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Research Article

Regression Analysis and Structural Equation Modelling with respect to Factors of CRM in Life Insurance Corporation India

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Abstract

This paper presents a Regression Analysis and a Structural Equation Model of the Customer Relationship Management in LIC India based on a study conducted among 400 policy holders of LIC India, selected from three districts in Tamil Nadu coming under Southern Region of LIC India. The sample size was arrived at based on a pilot study and subsequently applied statistical techniques. The selection of the sample from the policy holders in the eight branches was made using probability sampling technique, random sampling. Statistical package SPSS was used for regression analysis and developing the model. The regression equation showing the strength of the relationship of the variables of CRM and a model which is found to be a perfect fit are developed.

Keywords: *CRM, regression, structure equation model.*

Introduction

CRM is now a day's being practiced by organizations as part of its strategy, customized to manage and administrate its customers and vendors in an efficient manner, for achieving excellence in its business operations. The ultimate task in retaining a customer is the generation of satisfaction in the mind of the customer. The term CRM has evolved from relationship marketing. Customer Relationship Management is defined by researchers as follows

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Customer Relationship Management (CRM) is defined by Parvatiar and Sheth (2001) as a comprehensive strategy and process of acquiring, retaining and partnering with selective customers to create a super value for the company and its customers.

Chen and Popovich (2003) described CRM as the strategy of generating profits through amalgamation of business practices with technology, fulfilling customer needs and wants and maintaining long lasting relationships.

With the advent of policy changes in the insurance sector made by government of India, the foreign investment in the sector was encouraged. This paved the way for increasing competition in the sector and the public sector corporation LIC of India, which was having a more or less a monopoly status, had to tune its operations to meet the new challenges regarding acquisition, retention of customers enhancing customer satisfaction. For the implementation of an effective CRM practices, involvement of all the employees from bottom to top is essential in creating a long term customer value to the company. Hence it is found worthwhile to probe into the CRM practices in LIC India as it is in a level playing ground with private service providers.

Scope of the Study

The study is conducted based on perception of the policy holders and is limited to the three districts of Tamil Nadu, namely Tirunelveli, Thoothukudi and Kanyakumari. The study is confined to eight branches of LIC India in those districts.

Objectives

This paper is developed with the following objective.

i. To conduct a regression analysis to understand the strength of the relationship of variables.

Of CRM practices in LIC of India.

ii. To bring out Structural Equation Model as regards to the CRM practice in LIC.

Methodology

This paper forms the part of a major research study relating to the CRM practices in LIC India. The data collected reflected the perception of the LIC policy holders. The study was carried out by selecting 400 sample policyholders from the Southern region of LIC India, particularly from the districts of Tirunelveli, Kanyakumari and Thoothukudi, defining the population as the number of policy holders in the eight branches of those districts.The sample size was arrived based on statistical procedures and the selection of samples was with the

application of random sampling technique. The statistical package SPSS was used for developing the Structural Equation Model.

Literature Review

Customer Relationship Management is gaining momentum in the present-day competitive world. Ganesan and Rajagopalan (2004) revealed that againing momentum in the present-day competitive world. Executed CRM strategies could result in a number of quantitative benefits to the organisations, such as enhancing the ability to cross sell, improving customer retention and reducing the cost of services. Plessis M.D. and Boon J (2004) stressed the need for transforming information into customer knowledge. Reinarts W., et.al (2004) stressed the need for a strong organizational structure which can communicate the CRM strategies and underlying benefits effectively. Christos Sarmaniotis, et.al (2006) described that strategic issues relating to CRM were concerned with Customers' significance and Customers' value and also the marketing efforts directed towards the customers. Timothy Bohling.et.al, (2006) observed that successful application of CRM depended upon factors ranging from customers to business strategies and cooperation between employees. Ramasesham et.al (2006) described CRM as a process of achieving a continuous dialogue with customers, across all available touch points, through differentially tailored treatment based on the expected response from the customer to the increase in overall profitability of the organisation. KIM B Y., (2008) mentioned the importance to confirm that main purpose behind customer orientation was to ensure long lasting customer satisfaction to create customer loyalty. Dash Biswamohan and Mishra Bidhubhusham (2012) noticed during their study on insurance providers that with the entry of many private sector insurance companies in the market, that the customers are demanding quick and better service. They also pointed out the need for putting the public sector insurance providers also in the same track to face the competition. M V Sreenivasa Rao (2012) stated that that CRM strategy differed from organisation to organisation as the factors of influencing the success varied. According to him communication and training are equally important as deployment of technology.

