Institute of Actuaries of India

Subject CA1 – Paper II
Core Applications Concepts

May 2008 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Q.1

a) The project needs a

1. Clear definition
   - need to develop a clear definition in a timely & cost effective manner
   - with minimal changes happening later
   - to enable the real need of the project customer met

2. Full planning
   - technical and design changes should be avoided once implementation begins
   - design parameters should be broad enough to give some freedom of approach to avoid the need for subsequent changes
   - change control maintained (well documented)

3. thorough risk analysis

4. monitoring of development
   - tools for planning, monitoring and reporting on the progress of a project should be user friendly, allow all issues to be tracked & enable final outcomes to be predicted reliably.

5. measurement of performance and quality standards

6. thorough testing at all stages

7. care in managing different strands of the project

8. move at the right pace

9. stable but challenging relationship with external suppliers

10. a supportive environment

11. excellent communication

12. positive conflict management

13. a schedule of milestone point

(b) Initial appraisal document

Main purpose of the initial appraisal document would be to assess whether a detailed appraisal is worth undertaking.

The document would contain points on
1. Need for a new system
    - Features to be introduced in the product
        - are complicated will require system support for administration
        - competitors have such features, so the market needs it
    - with these features sales is expected to increase & increase in volumes mean more administration, important to automate more of the functionalities

2. Options available
- Upgrade the existing system
    - Existing system can't currently cope with the new features & processes
    - Will take a lot of effort to upgrade it
    - We do not have the technical expertise to upgrade the system to such levels
    - May not be stable for very high volumes of business

- Buy a new system
    - Off-the shelf product for group business administration available
    - These are from companies who specialize in system development & implementation
    - It might need less customization relative to upgrading the current system
    - Implementing the project can be worked out on a faster timeline

3. Preliminary findings
- there are ready made products available in the market which can be used with minimum customisation
- there are other customers (insurance companies) using these products
- vendors are willing to do a detailed demo for evaluation purpose

4. Cost & timelines
- approximate estimate of the cost gathered from all the vendors
- an estimate of the time schedule of the implementation and completion of the project drawn

5. Recommendation
- we should go ahead with project of looking for a group system

c) Detailed appraisal will cover:
- Definition the scope of the project
    - Evaluation criteria for the group system
    - Budget
    - Time scales
    - To whom (to which departments) the goals of the project apply
    - Exact responsibilities of people involved in the project team
    - List of connected issues for which project team is not responsible

- How the evaluation criteria was fixed
    - A detailed product specification prepared for each product
    - A detailed process specification prepared for each product
    - Based on both the product and process specification a Request for Information (RFI) was prepared for each of the system
    - All the user departments were consulted while finalizing the RFI

- Initial shortlist of vendor list
    - Short-listed vendors who have product to cater to my requirement; we got 7 of them
    - Asked the vendors to fill in a RFI, which included information of the company, implementation partner, functionality requirement and technology requirement.

- Methodology for evaluation
    - Each requirement was classified as Critical, Important & Desirable
    - Based on the vendors response, weights were given to each classification and a score card prepared for each vendor
    - Top three vendors were called for a detailed face to face demo with all the end-users
    - The score card was updated for the finding after the demo
    - Strength and weakness of the 3 selected vendors are prepared for management decision

- Cost of the project
    - Commercial proposal received from the short-listed vendors
    - Comparison of the commercial terms done

- Recommendation
    - Based on the relative strengths and weakness and the Cost factor, we make a recommendation
    - The suggested time lines after the vendor selection for the new group system to be implemented is given

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Q.2

a) The main problems with the NPV

- highly dependent on the risk discount rate being correct
- it doesn’t say any thing about the length of the project or time until profits will start to be made

b) The main problems with IRR

- can have multiple solutions (especially if there are net negative cashflows)
- if the initial amount of capital is not large, IRR can give a very high number but the project will still make an inadequate absolute profit
- ignores the scale and size of the project

b) The main problem with payback period is

- ignores time value of money
- ignores cashflow beyond the date that payback is achieved
- ignores the scale and size of the project

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Q.3

a) The following factors need to be considered when designing the product

(i) customer needs
- the design should meet the customers requirement
- clients need would be determined on how he can afford
- and his level of sophistication in understanding health products

(ii) characteristics of other stakeholders
- actuaries will want to assess the impact of the design on the cost & reserving implications
- lawyers will want to the contracts to say what is intended as the risks taken

(iii) level and form of benefits
- based on the customers need and his capacity to pay the level of cover in the product needs to be set
- similarly whether the clients will need a one-time payout or regular payouts will need to be considered

