Mathematical and Statistical Methods for Insurance and Finance

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I.INTRODUCTION

Mathematical finance, also known as **quantitative finance**, is a field of applied mathematics, concerned with financial markets. Generally, mathematical finance will derive and extend the mathematical or numerical models without necessarily establishing a link to financial theory, taking observed market prices as input. Mathematical consistency is required, not compatibility with economic theory. Thus, for example, while a financial economist might study the structural reasons why a company may have a certain share price, a financial mathematician may take the share price as a given, and attempt to use stochastic calculus to obtain the corresponding value of derivatives of the stock (*see: Valuation of options; Financial modeling*). The fundamental theorem of arbitrage-free pricing is one of the key theorems in mathematical finance, while the Black–Scholes equation and formula are amongst the key results.[1]

II.RESEARCH METHODOLOGY

Statement of the problem

An attempt was made by the researcher to analyses the consumers perception in relation to life insurance in Mumbai city. This Study will help us to understand the consumer's perception about life insurance companies also and thus it will focus on how companies should understand consumer needs how consumer selects, organizes and interprets the Quality of service and product offered by life insurance companies.
The thought that consumers prefer one product or one service over a new is not new. Hence the capability to recognize and calculate the elements of such inclination decisions is the research of the study.

Objectives of the study

To have an insight into the attitudes and behaviors of customers in reference to purchase of life insurance policy.
To study whether Income play a decisive role in consumers preferring insurance over other investment opportunities.

Scope of the study

This study is limited to the consumers within the limit of Mumbai city.

Research instrument

The researcher has made an attempt to construct a structured instrument for research and for the same purpose a structured Questionnaire has been designed as a research instrument.
For this project report, Questionnaire method was adapted to analyze the consumer's preference behavior and their motive for purchasing a life insurance policy.

Method of data collection

Data collection is an important aspect of any type of research study. The design of the data collecting method is backbone of research design. Data can be obtained by two different types of data collection method.

Primary Method by Questionnaire
Secondary Method by references

Sampling design

Target Population: Audience of Mumbai city.
Sample Size: 794 consumers
Sampling Method: The sampling method used to find the objectives is simple random sampling method.

Need for the study

The deeper the understanding of consumer's needs and perception, the earlier the product is introduced ahead of competitors, the expected contribution margin will be greater .Hence the study is very important.Consumer markets and consumer buying behavior can be understood before sound product and marketing plans are developed.This study will help companies to customize the service and product, according to the consumer's need.This study will also help the companies to understand the experience and expectations of the existing customers.

Research design

Research design used here is explanatory research and descriptive research.

Hypothesis

Ho: Income does not play a decisive role in consumers preferring insurance over other investment opportunities.

H1: Income does not play a decisive role in consumers preferring insurance over other investment opportunities.

Research limitation

Only the city of Mumbai is considered because of limited time.The sample size is only 80, due to limited time which is very less.A lot of respondents could not completely fill the questionnaire due to lack of time and lack of knowledge because many of the respondents were teenagers.The results may not be accurate due to lack of positive attitude.

III. DATA ANALYSIS AND INTERPRETATION

To test the hypothesis given below, chi square test of independence was used

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H1: Income does not play a decisive role in consumers preferring insurance over other investment opportunities.

Table 3.1

Consumers Preferring Insurance		Income					Total
		Dependent	Up to 20,000	20,001-40,000	40,001-60,000	Above 60,000	
No	Count	169	102	87	55	69	482
	% within Income	59.7%	83.6%	68.5%	57.9%	48.9%	62.8%
Yes	Count	114	20	40	40	72	286
	% within Income	40.3%	16.4%	31.5%	42.1%	51.1%	37.2%
Total	Count	283	122	127	95	141	768
	% within Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Survey

Chi-Square Test
Table 3.2

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.090(a)	4	.000
Likelihood Ratio	40.706	4	.000
Linear-by-Linear Association	6.420	1	.011
N of Valid Cases	768		

The above hypothesis is tested at 5% LOS

P value = 0.000
Since p= 0.00 < 0.05 therefore Null hypothesis is Rejected by the Researcher.
Thus Researcher concludes that Income does a play a decisive role in consumers preferring insurance over other investment opportunities.

