

---

# Multi-Criterion Decision Approach in Ranking of Money Back Insurance Policies

Sumegha Jagdale\*

Ankita Jagdale \*\*

K. Venkataraman \*\*\*

V.B. Gupta \*\*\*\*

## Abstract

*Life Insurance is the fastest growing sector in India. Life insurance is an agreement between two parties i.e. insured and insurer where in insurer agrees to assure insured in event of any contingency leading to death and injuries. Money back policies are popular life insurance plans in India. Money back policy provides regular cash back at periodic intervals, so that one can fulfil his/ her dreams and aspirations. The present paper analyses money back policy being offered by different insurance companies in the country. A questionnaire was prepared to get expert opinion on money back policy of different insurance companies i.e. Life Insurance Corporation, State Bank of India, Max Life Insurance, Bajaj Allianz Life Insurance, and Aviva Life Insurance. A multi-criterion decision making approach, Analytical Hierarchy Process, is applied to rank money back policy of different insurance companies. The results of the study show that LIC provides best money back policy to its customers.*

**Keywords:** *Insurance, Analytical Hierarchical Process, Multi-Criterion Decision approach, Decision Alternative*

## Introduction:

**'Future is unpredictable and rather, uncertain'**. Life insurance policy provides you assurance that your family will get financial security and support even when you are not around. This is the best way where the insured person can save his family from financial crisis at the time of any misshapen or after death. Life insurance policies are broadly categorized into two types: Life Insurance Product and Non Life Insurance Product. Life insurance products are like Term Life insurance, Whole Life insurance, Endowment life insurance, Money Back insurance, Unit Linked insurance, Retirement plans, saving and investment plans, Child insurance and Health insurance etc.

Money back policies are probably one of the costliest traditional insurance products available in the market. Money back is a traditional participating savings plan with added advantage of life cover and cash inflow at regular intervals. In order to meet your various financial obligations at crucial junctures, it offers a wide range of terms options with regular payments of Guaranteed Survival benefits made at different durations during the policy term. Unlike ordinary endowment insurance plans where the survival benefits are payable only at the end of the endowment period, money back plan provides for periodic payments of partial survival benefits as follows during the term of the policy, of course so long as the policy holder is alive.

Life insurance business in India started in the year 1818 with the establishment of the Oriental Life Insurance Company in Calcutta. However, this company failed in 1834. The process of re-opening of the insurance sector had begun in the early 1990s. In 1993, the Government set up a committee under the chairmanship of R N Malhotra, former Governor of RBI, to propose recommendations for reforms in the insurance sector. The committee submitted its report in 1994 in which, among other things, it recommended that the private sector be permitted to enter in the insurance industry. They stated that foreign companies should be allowed to enter by floating Indian companies, preferably a joint venture with Indian partners. Following the recommendations of the Malhotra Committee report, in 1999, the Insurance Regulatory and Development Authority (IRDA) was constituted as an autonomous body to regulate and develop the insurance industry. The IRDA was incorporated as a statutory body in April, 2000. The key objectives of the IRDA include promotion of competition so as to enhance customer satisfaction through increased consumer choice and lower premiums, while ensuring the financial security of the insurance market. The IRDA opened up the market in August 2000 with the invitation for application for registrations. Foreign companies were allowed ownership of up to 26%. (www.IRDA.com, 2013)

Today there are 27 general insurance companies

---

\*Student, School of Future Studies and Planning, DAVV, Indore

\*\*Student, IPS Academy, Indore

---

including the ECGC and Agriculture Insurance Corporation of India and 24 life insurance companies operating in the country. In December 2013 several new policies have been proposed like, Group Superannuation Cash Accumulation Plan, One Year Renewable Group Term Assurance Plan I, One Year Renewable Group Term Assurance Plan II, Endowment Plan, Money Back Plan-25years, Jeevan Anand, Money Back Plan-20 years, Group Gratuity Cash Accumulation Plan, Group Leave Encashment Plan, Single Premium Endowment Plan, Bima Bachat, Anmol Jeevan II, Amulya Jeevan II, and Jeevan Mangal. From these policies we are taking Money Back policy.

