THE UNDERWRITING PROCESS OF ENGINEERING INSURANCE IN SOUTH AFRICA

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Abstract

Engineering insurance covers damage to plant, machinery and other engineering equipment such as boilers, computers, cranes and lifts. The underwriting process of engineering insurance is therefore complex as different types of risks from a big variety of industries are involved. The underwriting process of engineering insurance often requires specialists such as engineers to identify and analyse the particular risks.

The objective of this research paper focuses on the improvement of financial decision-making regarding the underwriting process of engineering insurance. Secondary as well as primary data were necessary to reach this objective. The secondary data addressed the underwriting process of engineering insurance as well as the underwriting factors which should be considered by the short-term insurers when they are underwriting engineering insurance.

The empirical study embodied an opinion survey which included the top 10 South African short-term insurers which underwrite engineering insurance. As they are the market leaders in this country concerning engineering insurance, due attention was paid to obtain their perceptions regarding the importance of the underwriting factors of engineering insurance, the problem areas which the respondents encounter during the underwriting process, as well as how often the respondents need to adjust the policy stipulations to take the underwriting factors into account. As South Africa is a developing country and has an emerging market economy, the conclusions of this study should also be valuable to other countries which are classified similarly.

Keywords: Engineering Insurance, Insurance Policy Stipulations, Problem Areas, Underwriting Factors, Underwriting Process

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1 Introduction and Objective of Research

Engineering insurance is a special type of short-term insurance which focuses on damage to plant, machinery and other engineering equipment such as boilers, computers, cranes and lifts (Diacon & Carter, 1988:20-21). Engineering insurance is complex as different types of risks are often involved to meet the needs of various industries. Underwriters of engineering insurance often work closely with specialists within the engineering industry in order to compile portfolios which each should consist of similar degrees of risk (Macedo, 2009:9). This would understandably include the identification and an in-depth analysis of the risks involved in the various types of engineering operations.

The improvement of financial decision-making by short-term insurers regarding the underwriting process of engineering insurance represents the objective of this research. To reach this objective, secondary data as well as primary data should play an important role. The secondary data consists of a

discussion of the underwriting process of engineering insurance as well as the underwriting factors which should be taken into account when short-term insurers underwrite engineering insurance.

The primary data is based on an opinion survey which included the top 10 short-term insurers which are underwriting engineering insurance in South Africa. They are the market leaders of this class of short-term insurance in South Africa and their perceptions regarding engineering insurance are therefore vital in order to reach the research objective. Due attention is paid by the empirical study to determine the importance of the underwriting factors of engineering insurance, the problem areas which short-term insurers may encounter when they are underwriting engineering insurance, as well as how often short-term insurers need to adjust the policy stipulations to take the underwriting factors into consideration. It should also be emphasised that South Africa is a member of the BRICS countries and that the conclusions of this research should therefore be valuable to other countries which also have an emerging market economy and are classified as a developing country.

2 The Underwriting Process of Engineering Insurance

The underwriting process of short-term insurance should enable an underwriter to make the following important decisions (Diacon & Carter, 1988:190), viz.:

- Whether the insurer is going to accept the risk of the proposer or not, and
- If the insurer is going to underwrite the proposed risk, on which conditions and what proportion of the risk will be accepted by the insurer, and
- What the level of the premium will be which the insurer will charge the insured.

To enable a short-term insurer to make the preceding important decisions, the underwriting process consists of the following three steps, namely risk selection, coverage determination as well as premium calculation (West, 2007:26). The following sections briefly explain the contents of these steps.

2.1 Risk selection

The underwriting process starts by identifying all the risks involved, which will differ due to various sources of risks, activities and industries. Complicated models may be employed to identify the risks (Eybpoosh et al., 2011:1164-1175). The short-term insurer should thereafter select the risks which is a complex process, as the insurer will try to obtain profitable distributions of proposers.

It should be clear that insurers do not want to avoid claims, but merely to reduce unforeseen claims due to adverse selection (Williams et al., 1998:13). The problem of adverse selection is that proposers may conceal vital information from short-term insurers which may lead to insurers accepting too many poor risks. Underwriters of engineering insurance often obtain the support of professional specialists (such as engineers from various fields) to help identify and select the risks in order to combat adverse selection (Codd, 2008:30-31; Green, 2003:68 & 70; Heidenhain, 2001:268-276).