(iv) options and guarantees
- while getting into a new product line it is very critical to decide what options and guarantees would you want to provide and its onerousness
- and how would be charge for the same

(v) discretionary benefits
- should it be with profit
- any no claim discounts

(vi) discontinuance benefits
- what form and level of discontinuance benefits to be offered
- will make it more marketable but more complex & harder to administer

(vii) terms and contract conditions
- not too onerous nor too lax

(viii) profitability
- premiums charged should be enough to cover benefits & expenses plus an expected level of profitability for the capital providers

(ix) marketability
- Innovative product design
- Existence of options & guarantees

(x) competition
- What is the competition doing

(xi) regulatory requirements
- what is defined as health products in the regs
- any requirement on the premiums that can be charged
- and what are the reserving requirements

(xii) financing requirements
- design should be such that financing requirements should be minimum
- also depends how much capital is available

(xiii) risk characteristics
- depending on the level of risk, we
- may want to reinsure substantial portion
- since it is opening for the first time, the risk may be difficult to quantify easily and hence absorb easily

(xiv) premium pattern
- single premium or regular pay
- premium over full or part term of the policy

(xv) charges Vs expenses
- try to match the two as closely as possible

(xvi) extent of cross subsidies
- between large & small contracts

(xvii) consistency with other contracts

(xviii) administration systems
- can the existing system cope with health products
- how quickly can we buy or develop those features in the system

(xix) accounting implications

b) Risks can be mitigated by

- reinsuring a large part of the risk
- offering the contract in unit linked form to avoid a long-term guarantee
- incorporating ample margins in the premium rates
- offering the contract as a rider benefit rather than stand alone
- low guarantees
- reduce the options offered
- not offer high discontinuance benefits
- keeping the charges and expenses as matched as possible by nature and by timing

c) Unit linked platform for health product design

Pros

For the company

- capital efficient
- can explicitly charge for options and guarantees
- charges can be matched

For the customer

- can be more flexible in benefits
- and in premium payments etc
- will be more clear what is being charged

Cons

For the company

- administratively complex compared to without profit
- hence may need more training to sales and support staff
- may be a difficult sale compared to without profit design

For the customer

- may be more complex to understand
- in without profit the benefit payout is known (guaranteed); where as in UL the final benefit will not be known

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Q.4

Value of the liability is only an estimate of the future liability.
…. It may be different from the actual value
From year to year, the value is expected to go up or down due to

- membership changes
- demographics of the group changing
- investment return in the market changing

- salary increases vary from that assumed

The actual fund value might have grown different from what was assumed.

Even if none of the above changes, the value of the liabilities relative to the fund can still change year to year.

As the value is calculated using some assumption for
- mortality rates
- resignation rates
- interest (discount) rates
- salary escalation , etc

Actuary chooses these assumptions based on
- his judgment or
- his discussions with the company/trustees
- based on relevant actuarial guidelines prescribed by relevant regulatory body

Actuary would keep the assumptions consistent year to year unless there is a need to change

In this case the accounting body had changed its standards move from assumptions determined by the actuary’s discretion to a prescriptive method.

This may be for
- consistency between companies
- consistency with how other elements of the balance sheet are determined
- to make the balance sheets comparable
- better disclosures

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Q.5

Eligibility for taking the option could be

- the whole group will be have to select the option upfront and pay option premium for the same

- members retiring/resigning from service other than due to ill-health can take this option

- level of benefit can be restricted upto the sum assured taken under the group policy

- if the member was rated up life under the group policy, then offer to convert into individual policy could be restricted to the free cover limit

- the type of policies he can convert into should be savings/ endowment kind of products (and not term assurance type)

- May not offer riders on the converted policy

- No spouse cover may be extended

- Option has to be availed within a certain number of days immediately after retiring/ resigning

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Q.6
a) Where there is little past data,
(i) Mortality assumption could be set using
- data from similar contract
- industry data
- reinsurers' data

The above data is likely to be used to derive an adjustment to a standard mortality table.

(ii) expense assumption could be set using
- company's recent experience for the similar type of business
- using a expense model,
- any industry data
- or any model from reinsurer

any of the above data will need to be validated by the company for the expected expenses to be incurred

b) Effect of closure to new business
(i) Expenses

Closing of new business will have a major impact on the operations & hence the expenses of the company

Short term
- most significant will be the savings out of departments no longer required. Most activities related to acquisition of business can be closed immediately.

- These include
  - Sales and marketing staff

  - Branch offices

- Some corporate office departments (like NB customer support, underwriters, etc)

- New business systems (sales illustration)

It may be possible to sell the direct sales force (& so raise capital)

These expense reductions will be offset to some extent by certain additional costs like:

- redundancies

- disposal of marketing literature

- notifying policyholders

- early termination of office building's lease

All product development & most system development work can be stopped.