Money back plan give you regular intervals to make your moments even more memorable. This plan gives you a double benefit of guaranteed money back at regular intervals along with protection in case of an unforeseen eventuality. An important feature of this type of policies is that in the event of death at any time within the policy term, the death claim comprises full sum assured without deducting any of the survival benefit amounts, which have already been paid. Similarly, the bonus is also calculated on the full sum assured.

The work is related to this paper falls into seven criteria: premium, maturity, entry limit or age limit, riders, loan against policy, entry load, and liquidity. AHP is applied for ranking of money back policy of different insurance companies. The companies that are under consideration are Life Insurance Corporation, State Bank of India, Max Life Insurance, Bajaj Allianz Life Insurance, and Aviva Life Insurance. The results show that Life Insurance Corporation Company is the best for Money Back insurance and provides the best facility to the customer.

#### **Literature Review:**

In India, insurance has a deep-rooted history. 1957 saw the formation of the General Insurance Council, a wing of the Insurance Association of India. The General Insurance Council framed a code of conduct for ensuring fair conduct and sound business practices. In 1968, the Insurance Act was amended to regulate investments and set minimum solvency margins. The Tariff Advisory Committee was also set up then.

In 1972 with the passing of the General Insurance Business (Nationalisation) Act, general insurance business was nationalized with effect from 1<sup>st</sup> January, 1973. 107 insurers were amalgamated and grouped into four companies, namely National Insurance Company Ltd., the New India Assurance Company Ltd., the Oriental Insurance Company Ltd and the United India Insurance Company Ltd. The General Insurance Corporation of India was incorporated as a company in 1971 and it commence business on January 1<sup>st</sup> 1973,

(www.IRDacom, 2014). A study was conducted by Hurd and McGarrys (1997) to explore adverse selection in the purchase of insurance.

Grosen and Jørgensen (2000) analyze most common life insurance products i.e. Participating (or with profits) policy. This type of contract stands in contrast to unit-linked (UL) products in that interest is credited to the policy periodically according to some mechanism which smoothes past returns on the life insurance company's (LIC) assets. As is the case for UL products, the participating policies are typically equipped with an interest rate guarantee and possibly also an option to surrender (sell-back) the policy to the LIC before maturity.

Modern insurance products are becoming increasingly complex, offering various guarantees, surrender options and bonus provisions. A case in point is the with-profits insurance policies offered by UK insurers. While these policies have been offered in some form for centuries, in recent years their structure and management have become substantially more involved. The products are particularly complicated due to the wide discretion they afford insurers in determining the bonuses policyholders receive. The major emphasis of research has been on the problem of an insurance firm attempting to structure the portfolio underlying with-profits fund.( Consiglio et al.,2006)

The classical Principle of Equivalence ensures that a life insurance company can accomplish that the mean balance per policy converges to zero almost surely for an increasing number of independent policyholders. By certain assumptions, this idea is adapted to the general case with stochastic financial markets. The implied minimum fair price of general life insurance policies is then uniquely determined by the product of the assumed unique equivalent martingale measure of the financial market with the physical measure for the biometric risks. (Tom Fischer 2007)

Kwak et al., (2011) in his study, "Optimal investment and consumption decision of a family with life insurance" show that optimal portfolio and consumption choice problem of a family that combines life insurance for parents who receive deterministic labor income until the fixed time T. We consider utility functions of parents and children separately and assume that parents have an uncertain lifetime. If parents die before time T, children have no labor income and they choose the optimal consumption and portfolio with remaining wealth and life insurance benefit. The object of the family is to maximize the weighted average of utility of parents and that of children. Hence analytic solutions for the value function and the optimal policies, and then analyze how the changes of the weight of the parents' utility function

and other factors affect the optimal policies.