Moral hazards must also be taken into consideration by the short-term insurers. When the risks of a proposer are underwritten, the insured may decrease his/her efforts to avoid losses as his/her risks are now covered (Harrington & Niehaus, 1999:167). Moral hazards may actually increase the risk exposure of a short-term insurer.

Quantitative techniques are often applied during risk selection to analyse and classify the risks (Wu et al., 2010:1440-1453). Each short-term insurer will have a different perception concerning the particular risks and various approaches may therefore be employed in practice. The classification of the risks should eventually lead to the acceptance or rejection of the particular risks by the short-term insurer. The next step of the underwriting process, which focuses on the determination of the coverage, will be necessary when a short-term insurer accepts the particular risks.

2.2 Coverage determination

The acceptance of the proposer's risks by an insurer leads to the determination of the sums insured and/or the limits of liability, as well as the length of period of coverage. It should be emphasised that underwriters have to provide an amount of coverage to a policyholder for a particular period of time in order to obtain an underwriting profit, which is vital for the long-term survival of a short-term insurer.

Various policy stipulations can be employed by an insurer to counteract the extent of the detrimental results of risks. Excesses (deductibles) to be paid by the insured when a claim is made, as well as exclusions, conditions and/or endorsements of insurance policies are examples of how short-term insurers can limit the detrimental impact of an insurance policy (Dorfman, 1996:227; Rejda, 1995:81; Skipper, 1998:728). After completing the determination of an insurance policy's coverage, the appropriate premium should be calculated.

2.3 Premium calculation

Large financial losses may often be incurred when financial services, which include short-term insurance, fail (Oldenboom & Abratt, 2000:233). Setting the appropriate premium level is therefore of prime importance to short-term insurers (Dinsmore, 2010:22). Cognizance of what the insurance market can bear is necessary, while the direct and indirect

cost should be accounted for by the insurers. The office premium of short-term insurance consists of four components, viz. the risk premium, an expense loading, a profit loading as well as a contingency loading (Diacon & Carter, 1988:193). All four components of the office premium should be considered when the premium calculation is done.

Short-term insurers usually take the classification of the risks based on their probability and financial impact into account, which means that the premiums should be higher when the probability and/or financial impact are higher, and vice versa. It must however be remembered that market forces also impact on the premium level as competition between various insurers may prevail as they want to increase their market share.

3 Underwriting Factors of Engineering Insurance

A short-term insurer needs specific information regarding the following underwriting factors to successfully underwrite engineering insurance:

- The *personal details* of the proposer which includes amongst others his/her name, address and age, should be considered by the short-term insurer (Crane, 1984:416). These particulars are necessary to determine the credibility of the proposer from available historic records.
- The details of *previous claims* made by the proposer should be taken into consideration (Pollack, 1996:13-15). This is seen as a critical factor which may indicate how accident prone the proposer and his/her operations may be, and it may also point at the moral hazard of the proposer's attitude (Harrington & Niehaus, 1999:167).
- Particulars of *previous refusals and/or cancellations* of coverage of the proposer by another short-term insurer are important. The fact that another short-term insurer was previously so frustrated by the actions or lack of actions of the proposer that he/she refused and/or cancelled the coverage, should be a warning signal to a short-term insurer not to underwrite the risks of the proposer.
- The *skills and expertise* of the employees of the proposer that operate the plant and/or machinery are of prime importance, as the human factor may cause substantial losses in engineering insurance. The physical, mental and psychological abilities, as well as the knowledge, skills and motivation of the proposer's employees are crucial when a short-term insurer considers the underwriting of the related risks.
- The *scope and extent of the coverage* needed by the proposer will point to the possible losses which a short-term insurer may incur by underwriting the risks of the proposer. The coverage for engineering insurance which the proposer has already obtained from other short-term insurers should also be taken into consideration, as the aggregated coverage indicates the total risk exposure of the proposer's operations.
- The current *financial position* of the proposer should be considered by the short-term insurer to determine the following two aspects, namely whether the proposer will be able to pay the insurance premiums as well as a possible excess when claiming, but also whether the proposer is not in financial distress and that he/she sees the engineering insurance as a manner to fraudulently claim from the insurer.
- The conditions regarding the *environment* in which the plant and/or machinery are kept, should be important to the short-term insurer. Whether the plant and/or machinery are permanently in the open air, *or* are used outdoors but are kept safe at night in a garage or store, *or* whether the plant and/or machinery are always indoors, may represent an indication of the risk exposure of the plant and/or machinery.
- The proposed *maintenance* of the plant and/or machinery is important as regular maintenance is an essential factor to consider when underwriting engineering insurance (Werner, 2001:9-10). When plant and machinery are efficiently maintained, the claims concerning engineering insurance should be reduced and the employees should also be safer when operating the equipment.
- The *type and nature* of the proposer's projects are highly important when the underwriting process of engineering insurance is undertaken. It is logic that each engineering policy will differ due to the unique type and nature of its activities. The specialised knowledge of engineers is therefore indispensable to short-term insurers as they should be able to analyse and assess the activities of the related projects.
- The *advances in technology* of the related industry provide a challenge to the short-term insurers to keep up with the state of the art developments. Short-term insurers may misjudge themselves when they are underwriting engineering insurance which they are not acquainted with. The insurers may experience losses which they did not budget for.

