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## RESEARCH ARTICLE

### INVESTOR'S SUITABILITY FOR OPTING VOLUNTARY PENSION PLANS - USING AHP MODEL

\*<sup>1</sup>Debasmita Panigrahi and <sup>2</sup>Prof (Dr.) B. N. Mishra

<sup>1</sup>Debasmita Panigrahi, Faculty MBA (HR), College of IT and Management Education (CIME) Bhubaneswar, India

<sup>2</sup>Prof (Dr) B.N.Mishra, Professor, Department of PMIR, Utkal University, Bhubaneswar, India

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#### ABSTRACT

The shift from the defined benefit to the defined contribution scheme in India has enveloped within its purview a lot of changes, the most essential being the attitude of the individuals towards planning for their retirement. The pension products offered by various life insurance companies was not considered much as a source of retirement saving due to the concept and existence of defined benefit system till 2003. Abolishment of defined benefit program combined with opening of the insurance market after the year 2000 to the private players gave rise to the increased purchase of these policies from the private companies. This paper basically deals with the selection of insurance companies based on various criteria's like number of pension schemes offered by each company, the returns they provide to their customers, the flexibility in their investment options etc. So based on these criteria a weight is assigned to each of them and a final score is deduced with the help of Analytical Process Hierarchy and the companies are ranked based on their score. So looking into these scores an individual has to decide as to which company he/she has to invest his money to get higher returns and benefits.

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#### INTRODUCTION

In today's economic and social scenario, individuals tend to plan only for the present. They think of all sorts of alternative source of income to sustain their present livelihood. The decreasing mortality rate and the increased life expectancy of the present generation have enveloped within its purview the problem of a regular source of income and sustenance after the retirement. As of today although this source of retirement benefit in the form of pension is made available only to a small fraction of the population covering only 11% of the organized masses and old age being the common and definite problem of all. Private players also offer various kinds of pension products with a wide variety of options and benefits to suit the Indian customers at large. So far as the operation of the policies is concerned the insurance companies offers a wide spectrum of pension products and the individual policyholder has to opt for a particular policy and invest in the form of paying a single premium or annual premium as per the requirement of the policy. If regular premium contributions are made the period in which the policyholder makes contribution is called as the deferment period and at the end of the deferment period one can invest his notional cash value (the accumulated corpus then available) in purchasing of annuity, which shall pay the policyholder a monthly income in the form of pension on retirement. The start of the annuity payment period is known as the vesting period. In almost all the policies the general rule is

that after the premium paying term one can avail the pension in the form of commuting one third of the accumulated amount in lump sum and rest two third the policyholder has to invest in some form of annuity. The pension products offered by the insurance companies have its own unique features and benefits. There are in total 24 players available in the Indian market ([irda.gov.in](http://irda.gov.in)). The objective of this paper is to rank the Indian insurance company from investor's viewpoint. This chapter is organized as follows: The first part deals with introduction, part 2 deals with the Indian pension scenario, part 3 deals with the literature overview followed by methodology in part 4 and then part 5 deals with the introduction of AHP and analysis of the proposed study with the Analytical Hierarchy Process Model (AHP) using super decisions software. Part 6 deals with assigning weights to the attributes and determining the score as to which insurance company ranks first in terms of investors point of view so that they can make a valid investment in it and earn good returns in their pension fund while they retire.

#### Voluntary Pension in India

The pension sector in India has just come into the limelight due to the reform process initiated in 2003 for the state and central government employees, to change the existing unfunded defined benefit (DB) pension to a fully funded defined contribution (DC) system. Earlier there was the concept of DB and only 11% of the working population was covered under any pension scheme. Broadly pension has been categorized as: the mandatory pension for the public sector undertakings which includes the Employees provident fund (EPF), Employees pension scheme (EPS) and the Employees deposit linked

\*Corresponding author: Debasmita Panigrahi, Department of PMIR, Utkal University, Bhubaneswar, Faculty MBA (HR), College of IT and Management Education (CIME), Orissa, India.

insurance scheme (EDLIS); the civil servants pension solely for the government employees includes the civil servants pension, the General provident fund (GPF) and the Gratuity (Currently after the reform the civil servants pension has been modified to New Pension Scheme (NPS) for employees joining government jobs after 2004); the voluntary pension that includes the public provident fund (PPF) and the individual and group annuities offered by the life insurance companies and the social assistance pension for the unorganized masses like the National old age pension (NOAP) and the National social assistance programs (NSAP).