Sung (2011) “Behavioral optimal insurance”, show that under a fixed premium rate; the optimal insurance policy is a generalized insurance layer (that is, either an insurance layer or stoploss insurance). This optimal insurance decision problem is resolved by first converting it into three different sub-problems similar to those in Jin and Zhou (2008).

Ramsay and Oguledob (2012), “Insurance pricing with complete information, state-dependent utility, and production costs” they prove that, depending on the level of  $q$  and the marginal rate of substitution between states, it may be optimal for individuals to buy complete (full) insurance, partial insurance, or no insurance at all.

Diers et al. (2012) they describe that, advantages of the Bernstein copula, including its flexibility in mapping inhomogeneous dependence structures and its easy use in a simulation context due to its representation as mixture of independent Beta densities.

**Methodology:**

The Analytic Hierarchy Process (AHP), developed by Thomas L. Saaty in the year 1980 (Saaty, 1980) and is designed to solve complex multi-criteria decision problems. AHP requires the decision maker to provide judgments about the relative importance of each criterion and then specify a preference for each decision alternative using each criterion. The output of AHP is a prioritized ranking of the decision alternative based on the overall preferences expressed by decision maker.

In this research, three steps toward establishing an AHP model were implemented as follows:

**Hierarchical Model Design:** This step involves in development of a graphical representation of the problem in terms of the overall goal, and the criteria to be used, and decision alternatives. Such a graph depicts the hierarchy for the problem. The first level of the hierarchy represents the overall objectives; second level, the criteria and the third level, the alternatives.

**Establishing Priorities Using AHP:** In this step AHP uses pair-wise comparisons expressed by the decision maker to establish priorities for the criteria and priorities for the decision alternative based on each criterion. In pair-wise comparison we are establishing the priorities for the all criteria. Using AHP, the decision maker specifies judgments about the relative importance of each of the all criteria in terms of its contribution to achievement of the overall goal. For giving the numerical rating criterion for each alternative, use the following Table 1:

**Table 1: Fundamental scale of pair-wise comparison for AHP**

| Verbal Judgment              | Numerical rating |
|------------------------------|------------------|
| Extremely more important     | 9                |
|                              | 8                |
| Very strongly more important | 7                |
|                              | 6                |
| Strongly more important      | 5                |
|                              | 4                |
| Moderately more important    | 3                |
|                              | 2                |
| Equally important            | 1                |

At the next level, the decision maker indicates a preference for each decision alternative based on each criterion. A mathematical process is used to synthesize the information on the relative importance of the criteria and the preferences for the decision alternative to provide an overall priority ranking of the decision alternative. This aspect of AHP is referred to as synthesization. The following three-step procedure provides a good approximation results.

- Sum the values in each column of the pair-wise comparison matrix.
- Divide each element in the pair-wise comparison matrix by its column total.
- Compute the average of the elements in each row of the normalized pair-wise comparison matrix.

A key step in AHP is provides a measure of the consistency for the pair-wise comparisons by computing a consistency ratio. This ratio is designed in such a way that a value greater than 0.10 indicates an inconsistency in the pair-wise judgments. Otherwise the consistency ratio is 0.10 or less, the consistency of the pair-wise comparison is considerable.

Continue this process of calculating the priorities of all decision alternatives for each and every criterion.

Finally, the rankings of the decision alternative and the order of preference is obtained by summing and averaging the overall priorities obtained from previous step.

**Model Development:**

**Step 1:** 1. Select the criteria with the help of the experts who are using the money back insurance policy. The selected criteria are as follows with description:

Table 2: Selected criteria and their description

| Criteria                        | Description                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Premium (CR-1)                  | The amount of money that is charged for certain amount of insurance coverage.                                            |
| Maturity (CR-2)                 | The stage benefit amount that is received by the life insured or the death cover amount that is received by the nominee. |
| Entry limit or Age limit (CR-3) | It is regulation establishing the maximum age for doing or holding something.                                            |
| Riders (CR-4)                   | Riders are additional benefits that can be added to insurance policy.                                                    |
| Loan against policy (CR-5)      | The loan amount is a certain percentage of the surrender value of the policy.                                            |
| Entry load (CR -6)              | It is charged at the time an investor purchases the units of a scheme.                                                   |
| Liquidity (CR- 7)               | Liquidity is characterized by a high level of trading activity.                                                          |