4 Research Methodology

The objective which this research embodies the improvement of financial decision-making by short-term insurers when they are underwriting engineering insurance. The secondary data was already discussed in this research paper and it provided the bases for compiling a questionnaire to apply in the empirical study. The primary data was obtained by means of an opinion survey which focused on the top 10 South African short-term insurers which underwrite engineering insurance. These insurers represented more than 80% of the annual gross written premiums for engineering insurance (Santam, 2011).

Copies of an invitation letter and the questionnaire were mailed to the executive managers of the top 10 short-term insurers who underwrite engineering insurance. A stamped and addressed envelope was also provided for returning the completed questionnaire. Ten completed questionnaires were eventually available after following up.

Some of the questions on the questionnaire used a five point Likert interval scale. It was possible to weight the responses obtained from the short-term insurers as it was explicitly stated on the questionnaire that the five point Likert interval scale forms a continuum (Albright *et al*., 2002:224-229 & 245). The weights which were assigned to the respondents' perceptions are shown in Table 1.

Table 1. The weights assigned to the answers of the respondents

Answers of the respondents:		Weights assigned:
Extremely important	Always	5
Highly important	Very often	4
Moderately important	Sometimes	3
Little important	Seldom	2
Not important	Never	1

The following sections provide the depiction and discussion of the empirical results of this research paper.

5 Empirical Results

The opinion survey focuses on the following three aspects of the underwriting process of engineering insurance, viz.:

- The *importance* of the various underwriting factors of engineering insurance,
- The *problem areas* which short-term insurers may experience when they are underwriting engineering insurance, as well as
- How *often* short-term insurers need to adjust the policy stipulations to take the underwriting factors into consideration.

The next section addresses the perceptions of the respondents regarding the importance of the underwriting factors of engineering insurance.

5.1 The importance of underwriting factors of engineering insurance

Table 2 depicts the perceptions of the respondents concerning the importance of the factors which short-term insurers should consider when they are underwriting engineering insurance.

Table 2. The importance of the underwriting factors when underwriting engineering insurance, as perceived by the respondents

Underwriting factors	Extremely important	Highly important	Moderately important	Little important	Not important
Details concerning the name, address and age of the proposer	3	2	1	2	2
Particulars of previous claims made by the proposer	8	2			
Particulars of previous refusals and/or cancellations of cover of the proposer	7	3			
The skill and expertise of the people operating the plant and/or machinery	6	2	2		
The scope and extent of the cover applied for	5	5			
Current financial position of the proposer	1	4	3	2	
Conditions regarding the environment in which the plant and/or machinery are kept	7	2	1		
Proposed maintenance of the plant and/or machinery	7	3			
The type and nature of the projects undertaken by the proposer	7	3			
Advances in technology of the manufacturing industry	4	2	2	1	1

The results of the preceding table which are based on a five point Likert interval scale were weighted. The weights which were provided in Section 4 of this research paper were applied. The

total weighted score calculated for the importance of each underwriting factor, appear in the following table and are ranked in a declining order of importance.

Table 3. The weighted responses on the importance of the underwriting factors when underwriting engineering insurance, in a declining order of importance

Total weighted score calculated	Declining order of importance	Underwriting factors
48	1	Particulars of previous claims made by the proposer
47	2	Particulars of previous refusals and/or cancellations of cover of the proposer
47	2	Proposed maintenance of the plant and/or machinery
47	2	The type and nature of the projects undertaken by the proposer
46	5	Conditions regarding the environment in which the plant and/or machinery are kept
45	6	The scope and extent of the cover applied for
44	7	The skill and expertise of the people operating the plant and/or machinery
37	8	Advances in technology of the manufacturing industry
34	9	Current financial position of the proposer
32	10	Details concerning the name, address and age of the proposer

The results of Table 3 point out that the particulars of previous claims made by the proposer are perceived by the respondents as the *most* important underwriting factor for engineering insurance. It is therefore considered by the short-term insurers as a critical factor which may be a signal of how accident prone the proposer may be.

