptable definition of risk, risk is a combination of the probability of an event (P) and its consequences (C) [8]:

$$R=P\times C \quad (2)$$

Probability is a matter of statistics and as it is said before in this paper, term of risk in insurance refers only to the amount of damage that harmful event may cause. Consequences refer on loss that can occur. In insurance, loss that will be taken into consideration during risk assessment is defined as Probable Maximum Loss (PML). The PML for a property is that proportion of the total value of the property which will equal or exceed, in a stated proportion of all cases, the amount of loss from a specified peril or group of perils. [11] PML is the anticipated value of the biggest monetary loss affecting a business and/or a property that could result from a catastrophe. The PML is usually smaller than the maximum foreseeable loss (MFL), which assumes that all protective features fail, resulting in a complete write off (total loss).

Using deductive logic, it is easy to conclude that insurance premium depends on all preventive measures that are taken (both active and passive) and some other factors that affect PML.

In fire insurance, the calculation of PML takes into account next variables:

- Passive fire protection measures,
- Active fire protection measures,
- Susceptibility of the contents of insurance (Fire Class of goods) and
- Value of business or insured property.

From the Insurer standpoint of view, Insurance Risk of fire peril can be expressed as a function of following complex parameters:

$$R_f=f\{cc, f_pc, a_{fp}, fc, v, \ldots\} \quad (3)$$

Where:

R_f - represent Insurance Risk of fire peril;

Cc - refers to Construction Class;

f_pc - refers to Fire protection Class;

a_{fp} - refers to Active Fire Protection;

fc - refers to Fire Class of goods;

v - refers to Value.

Using deductive logic, it is easy to conclude that fire insurance premium depends on all preventive measures that are taken (both active and passive) and some other factors that affect PML.

7.1. Influence of preventive on Technical Result of insurance companies

Business result of insurance company is realized through gain or loss. Technical Result (TR) is an indicator of business success of the company. High TR is tendency of business. It is displayed for each sector of business. TR is calculating as a ratio of all damages (disbursements) and all paid premiums for a certain period of time.

Thus, if it could be possible to impact on the amount of damage that harmful event may cause, it could be also possible to impact on technical result. By decreasing the amount of disbursements, technical result is increasing. As is previously said, preventive measures positively influence on PML and potential disbursements, thus it can be said that preventive positively impact on TR of insurance companies.

7.2. Fire insurance premium

The insurance premium is calculating by simple multiplying adequate Rate of certain risk and Sum Insured. Rates of risks differ from level of risk and depends, in fire insurance, from applying passive preventive measures that were mentioned before in this text. For purposes of this paper, in Table 2 it will be shown examples of influence of passive protection measures on the premium amount. Premium tariffs (rates) are taken from one domestic insurance company. In this example, Sum Insured has a value of 100.000,00 €.

Active protective measures also have significant influence on fire insurance premium. Applying them Insurers may give discount from 10-30% of calculated premium. But also, if Insurer consider that in certain case, when fire risk is higher than usual, prevention measures are required and their absence can be penalized with the same percent of an extra charge.

Table 2: Influence of passive protection measures on premium amount,

Construction Class	***Fire protection Class***					
	I class		*II class*		*III class*	
	rate (‰)	*premium (€)*	*rate (‰)*	*premium (€)*	*rate (‰)*	*premium (€)*
Massive Class	0,45	45,00	0,90	90,00	1,36	136,00
Mixed Class	1,36	136,00	2,49	249,00	3,62	362,00
Light Class	3,39	339,00	4,52	452,00	5,65	565,00

8. SUMMARY

Risk of fire is one of oldest and most dangerous peril threatening humane society since its beginning. By the growth of human wealth, the frequency of fire accidents and severity of consequences has become more serious. Fire accidents can result in civilian deaths, devastating damage and property loss. But fortunately, most fires are preventable.

Fires can be caused in a number of ways. Most are civilian fire, occurred in residences, by negligence. Inattention can be most easily prevented by education about fire risk, stricter laws, and better implementation of fire prevention politics. Civilians can protect their homes by building better, stronger constructed, fire-resistant buildings, using non-flammable materials under construction. Also, the community should be more fire aware and must put pressure on local authorities to secure community in case of a fire with a sufficient number of fire departments and necessary infrastructure for fire suppression in case of an event. Industry must conduct active protective measures against fire and must comply with regulations about the adequate warehousing of goods.

Insurance companies have a significant role in preventing fires risk by stimulating future customers to implement fire preventive measures. Fire risk cannot be completely eliminated, it can only be controlled. The best way for controlling fire risk is prevention.

From fire prevention benefits both the Insurer and the Insured. Insured benefits with smaller amount of fire insurance premium, because premium price is calculating on base of risk cost. Fire risk depends from implementing prevention measures and if the risk is higher, the premium will be more expensive. From other side, Insurer benefits from fire prevention with smaller probability of realization of risk and consequently fewer damages, less losses and less indemnities.

9. QUESTIONS

1. How can you define insurance, as preventive or corrective way of managing risk?
2. In your country, what is the most common cause of fire?

3. If risk is a combination of the probability of an event and its consequences, how can we decrease risk in case of fire risk?
4. On which components depends on the amount of insurance premium? By your opinion which component (components) affect the price at most?
5. From fire prevention benefits both the Insurer and the Insured. Explain how.

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