Till late 90's LIC was the sole player operating in the Indian market and in the year 2000 and onwards private insurance companies flooded the Indian market due to the globalization of the entire market. But till date, the market capitalization of the life insurance corporation of India was the highest and the whole gamut of these insurance companies was being regulated by IRDA (Insurance regulatory and development authority). Our area of analysis in this paper is the voluntary pension which includes the pension schemes of the private insurance companies. At present in India there are 24 players in the market among which one is LIC and the other 23 are the private players.

The figure below shows the market capture of the life insurance companies in the Indian private pension market, the top 5 life insurance companies in India control 85% of the market-share while the remaining dozen are still struggling to setup their operations. The insurance companies listed above work in the same guidelines and principles as given by the Insurance Regulatory and Development Authority (IRDA). Policyholders of these companies invest their money in the form of premium to purchase the pension products and this amount is further invested by the insurance companies in some blue chip companies to earn a hefty return so as to repay the policyholders with an amount over and above their premium in the form of monthly pension.

This is the fundamental guidelines being followed by all insurance companies but the returns in the form of pension being provided somehow differs (although miniscule difference) in all companies. The figure below shows the market capture of the life insurance companies in the Indian private pension market, the top 5 life insurance companies in India control 85% of the market-share while the remaining dozen are still struggling to setup their operations.

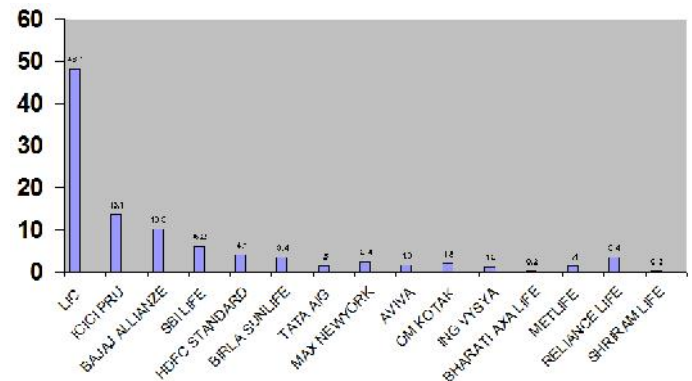


Figure 1.

Some of the joint ventures between these major players of insurance companies in the market are:

#### Literature Overview

Indian economy is among the most under insured markets in terms of spread and penetration leaving a huge untapped market penetration, with the insured population being only 70 million people (Palande, Shah and Lunawat, 2003). Annuitisation is one of the more difficult and neglected areas of social security privatization and reform around the world. [Cardinale, Findlater Orszag (2002)] reviewed annuities in thirteen countries around the world and found no instances where countries had adequately dealt with the problem of private provision of annuities, particularly on a wholesale

Table 1.