Although some system development work will need to be continue (to be able to manage the existing books of business)

It might decide to scale down its administration functions, since quality service is no longer needed to attract new business.

however retaining existing business will be important to keep the per-policy fixed expenses at an acceptable level.

Longer term
Further redundancies expected as the number of policies to manage are decreasing

As the number of policies in-force decreases, it causes an increase in the per policy fixed expenses.

(ii) withdrawal rates

Short term

- withdrawal experience will vary by investment type

- it may increase due to doubts in the minds of the policyholder of the security of their benefits

- higher withdrawals will cause the fund to become small faster and making it difficult to practically manage depleting fund separately

- If the company sales force has moved to competitors, they may recommend the clients to move their funds to the other provider

- The effect of withdrawal rates is less certain if the policyholders see the prospect of any windfall payments e.g if there is a chance of a mutual life insurance company demutualising as a way of raising capital to improve its financial situation.

Longer term

- some of these withdrawals may be selective, leading to worsening of the mortality and sickness experience of the company.

- If service levels decline over time, withdrawals are likely to increase

(iii) Investment policy

Short term

- the loss of NB strain will improve the solvency position, which might suggest a less constrained investment policy

- However the policy is likely to be constrained as the business was closed to new business due to some solvency constrain

Longer term

- When the average outstanding term becomes much shorter, the assets should be moved more towards short-dated, fixed interest type investments to reduce the volatility of payouts.

- As the size of the fund reduces, volatility will increase relative to the size of the fund.

- The need for liquidity may increase as fund runs off and if withdrawals increase. The company may be forced to dispose of illiquid assets at an unfavourable time. To prevent this, it will have to undertake a gradual move into more liquid assets.

- Dealing costs will increase relative to the size of the fund, thus reducing the net returns

- Difficult to retain good fund managers, hence returns may be affected adversely

- Tax position may change for a contracting fund compared to an expanding fund

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Q.7

The management control systems are:

1. Data recording
   - important to hold good quality data on all risks it insures
   - especially the risk factors identified when the product designed or underwritten
   - though this does not change the risk taken, it helps ensuring adequate provisions are made for those risks
   - and reduces the operational risks from having poor data

2. Accounting and auditing

Good accounting & audit procedures though do not change the risks undertaken

- they enable proper provisioning
- regular premiums to be collected
- shows the correct financial position to the providers of finance

3. Monitoring of liabilities taken on

It is important to monitor the liabilities taken

- to protect against aggregation of risks of specific type to unacceptable levels
- where new business strain is expected at start, to quantify the amount of new business so that it is within the provider's resources
- Incase of cross subsidy assumed in premium rating, need to check on any change in business mix putting the profitability of the contract at risk

4. Options and guarantees

Care needs to be taken when offering these as they may appear to have limited value when granted but which could become more valuable with changing economic conditions.

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Q.8

(a) factors for appropriate reinsurance program

- stability of profits
  - more excess of loss protection may result in more stable results
  - stable results mean stable dividends to shareholders
- management & shareholders' attitude to risk
- size of free reserves
- extent to which it can withstand adverse large loss experience

- potential for accumulations of claims

- too much geographic concentration

- need more quota share in order to write a wider range of risks yet similar levels of net exposure

- statutory solvency
    - how will it impact

- company's expected business plan, if it plans to expand very fast; how much will it strain the free reserves

- technical assistance from the reinsurers; will it change with the change in the reinsurance program

- how will the investors, analysts, etc react to a change in the reinsurance

- value for money of reinsurance available in the market

(b) Construction of the model

- model should project cashflows over a 5-10 year period.

- By varying the retention level for excess of loss reinsurance and the proportion reinsured for quota share, the model can be used to determine the effect on profitability & statutory solvency

- Projections need to be realistic, hence assumptions to be best estimate

- The future gross claims expected should be determined suing individual claims gross of reinsurance

- These are adjusted for
    - Claims inflation
    - Changes in policy terms & conditions (e.g. changes in claims definitions, cover provided, amount of any loss met by the policyholder)
    - Changes to the cover provided
    - Changes to deductibles (policy excesses)
    - External factors
    - Changes to claims handling or settlement costs, etc

- claims frequency & amount distributions should be modeled separately so that trends can be spotted in either

- For a sensible retention limit, a combined claims distribution function is determined

- Expenses & investment cashflows should also be modeled

- Reinsurance premiums likely to be charged for excess of loss cover with various excess points should be investigated

- These reinsurance premiums should be compared with modeled reinsurance recoveries expected at different excess points

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