Three underwriting factors obtained the *second* most important position, with only one point lower that the most important underwriting factor. They address a variety of aspects and are as follows:

- Particulars of previous refusals and/or cancellations of cover of the proposer,
- The proposed maintenance of the plant and/or machinery, as well as
- The type and nature of the projects undertaken by the proposer.

It should be mentioned that the details concerning the name, address and age of the proposer as well as the current financial position of the proposer are the two underwriting factors which are least important according to the perceptions of the respondents. While personal details are thus not very important, the particulars of previous claims made by the proposer, and that of the previous refusals and/or cancellations of the proposer's cover, the proposed maintenance of the plant and/or machinery, as well as the type and nature of the projects undertaken by the proposer represent the prime underwriting factors to be considered when short-term insurers underwrite engineering insurance.

The following section pays attention to the problems which short-term insurers may encounter when underwriting engineering insurance as well as possible solutions to solve them.

5.2 Problem areas in the underwriting process of engineering insurance and possible solutions to solve them

The respondents were requested to mention the three most important problem areas which they experience in the underwriting process of engineering insurance. Their responses appear in the following table.

According to Table 4 all the respondents experienced one particular problem area, namely to ensure that efficient maintenance of the plant and/or machinery is done by the policyholders. It should be remembered that maintenance cost incurred by the policyholders decrease their net profit and net cash inflow. It can therefore be expected that the policyholders may not always be keen to undertake the necessary maintenance. Possible solutions to solve this problem area emphasise the application of service book histories, the implementation of comprehensive risk management programmes, the training of the operators of the plant and/or machinery, as well as conducting plant and/or machinery surveys.

Table 4. Problem areas in the underwriting process of engineering insurance, as perceived by the respondents

Problem areas	Number of respondents who mentioned the problem area
Ensuring efficient maintenance of the plant and/or machinery	10
The scope and extent of the risk which is underwritten	8
The insurer's lack of knowledge concerning the plant and/or machinery which are underwritten	8
The changes in advances in technology concerning the manufacturing industry	2
Changes in the financial position of the proposer/insured	1
Possible changes in legislation concerning engineering insurance	1

Two other problem areas, which were indicated by eight of the 10 respondents, are as follows:

- The scope and extent of the risk which is underwritten, and
- The insurer's lack of knowledge concerning the plant and/or machinery which are underwritten.

These two problem areas may indicate that:

- The *short-term insurers* do not apply due diligence during the underwriting process to obtain the information concerning the scope and extent of the risk, *or*
- The problem area may emerge from *proposers* who may conceal vital information about the scope and extent of the risk which results in insurers accepting poor risks, *or*
- The *short-term insurers* may not have the necessary knowledge about the plant and/or machinery which they are underwriting.

The solution for these problem areas is embedded in adequate education, training and skills development of the underwriters of engineering insurance to ensure that they fully understand the risks and technical details they are dealing with, while the proposers should understand the basic principle of utmost good faith which emphasises the disclosure of all material information.

5.3 How often the stipulations are adjusted to take the underwriting factors into account

It may be necessary for short-term insurers to adjust the stipulations (terms) of the engineering insurance policies to take the underwriting factors into account. The perceptions of the respondents on how often the stipulations of the engineering insurance policies have to be adjusted, are depicted in the next table.

Table 5. How often the stipulations of an engineering insurance policy have to be adjusted to take the underwriting factors into account, as perceived by the respondents

Stipulations of the insurance policy	Always	Very often	Some-times	Seldom	Never
Adjust the level of the premium charged	3	4	3		
Adjust the monetary amount of indemnity provided	1	4	5		
Adjust the length of the coverage period		4	1	4	1
Require that the operators of the plant and/or machinery have adequate skills to operate the plant and/or machinery	5	4	1		
Require that the plant and/or machinery be frequently maintained	7	1	2		
Reserve the legal right to exercise periodic inspections of the plant and/or machinery	4	2	2	1	1

A five point Likert interval scale was employed in the preceding table. By applying the weights which were provided in Section 4 of this research paper, it was possible to calculate the total weighted scores on how often the stipulations of the engineering insurance policies have to be adjusted to take the underwriting factors into account. The total weighted scores calculated are shown in the following table where they are ranked in a declining order of frequency.