Insurance Company	Policy name	Joint venture	Some features	Returns or Bonus	Benefits Available
LIC	Jeevan Nidhi Jeevan Akshay 2 New Jeevan Dhara 1 Future Plus New Jeevan Suraksha 1	Only public sector undertaking managed by the govt. of india	Exit option available after 15years. LIC offers 6 different types of pension policies.	Policy offers certain guaranteed returns on investment.	Loan facility available upto 75% of purchase price after 3 years
HDFC	Personal pension plan Unit linked pension	HDFC bank of India(81.4% holding) and standard life of Europe(18.6%)	Participating with profit plan	Bonus as per the company surplus	Notional cash option.
SBI LIFE	Life long pension	State bank of India and 74% Cardiff SA of france 26%	Monthly contribution of premium possible..	4% p.a GR till 2010 & revised rate after that and vested bonus	Pension cum life cover plan 30 days Free Look Period.
MAX NEWYORK LIFE	Easy life retirement plan	Max India ltd and newyork life international	25% commutation can be done	Bonus as per company profits.	Annuity for life and annuity for guranteed minimum option available
MET LIFE	Met Pension	Met india along with life insurance of US.	Participating deffered annuity plan	Accumulated corpus +GA+RB+TB*	Death benefit available in endowmnt phase and immediate annuity phase

basis. The largest retirement annuities market in the world is the United Kingdom (at over 10bn/year of premia) and Cardinale, Findlater and Orszag (2002) found that it was from well functioning market. In particular there are significant capacity problems in the market to the lack of long-term securities to back annuities obligations. There are however several features of the present annuity market which are likely to pose significant problems in the future. The limits of the current state of play can be grouped into two broad categories: excessive regulation and lack of competition. Excessive regulation has created a perception among providers that annuity products are not very profitable. This is primarily because of regulatory requirements to provide high guaranteed benefits to survivors, lack of suitable assets to match liabilities tied to the wage index and prohibition to charge front-load fees. Asset liability mismatch also leads to substantial risks, which may not be fully appreciated by life insurers. Moreover, lack of competition is exacerbated by the presence of a provider backed by the State competing with private life insurers. In the case of insolvency however State-owned life insurance would be bailed out with taxpayers' money, casting doubt on whether the reformed pension system is ultimately a privatized one.

Amongst the life insurance market the central government revenue expenditure of the pension sector in the year 1995- 96 was 4277 crore and this increased to Rs 19542 in the current year of 2005- 06.(CMIE Report,2005). This indicates that a heavy increase in the pension expenditure in the last ten years has forced the government to plan for the pension system by shifting the concept of Defined Benefit to Defined Contribution. To some extent the participation of private players in offering pension service has increased the awareness and increased planning for the retirement. To strengthen insurer operation in developing countries, it is important to reform insurance law and regulation. This is accomplished by better licensing of insurance companies and their agents, enhancing reporting and disclosure, and requiring minimum capital requirement (Demirguc-Kunt 1996). Another pension-specific issue in the insurance context has to do with the dearth of actuaries capable of pricing products such as life time annuities. This is particularly a problem in country where life expectancies are changing quickly, and often no statistical databases are available with which to project future mortality patterns. It may be that there is a need for some sort of international financial advisory organization to collect and project mortality rate, offer regulatory guidelines for insurer, and disclosure standards as well as reserve requirements in insurance as well as for the other financial sectors (Fields and Mitchell 1993). The idea would be that adhering to these guidelines would make developing countries insurance companies more competitive and less costly in the long run.

## MATERIALS AND METHODS

Data are collected from the insurance company officials and experts through a focused group discussions (FGDs) and a questionnaire method. Their opinion as to which pension product has what best features in it to distinguish it from the other products has been dotted down and summarized in the form of a model. All 24 private players are not taken into our analysis. Instead the first 5 companies (shared 95%) based on

the pareto analysis are considered. Those are LIC, ICICI Pru, BIRLA SUNLIFE, Bajaj Allianz, and SBI LIFE respectively.

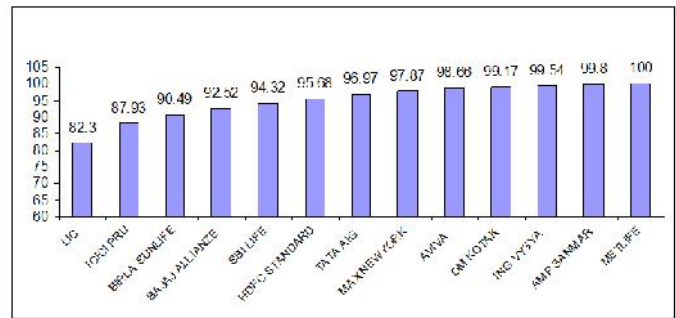


Figure 2.