Prominent factors which are preferred for other investment opportunities over insurance over

Table 3.3

Capital Availability	Gender	N	Mean	Std. Deviation	Std. Error Mean
	Male	455	3.93	1.018	.048
	Female	339	3.72	1.074	.058
Herd mentality	Male	455	4.04	.853	.040
	Female	339	3.97	.977	.053
Competitiveness	Male	455	3.24	1.038	.049
	Female	339	3.37	.998	.054
Regulatory Environment	Male	455	2.84	1.080	.051
	Female	339	2.91	1.062	.058
Risk	Male	455	4.18	.880	.041
	Female	339	4.04	.911	.049
Openness to Regional and International Trade	Male	455	2.39	1.179	.055
	Female	339	2.40	1.193	.065
Market trend	Male	455	3.89	.967	.045
	Female	339	3.90	.922	.050
Stability	Male	455	4.20	.805	.038
	Female	339	4.09	.855	.046
Steady Income	Male	455	4.19	.806	.038
	Female	339	4.09	.871	.047
Easy installments	Male	455	3.93	.971	.046
	Female	339	3.81	1.038	.056
Return on Investment	Male	455	3.97	.982	.046
	Female	339	3.81	1.028	.056
Non-financial factors	Male	455	3.11	.610	.029
	Female	339	3.17	.583	.032

Source: Survey

Independent Samples Test

Table 3.4

	t-test for Equality of Means		
	T	Df	Sig. (2-tailed)
Capital Availability	2.717	706.349	.007
Herd mentality	1.028	669.865	.304
Competitiveness	-1.733	792	.084
Regulatory Environment	-.887	792	.375
Risk	2.053	792	.040
Openness to Regional and International Trade	-.022	792	.982
Market trend	-.098	792	.922
Stability	1.855	792	.064
Steady Income	1.802	792	.072
Easy installments	1.651	792	.099
Return on Investment	2.204	709.509	.028
Non-financial factors	-1.390	792	.165

The researcher has made an attempt to find the prominent factors which are responsible for prominent factors which are preferred for insurance over other investment opportunities.

The first table gives mean ratings given to factors by males and females. The second table gives significance of difference.

From the above table p value for Capital Availabilityis 0.007 which is significant at 5% LOS.

Since p <= 0.05 the difference between ratings of males and females is significant. Therefore Capital Availabilityis significant factor for choosing aninsurance over other investment opportunities.

Similarly Competitiveness, Regulatory Environment,Risk, Stability, Steady Income, Easy installments and Return on Investment are significant factors for choosing an insurance over other investment opportunities.

IV. FINDINGS

1. Income does a play a decisive role in consumers preferring insurance over other investment opportunities.

2. The main reason for not investing in insurance is that returns are not that lucrative enough.

3. Many of the insurance policies are taken with the help of notification from newspapers, followed by internet, friend, and so on.

4. The most important motive behind purchase of life insurance is steady income for future, followed by pension and financial security for family.

5. According to the study 58.75% of the people are satisfied with their existing plan.

6. 28.75% of people go for endowment/money back/ pension plan, and then 23.75% for whole life insurance plan and so on.

7. With reference to the study made 70% of the people invest in banks then 30% of the people invest in life insurance.

8. 27.50% of the sample population have rated life insurance at average.

9. Income, Competitiveness, Regulatory Environment,Risk, Stability, Steady Income,Easy installments and Return on Investment are significant factors for choosing an insurance over other investment opportunities.

V. RECOMMENDATIONS AND CONCLUSIONS

Recommendations

1. Life insurance should be made quite affordable for lower income levelled people. Rates for returns should be revised and made lucrative enough.

2. Advertisement should made more through T.V as people are not getting more informed by T.V.

3. 58.75% of the people are satisfied with the insurance plan. 41.25% are not satisfied with the insurance plan.

4. 28.75% of the people prefer money back/endowment/pension plan. Then 23.75% of the people prefer whole life insurance plan.

5. Out of 100% of the sampled population 70% people would prefer to invest in banks and 30% would like to invest in life insurance.

6. According to high income level 27.50% of people have rated as life insurance as average. And 26.25% of people have rated life insurance as very good.

Conclusion

Since there are many players in the Indian Insurance Market the competition level is very high. So the companies are introducing new schemes. From this it is found that The LICis the major market share holder in the insurance field. Even if there are many players inthis field still it is an untapped market. Only a few portion of Indian population is insured.

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