There are number of Insurance Company in India that provides insurance facility. For the purpose of the study the insurance companies from public, private and foreign sectors are considered as given below:

- Life Insurance Corporation(C-1)
- State Bank of India(C-2)
- Max Life Insurance(C-3)
- Bajaj Allianz Life Insurance(C-4)
- Aviva Life Insurance(C-5)

First, the hierarchical model is developed as given below in Fig. 1:

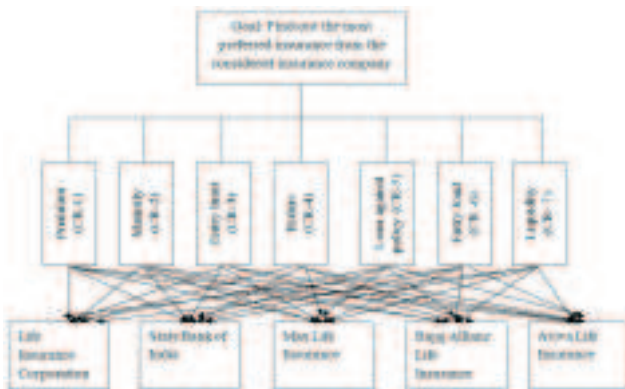


Fig. 1: Hierarchical model for the best insurance company selection

**Step 2:** The pair-wise comparison matrix is drawn by using the pair-wise comparison of the criteria.

Then the consistency ratio is calculated using consistency index (CI) that is shown below:

$$CI = (\lambda_{max} - n) / (n-1)$$

Where  $\lambda_{max}$  is average and n is the number of items to be compared.

Compute the consistency ratio, which is define as

$$CR = CI / RI$$

Where RI is random index; RI is the consistency index of a randomly generated pair-wise comparison matrix. Here n=7 and RI= 1.35

**Step 3:** Other priorities are calculated for each of the alternatives (Life Insurance Corporation(C-1), State Bank of India(C-2), Max Life Insurance(C-3), Bajaj Allianz Life Insurance(C-4), and Aviva Life Insurance (C-5)) using pair-wise comparison matrix for all criteria.

**Step 4:** Overall priority ranking is performed at the end to find out the best alternative among all existing alternatives.

**Step 5:** Rank the insurance companies of all alternatives are calculated. The numerical result shows that the Life Insurance Corporation is higher value as compare to other. So that Life Insurance Corporation of Life Insurance Company is the most preferred company for Money back Insurance.

**Results and Analysis:**

The pair-wise comparison matrix is drawn by using the pair-wise comparison of the criteria. Pair-wise comparisons are establishing the priorities for the all criteria. One of the pair-wise comparison matrixes is shown in Table 3.

Table 3: Pair-wise comparison matrix of criteria

The consistency ratio is calculated as 0.086 i.e. less than 0.10 so the consistency of the pair-wise comparison is considerable. Finally, the rankings of the decision alternative and the order of preference is obtained by summing and averaging the overall priorities obtained from step 4. These are shown in following Table 4:

Table 4: The priority of the insurance companies as per different criteria

It is clear from the Table 4 that most preferred insurance company for money back policy is Life Insurance Corporation (C-1) followed by State Bank of India (C-2), Aviva Life Insurance (C-5), Bajaj Allianz Life Insurance (C-4) and least preferred is Max Life Insurance (C-3).