## AHP Introduction and Analysis

The AHP (Analytical Hierarchical Process) is widely used multi criteria decision making technique developed by Satty (1980). The AHP consists of three parts: the hierarchy structure, eigen value calculation and the matrix of pairwise comparison. In AHP, a decision maker is asked to estimate pair-wise comparison with respect to strength of preference between subjects of comparison. Thus the AHP is deeply related to subjective judgment. For reducing subjective extent of human judgment, we propose decision table approach for obtaining more objective weights.

The main steps of the process are :(a) define the criteria for insurance company selection ;(b) calculate the weights of criteria with AHP ;(c) compute the overall score of each insurance company.

## Define the criteria for company selection

Owing to the large number of factors affecting selection decision, the decision should be made, based on an orderly sequence of steps. In fact, most decision makers cannot simultaneously handle many factors when making a decision. As such, it is necessary to break down the complex problem into more manageable sub-problems through the multi-level decision hierarchy. The Analytical Hierarchy Process (Saaty, 2000) is a decision approach designed to aid in the solution of complex multiple criteria problems in a number of application domains. This method has been found to be an effective and practical approach that can consider complex and unstructured decisions (Partovi, 1994). The Analytical Hierarchy Process (AHP) is proposed in this research in order to handle both tangible and intangible factors and sub-factors affecting insurance company selection. The selection of the methodology is based on the characteristics of the problem and the consideration of the advantages and drawbacks of other methodologies. The decision-maker judges the importance of each criterion in pair-wise comparisons. The outcome of AHP is a prioritised ranking or weighting of each decision alternative.

## Establishment of a structural hierarchy

This step allows a complex decision to be structured into a hierarchy descending from an overall objective to various

'criteria', 'sub-criteria', and sub-sub criteria until the lowest level. The objective or the overall goal of the decision is represented at the top level of the hierarchy. The criteria and sub-criteria contributing to the decision are represented at the intermediate levels. Finally, the decision alternatives or selection choices are laid down at the last level of the hierarchy. According to Saaty (2000), a hierarchy can be constructed by creative thinking, recollection and using people's perspectives. He further notes that there is no set of procedures for generating the levels to be included in the hierarchy. Zahedi (1986) comments that the structure of the hierarchy depends upon the nature or type of managerial decision. Also, the number of the levels in a hierarchy depends on the complexity of the problem being analysed and the degree of detail of the problem that an analyst requires to solve (Zahedi, 1986). As such, the hierarchical representation of a system may vary from one person to another.

### Establishment of comparative judgements

Once the hierarchy has been structured, the next step is to determine the priorities of elements at each level ('*element*' here means every member of the hierarchy). A set of comparison matrices of all elements in a level of the hierarchy with respect to an element of the immediately higher level are constructed so as to prioritise and convert individual comparative judgements into ratio scale measurements. The preferences are quantified by using a nine-point scale. The pair-wise comparisons are given in terms of how much element A is more important than element B. As the AHP approach is a subjective methodology (Cheng and Li, 2001), information and the priority weights of elements may be obtained from a decision-maker of the company using direct questioning or a questionnaire method.

