

# **INTRODUCTION TO ACTUARIAL MODEL**

## **ASSIGNMENT 1**

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## Question 1)

Stochastic models is a type of model where in the same set of parameter values and initial conditions will lead to a set of different outputs.

Stochastic modelling certainly is a good way of modelling because of the following reasons:

- Stochastic models depict real life scenarios which give a better and complete understanding of all possible outcomes of a particular situation.
- Due to the randomness, these type of models provide a huge set of possibilities of the future events .

Thus the important steps that one should keep in mind for the development of model are:

1. Develop a well defined set of objectives.
2. Plan the modelling process and how the model will be validated.
3. Collect and analyse the necessary data for modelling.

4. Define the parameters for the model and set a particular parameter value for the same.
5. Define the model initially by comparing it to real world needs. Refining the data at a later stage.
6. Involve experts on real world system you are trying to model.
7. Decide on whether a simulation model or general purpose language is appropriate for the implementation of the model.
8. Write the computer program of the model.
9. Debug the model to make sure it performs the intended operation.
10. Test the correctness of the model.
11. Review and carefully check the appropriateness of the model.
12. Analyse the output from the model.
13. Communicate the results in a simple way.

Question 2) Stochastic models is a type of model where in the same set of parameter values and initial conditions will lead to a set of different outputs. There are certain factors which could cause the probability of the insurance company having insufficient assets to be inaccurate.

- According to the principles of stochastic modelling , the randomness is not realistic to measure the probability as it ignores a lot of important aspects like inflation, changing tax rates etc.
- There may be errors to decode or debug the data.

Question 3)The stages that one should go through while identifying a appropriate model(future mortality) are:

- Identify and note the well defined set of objectives. Also check whether the parameters that we use are in line with the objectives of the modelling.
- After checking the parameters, the validity of the model should be checked.
- One should also check the past data for a more accurate model. ( past mortality rate, maximum age to which people survive, cause of death , geographical location etc)
- Debug the data and test the sensitivity of the data.
- Before going through with the process, it is extremely important to consult a professional authority for utmost reliability and accuracy.
- Finally, analyze the output .
- The most important step is communicating the result in the most easiest and simplest way.

Question 4) Model documentation is the formal collection of documents and data that provides a detailed explanation of all the outputs and assumptions.

Key items that one would list in the documentation of the model are:

- Define the input data.
- Check if the input parameters match the real -world needs.
- State the bibliography of the data used.
- Sensitivity testing
- Assumptions made while designing the model
- Get all the data and facts validated by a professional.

Question 5) Advantages of the strategy:

- Segregating the data on the basis of age specific consumption is a good strategy to increase profits.
- The model is simple and seems easy to understand.
- Using the past data will give him a fair idea of future projections.

Disadvantages of this strategy:

- Using only age as a parameter to project a good future sale is not a good strategy. This is because there are other aspects that one should keep in mind. (weather as it is a confectionery shop, pricing of the products within the next 10 years, inflation rates will change with time.)
- Extrapolation may be a tedious job and will take a lot of time.
- Broadening the range of parameters may help in better sales.

Question 6) The difference between the revised results and original results has occurred due to the following reasons:

- While analysing the output , it is often done by stratified sampling techniques and it is possible that some of the recorded values might be wrong. That's why its very important to assess the data properly.
- The source of data was wrong. It probably wasn't recorded from trusted sources or could also be due to the carelessness of the actuary.
- The model wasn't tested by designing appropriate simulation experiments.
- The original data wasn't reviewed by a professional the first time .
- It is very much possible that the original data was useless and fatally attractive which gave a sense of fake confidence.



## Question 7)

While designing any model it is very necessary to plan the modelling process in such a way that it lines with the real -world problems.

In the above given question, the given objective is a good way to determine the appropriateness of the model.

Some steps to check for the appropriateness of any model are:

- Validity of the model and the purpose to which it is put.
- Current relevance of models used in the past.
- Their methods might be wrong in the future in case a pandemic like COVID occurs. It will vastly affect the mortality rates and thus it may not be a good option.
- Only considering one parameter is not advised as there are other factors too, which could affect the outputs. (geographical location, migration of people during certain time of the year etc.)

Question 8) While constructing a model for sickness rate among the employees to design a sick pay scheme, following steps are to be kept in mind.

- First step should be checking if the employees need sick leaves due to some common health issues. (common cold, body aches etc). In short , determining the trend of sickness amongst the employees.
- Necessary steps must be taken in case of a pandemic.
- Actuaries must add other beneficiary options in the scheme. (cover in case of death, a job to someone from the family if the employee dies)
- The model should be easy to communicate and implement.
- The sick pay scheme should be different for different age groups as older people are more prone to various diseases than the young employees.

THANKYOU