Table 3: Pair-wise comparison matrix of criteria

| Company | CR-1 | CR-2 | CR-3 | CR-4 | CR-5 | CR-6 | CR-7 | PRIORITY |
|---------|------|------|------|------|------|------|------|----------|
| CR-1    | 1    | 1/3  | 1/5  | ½    | 1/3  | ½    | 1/3  | 0.054    |
| CR-2    | 3    | 1    | 3    | ½    | ½    | 1    | 1/3  | 0.118    |
| CR-3    | 5    | 1/3  | 1    | ½    | 1/3  | ½    | ¼    | 0.089    |
| CR-4    | 2    | 2    | 2    | 1    | 2    | 2    | 1/3  | 0.177    |
| CR-5    | 3    | 2    | 3    | ½    | 1    | 2    | ½    | 0.167    |
| CR-6    | 2    | 1    | 2    | ½    | ½    | 1    | 1    | 0.126    |
| CR-7    | 3    | 3    | 4    | 3    | 2    | 1    | 1    | 0.269    |

Table 4: The priority of the insurance companies as per different criteria

| Company          | C-1      | C-2     | C-3      | C-4     | C-5      |
|------------------|----------|---------|----------|---------|----------|
| CR-1             | 0.517    | 0.243   | 0.027    | 0.076   | 0.137    |
| CR-2             | 0.485    | 0.245   | 0.031    | 0.087   | 0.152    |
| CR-3             | 0.480    | 0.138   | 0.032    | 0.085   | 0.265    |
| CR-4             | 0.509    | 0.237   | 0.033    | 0.081   | 0.141    |
| CR-5             | 0.491    | 0.248   | 0.033    | 0.078   | 0.150    |
| CR-6             | 0.493    | 0.245   | 0.037    | 0.081   | 0.144    |
| CR-7             | 0.473    | 0.254   | 0.035    | 0.087   | 0.151    |
| OVERALL PRIORITY | 0.365795 | 0.17846 | 0.024764 | 0.06151 | 0.114027 |
| RANK             | 1        | 2       | 5        | 4       | 3        |

**Conclusion:**

The AHP model is used to rank money back policies of different insurance companies using seven criteria. The criterion, Riders, is the most important criterion that affects the customer. Maturity and liquidity are the next two important criteria that affect the customers. The study also ranked the different insurance companies for their money back policies. It reveals that most preferred insurance company is LIC followed by State Bank of India, and Aviva Life Insurance. The customers preferred LIC because it provides the Maturity term is more than premium paying term, Early and higher rate of survival benefit payment and also Risk cover increases every five years.

**References:**

1. Insurance Regulatory and Development Authority (IRDA)
2. Insurance Regulatory and Development Authority (IRDA)
3. Michael D. Hurd, Kathleen McGarry (1997): "Medical insurance and the use of health care services by the elderly". *Journal of Health Economics* 16, 129-154.
4. Grosen Anders, Jørgensen Peter Løchte (2000): "Fair valuation of life insurance liabilities: The

impact of interest rate guarantees, surrender options, and bonus policies". *Insurance: Mathematics and Economics* 26, 3757.

5. Consiglio Andrea a, Saunders David, Zenios Stavros A. (2006): "Asset and liability management for insurance products with minimum guarantees". *Journal of Banking & Finance* 30, 645667.
6. Fischer Tom (2007): "A law of large numbers approach to valuation in life insurance". *Insurance: Mathematics and Economics* 40, 3557.
7. Kwaka Minsuk, Shin Yong Hyun, Choi U Jin (2011): "Optimal investment and consumption decision of a family with life insurance". *Insurance: Mathematics and Economics* 48, 176188.
8. Sunga K.C.J.Yamb S.C.P, Yunga S.P., Zhoua J.H. (2011): "Behavioral optimal insurance". *Insurance: Mathematics and Economics* 49, 418428.
9. Ramsaya Colin M., Oguledo Victor I (2012): "Insurance pricing with complete information, state-dependent utility, and production costs". *Insurance: Mathematics and Economics* 50, 462469.
10. Diers Dorothea, Eling Martin, Sebastian D. Marek (2012): "Dependence modeling in non-life insurance using the Bernstein copula". *Insurance: Mathematics and Economics* 50, 430436.