### Synthesis of priorities and the measurement of consistency

The pair-wise comparisons generate a matrix of relative rankings for each level of the hierarchy. The number of matrices depends on the number of elements at each level. The order of the matrix at each level depends on the number of elements at the lower level that it links to. After all matrices are developed and all pair-wise comparisons are obtained, eigenvectors or the relative weights (the degree of relative importance amongst the elements), global weights, and the maximum eigenvalue ( $\lambda_{max}$ ) for each matrix are then calculated using Super Decisions software. The  $\lambda_{max}$  value is an important validating parameter in AHP. It is used as a reference index to screen information by calculating the consistency ratio CR (Saaty, 2000) of the estimated vector in order to validate whether the pair-wise comparison matrix provides a completely consistent evaluation. The consistency ratio is calculated as per the following steps:

- 1) Calculate the eigenvector or the relative weights and  $\lambda_{max}$  for each matrix of order  $n$
- 2) Compute the consistency index for each matrix of order  $n$  by the formulae:  

$$CI = (\lambda_{max} - n) / (n - 1)$$
- 3) The consistency ratio is then calculated using the formulae:  

$$CR = CI / RI$$

Where, RI is a known random consistency index obtained from a large number of simulation runs and varies depending upon the order of matrix. The value of CR is equal to, or less than that value, it implies that the evaluation within the matrix is acceptable or indicates a good level of consistency in the comparative judgements represented in that matrix. In contrast, if CR is more than the acceptable value, inconsistency of judgements within that matrix has occurred and the evaluation process should therefore be reviewed, reconsidered and improved. The hierarchical structure developed in this study is a four-level hierarchy in which the top level represents the goal of the problem and the last level consists of the alternative companies. The second level of the hierarchy contains the general criteria which are usually considered in selecting companies at the third level, these criteria are decomposed into various sub-criteria that may affect the company selection.

### The variables given below are detailed as follow

- Pension schemes signify that each individual insurance company offers one or more pension schemes as per the competitive market and customer requirements depending on the no of pension schemes offered and tenure of investment by the individual.
- Returns shows that what each particular pension product gives a certain amount
- Market returns depending upon the premium invested in the market. So depending upon these returns an individual opts for a particular pension plan. They also focus on the regular guaranteed return of the principle amount invested at least and the internal rates of return from the policies.
- Investment pattern points to the options of investment provided by pension fund managers of insurance company to the individual. It's a combination of investment either in the equity or corporate bonds or government securities. Basically what we state as the risk, balance and secure investments. It also signifies whether an individual opts for a single premium or regular premium.
- Pension benefit flexibility signifies each company's own pattern of providing pension, like one may opt for a lump sum take home whereas some may opt for monthly pension. Among the best pension benefit flexibility comes the choice of retirement age, holding option as to how long an individual can hold a policy even after the maturity of the policy and certain other pension services.
- The overall AHP hierarchy is provided in Figure. 3 below.

### Determination of importance of weights of the attributes

We have used the Analytic Hierarchic Process (AHP) for determining the importance weights of the attributes. The basic assumptions that we have made are the following:

- Employees/Customers are taking single policy from the insurance providers.
- All the attributes (criteria) are assumed to be independent of one another.

A detailed model is shown in the diagram below with goals, criteria and sub criteria mentioned in hierarchical order. In the conventional AHP, the pairwise comparisons for each level

