INTRODUCTION TO ACTUARIAL MODELS

ASSIGNMENT-1

1) The steps that should be followed considering the model development are:-

→ Defining the set of objectives that are required to be met by the process.

→ Planning the modelling process and how the model will be validated.

→ Defining the model parameters and considering appropriate values for them. Here it refers to the criteria that the capital held should be sufficient so there is a less then 0.5% chance of liabilities exceeding assets last year.

→ Defining the model initially bey capturing the real world essence.

→ Involving the real world system experts of the model you are working on in order to check the validity of the conceptual model.

→ Decide what type of a model base would be appropriate for implementation.

→ Writing the program for the model.

→ Testing the reasonableness of the output from the model.

→ Reviewing the appropriateness of the model in case of small changes to the input data parameters.

→ Analyse the output from the model.
→ Ensuring that the output is backed with professional guidance.
→ communicating and documenting the results and the model.

2) The factors that can cause the probability to be inaccurate could be:-

→ The data input for the model. If the data quality is poor and lacks credibility, then the output from the model is likely to be flawed.
→ Being inclined to set inputs in order to get a particular output rather than comparing the results of input variations.
→ It is not possible to include all the future events. A significant change might render the results obsolete.
→ considering too many variables and input parameters whose correlations could affect the probability outcome.
→ It may only be valid in relative terms rather than absolute terms.

3) For identifying an appropriate model the following steps should be considered:-

→ Analyzing the past data and making predictions about the future events.
→ sampling the data into different strata in order to remove any biasedness and to highlight any patterns or trends.

→ Defining the objectives in order to select an appropriate modelling process.

→ Considering all the scenarios and keeping the probability of significant changes in mind in order to reduce the uncertainity.

→ Processing and debugging the data in order to indentify the type of the data distribution and hence, selecting the appropriate model for it.

4) The key items that should be included in the documentation of the modefi-

→ The specification of the original data and the computer code.

→ Description of each data variable, an audit trail describing the decisions made while cleaning and processing the data.

→ Documenting the full code used.

→ Documenting the software environment, the computing architecture, the O.S, the software toolchain, external dependencies and version numbers.

→ Documenting the results and the reviews on the outputs.

→ Documentation of all the aspects that can be important in ensuring reproducibility.

6) For the given modelling strategy, the advantages for the manufacturer could be:-

→ He can have an estimate for the future cash flows in compressed time frame.

→ He can compare the past data in order to improve the business in the future.

→ He has the control over the experimental conditions and the other factors which can contribute to variability in the future values and hence can avoid upsetting them.

The disadvantages of the given modelling strategy could be.-

→ The results of the model can look impressive when run on a computer but if it has not passed the tests of validity and verification, it might not be able to imitate the results in the corresponding real-world system..

→ The manufacturer shouldn't fixate on adjusting his input in order to obtain a particular output. That will cause the results to vary in the real world system.

→ He ~~might~~ use the model as a 'black box' and assume that all the results are valid without considering the appropriateness of using the model for the data input and expected output.

→ He should process the past data and check the parameters. If the input data quality is poor, then the output is likely to be flawed.

→ He can't predict the scenarios of all the events possible in the future. A significant change might render the model obsolete.

5) The revised results produced are significantly different from the original results. The possible reasons responsible for this are:

→ The actuarial student who produced the original model might have not documented some aspects that can be important for replicating the outputs.

→ There could be some miscalculations in the processing of the outputs or while entering the inputs if they were edited or entered manually.

→ The improved data might have some parameters in correlation that could affect the results.

→ The original model research could be carried out using an incorrect distribution.

→ There might not be the transparency in stating how the results are achieved

→ The study has some required elements which were a unique occurance.

8) The factors that the company should take into consideration while developing the model are:-

- Considering the risks that may be involved and creating a model that will not understate costs or other risks that may be involved.
- Defining the objectives that need to be met by the process.
- Determining the complexity of the model by determining the complexity of the relationship between the model parameters.
- Here, consideration must be given to the issues such as the current regulations, taxation and the cancellation terms.
- Future events affecting the firm's investment returns, inflation, new business, lapses, mortality and expenses that affect the parameter relationships should be taken into account
- The data used for the modelling process should be credible and of quality.

7) For the given modelling approach, the factors that should be considered are:-

- If the population distribution of the given town is not considered properly then the results might vary in the actual world scenario.
- The data input for the model should be appropriately processed and debugged in order to achieve appropriate outcomes.
- The relationships that are predicted in the given data should align with the objectives

in order for anyone to expect appropriate outcomes.

- These potentially predictive relationships should be tested by using a different set of data, known as the test set, to assess the strength of these relationships.
- From the given data check the equations between the independent and dependent variables.