Table 6. The weighted responses on how often the stipulations of an engineering insurance policy have to be adjusted to take the underwriting factors into account, in a declining order of frequency

Total weighted score calculated	Declining order of frequency	Stipulations of the insurance policy
45	1	Require that the plant and/or machinery be frequently maintained
44	2	Require that the operators of the plant and/or machinery have adequate skills to operate the plant and/or machinery
40	3	Adjust the level of the premium charged
37	4	Reserve the legal right to exercise periodic inspections of the plant and/or machinery
36	5	Adjust the monetary amount of indemnity provided
28	6	Adjust the length of the coverage period

The efficient maintenance of the plant and/or machinery was mentioned by all the respondents as a problem area according to Table 4. It is therefore logic that the stipulation regarding the maintenance of the plant and/or machinery represents the stipulation *most* frequently adjusted by the short-term insurers. The requirement that the insured's operators of the plant and/or machinery have adequate skills to operate the plant and/or machinery embodies the stipulation of the engineering insurance policies which is *second* frequently adjusted by the short-term insurers.

It is interesting to note that the preceding two stipulations which are most frequently adjusted, focus on requirements to which the policyholders must adhere concerning the plant and/or machinery as well as the operators, while the stipulation which is *third* frequently adjusted only requires that the level of the premium charged is adjusted. No further action by the policyholders is required.

6 Conclusions

This research was undertaken to reach the previously stated *objective*. It was formulated as the improvement of financial decision-making by short-term insurers regarding the underwriting process of engineering insurance. A literature study was done to obtain the necessary secondary data to compile a questionnaire, where after an opinion survey followed to gain primary data.

The top 10 short-term insurers in South Africa which underwrite engineering insurance formed the sample for the empirical study. It should be emphasised that these 10 insurers represented more than 80% of the annual gross written premiums for engineering insurance and are therefore the market leaders of engineering insurance in South Africa. Their perceptions regarding engineering insurance are therefore indispensable for the success of this study.

The following important conclusions were made which should be valuable to short-term insurers in developing countries, including South Africa, when they are underwriting engineering insurance:

(1) According to the perceptions of the respondents, the particulars of previous claims made by the proposer represent the *most* important *underwriting factor* for engineering insurance. Short-term insurers therefore regard the previous claims as a critical factor which may be a signal of how accident prone the proposer may be. Three other underwriting factors, which address a variety of aspects, obtained the *second* most important position. These underwriting factors are as follows:

- Particulars of previous refusals and/or cancellations of cover of the proposer,
- The proposed maintenance of the plant and/or machinery, as well as
- The type and nature of the projects undertaken by the proposer.

These four underwriting factors address various aspects and are the prime underwriting factors to be considered when short-term insurers underwrite engineering insurance.

(2) The majority of respondents indicated the following three *problem areas* which they experienced when they underwrite engineering insurance, viz.:

- The problem to ensure efficient maintenance of the plant and/or machinery,
- The scope and extent of the risk which is underwritten, and
- The insurer's lack of knowledge concerning the plant and/or machinery which are underwritten.

The *first* problem area can be solved by the application of service book histories, the implementation of comprehensive risk management programmes, the training of the operators of the plant and/or machinery, as well as conducting plant and/or machinery surveys. The solution for the *second* and *third* problem areas can be found in sufficient education, training and skills development of the underwriters of engineering insurance to make sure that they fully comprehend the risks and technical details with which they are dealing, while the proposers should understand the basic principle of utmost good faith which entails the disclosure of all material information.

(3) The following three *stipulations* of an engineering insurance policy are *most frequently adjusted* by the short-term insurers, namely:

- The requirement that the plant and/or machinery be frequently maintained,
- The requirement that the operators of the plant and/or machinery have adequate skills to operate the plant and/or machinery, and
- The adjustment of the level of premium charged.

It is interesting to note that the first two stipulations which are most frequently adjusted by the short-term insurers, focus on requirements to which the policyholders must adhere concerning the plant and/or machinery as well as the operators. The third stipulation mentioned above only requires that the level of the premium charged is adjusted. No further action by the policyholders is required.

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