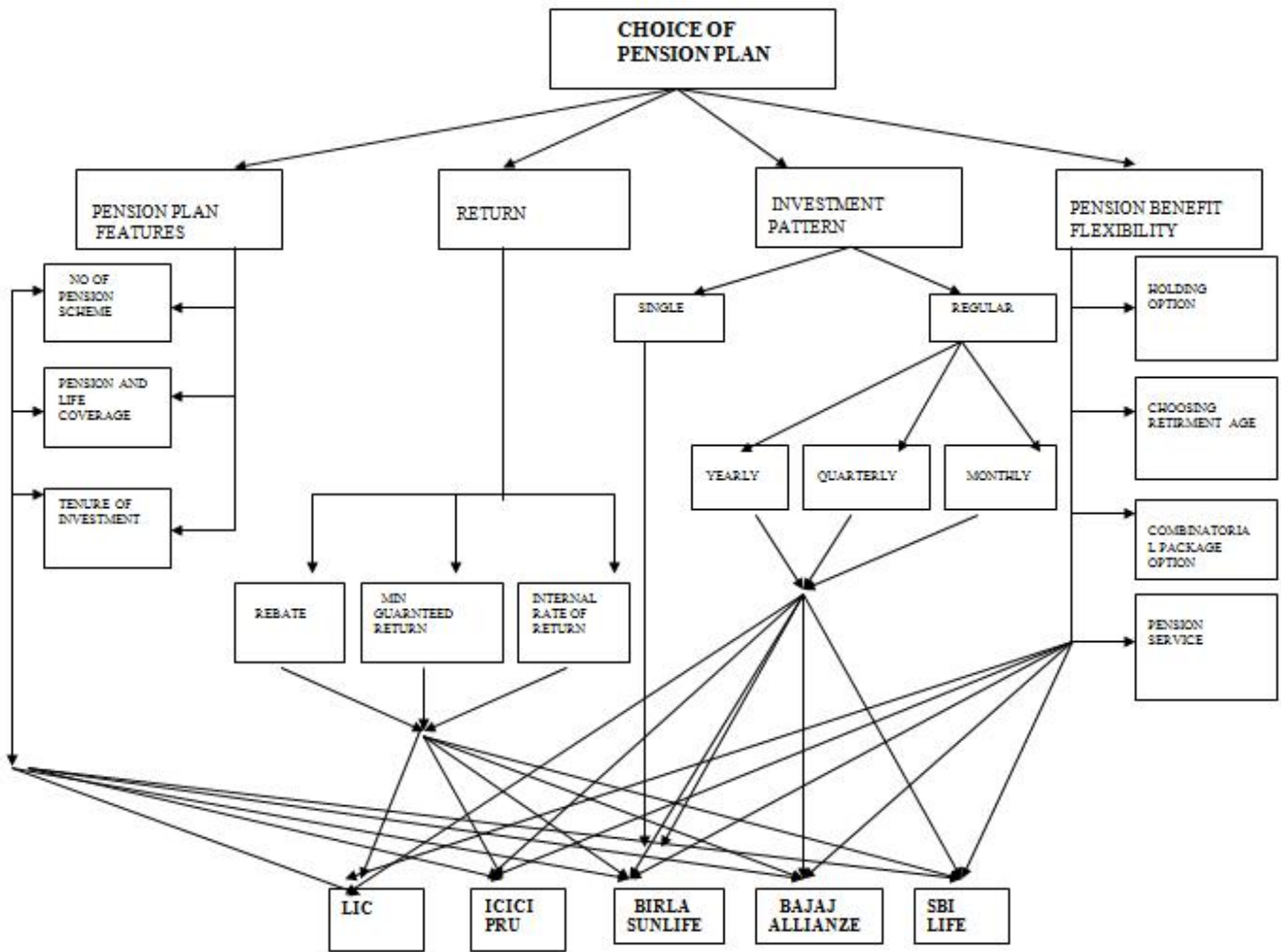


Fig. 3. Cumulative market share

with respect to the goal of organization satisfaction are conducted using a nine-point scale. Each pairwise comparison represents an estimate of the priorities of the compared organization requirements. The nine-point scale (1 to 9) developed by Satty (1980) expresses preferences between options then these preferences are translated into pairwise weights of 1 to 9 respectively to make the structure of the  $m \times n$  matrix (where m is the number of alternatives and n is the number of criteria).

$$A_{AHP-SCORE} = \max_i \sum_{j=1}^n a_{ij} w_j, \quad \text{for } i = 1, 2, 3, \dots, m. \quad (1)$$

And  $\sum_{i=1}^n a_{ij} = 1$  where,  $a_{ij}$  is the performance value (for  $i = 1, 2, 3 \dots, m$  alternatives and  $j = 1, 2, 3, \dots, n$  criterion) and  $w_j$  is the criteria weights (decision matrix).

The nine-point scale (1 to 9) developed by Satty (1980) are crisp real numbers. However, organization requirements always contain ambiguity and multiplicity of meaning. The descriptions of organization requirements are usually linguistic and vague. Furthermore, it is also recognized that human assessment on qualitative attributes is always subjective and thus imprecise. Therefore, conventional AHP seems inadequate to capture organization requirements explicitly and determine

the importance weights of organization requirements accurately (Deng, 1999; Kwong and Bai, 2002; Erensal 2006).

**Analysis and Interpretation**

As per the table above the total weights of the above criteria is coming 1 which means that the views given by experts during the process of questionnaire survey is almost accurate and a weightage of 1 denote that each and every criteria has been compared with all nodes and all alternatives and there is no criteria or node missed out without being compared. This denotes a perfect pair wise comparison which is the main objective of AHP, to do pair wise comparison.

**Final score of the insurance companies (in terms of ranking)**

The overall synthesized priorities of the alternatives:

SCORE:

Name	Ideals	Normal	Raw
1. LIC	0.447600	0.102048	0.030195
2. ICICI Pru	0.997332	0.227382	0.067280
3. Birla Sun life	1.000000	0.227990	0.067459
4. Bajaj Allianz	0.997883	0.227507	0.067317
5. SBI life	0.943340	0.215072	0.063637



POLICY DECISION	CLUSTER	RELATIVE WEIGHT	CRITERIA	RELATIVE WEIGHT	SUB CRITERIA	RELATIVE WEIGHT	GLOBAL WEIGHT USING AHP			
	PENSION SCHEMES	0.064		No of pension schemes	0.070			0.004		
Pension + Life coverage				0.348						
Tenure of investment				0.582						
RETURNS		0.298		Rebates or discounts	0.634			0.18		
				Minimum guaranteed return	0.174					
				IRR	0.192					
INVESTMENT PATTERN	0.475		Single	0.200			0.09			
			Regular	0.800				Yearly	0.659	0.25
								Quarterly	0.156	0.06
								Monthly	0.185	0.07
PENSION BENEFIT FLEXIBILITY	0.163		Choosing retirement age	0.382			0.06			
			Holding option							
			Combinatorial package Option	0.076				0.01		
			Pension services	0.304				0.05		
	0.238	0.04								
						<b>Total</b>	<b>1.00</b>			

As per the final score of the companies we find that Birla sun life ranks the highest score followed by Bajaj allianze and ICICI pru. These scores are based on the rankings that we get by taking the weights of the particular criteria and then comparing with all policies and companies concerned and then arrive at this figure. So from the investors point of view its best to invest in birla sunlife looking into all the criterias and sub criteias and returns concerned.

**Conclusion**

The analysis and findings depict that from the investor’s viewpoint, birla sunlife is the best investment option to be made. The policy features, its investment returns and the flexibility that the company offers is most suitable for an investor. The analysis above is done through AHP and companies are ranked as per the assignment of weights and conclusion is deduced that not all companies are best only in terms of their returns they provide but also policy features and

flexibility plays an important role. The impact that the pension reform has towards the insurance companies pension products is depicted as to the more number of investors opting for pension products after the reform in India 2004. But most important is whether birla sunlife is providing sufficient returns in terms of being the best from all insurance companies as compared to other insurance companies in developed nations is a scope for further research.

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## APPENDIX

Super Decisions Main Window: PENSION11.mod: Cluster Matrix View								
Cluster Node Labels	Alternatives	Criteria	Investment Pattern	Pension Benefit Flexibility	Pension scheme	Policy decision	Regular	Returns
Alternatives	0.000000	0.000000	0.500000	1.000000	1.000000	0.000000	1.000000	1.000000
Criteria	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000
Investment Pattern	0.000000	0.067532	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Pension Benefit Flexibility	0.000000	0.163970	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Pension scheme	0.000000	0.327201	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Policy decision	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Regular	0.000000	0.000000	0.500000	0.000000	0.000000	0.000000	0.000000	0.000000
Returns	0.000000	0.441298	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Done								

\*\*\*\*\*