Analysis and Discussion

The study considered five variables namely i. Attitude of the Employees, ii Knowledge of the Employees iii. Customer Engagement iv. Deployment of Technology and customer Benefits as the major factors of CRM. The strength of the relationship of the independent and dependent variables are assessed using regression analysis and developing the regression equation are described below followed by the SEM model.

Regression Analysis

Regression analysis is performed to determine the statistical relationship between two or more variables. In simple regression two variables two variables are used, one variable (independent) is the cause of the behaviour of another variable (dependent). When there are more than two independent variables the analysis concerning relationship is called multiple correlation and the equation describing such relationship is known as multiple regression equation.

The regression analysis refers to the derivation of an appropriate mathematical expression, which is derived for finding values of a dependent variable on the basis of independent variables. The regression equation is so designed to examine the relationship of a variable Y to a set of variables X_1, X_2, X_3, X_4, ---------- X_n. The linier regression equation is expressed as, $Y=b_1X_1 +b_2X_2 +----------+b_n X_n +b_0$

Where Y is the dependent variable to be predicted, X_1, X_2, X_3 ----------X_n are known independent variable to be used for predicting and b_1, b_2, -----b_n are coefficient of the variables.

Here the dependent variable is Customer satisfaction and independent variables are Factors of CRM.

Dependent Variable	Customer Satisfaction
The independent variables	Attitude
	Knowledge
	Customer Engagement
	Deployment of Technology
	Customer Benefits
Multiple R Value	0.782
R- Square Value	0.611
F Value	123.638
p-value	<0.001**

Table 1.

Regression Analysis

Dependent Variable: Customer Satisfaction					
Variables	Unstandardized Coefficient		Unstandardized Coefficient Beta	t-value	p-value
	B	Standard Error			
(Constant)	1.317	0.818		1.610	0.108
Attitude	0.209	0.046	0.194	4.500	<0.001**
Knowledge	0.254	0.047	0.250	5.369	<0.001**

Customer Engagement	0.109	0.050	0.106	2.176	0.030*
Deployment of Modern Technology	0.111	0.036	0.131	3.048	0.002**
Customer Benefits	0.262	0.045	0.280	5.778	<0.001**

** denotes significant at 1% level

* denotes significant at 5% level

The multiple correlation coefficient is 0.782 which measurers the degree of relationship between the actual values and predicted values of Customer satisfaction. Since the predicted value is obtained as a linear combination of Attitude (X_1), Knowledge (X_2), Customer engagement (X_3), Deployment of Modern Technology (X_4), and Customer Benefits (X_5), the correlation coefficient value of 0.782 indicates that the relationship between Customer Satisfaction and the five independent variables is quite strong and positive.

The Coefficient of Determination R -Square measures goodness of fit of the estimated Sample Regression Plane (SRP) in terms of the proportion of the variation in dependent variables fitted by the sample regression equation. Thus, the value of R-square is 0.611 which simply means that 61.1 percent of the variation in Customer Satisfaction is explained by the estimated SRP that uses Attitude, Knowledge, Customer engagement, Deployment of Modern Technology, and Customer Benefits as independent variables and R square value is significant at 1% level.

The Multiple Regression Equation is

$$Y=1.317 + 0.209\ X_1+0.254\ X_2 + 0.109\ X_3 +0.111X_4 +0.262X_5$$

Here the Coefficient of X_1, i.e. 0.209, represents the partial effect of Attitude on Customer Satisfaction, holding the other variables constant. The estimated positive sign implies that such effect is positive that the Customer Satisfaction would increase by 0.209 for every unit increase in Attitude and this coefficient value is significant at 1% level. The Coefficient of $X_2$is 0.254, which represents the partial effect of Knowledge on Customer Satisfaction, holding the other variables as constant. The estimated positive sign implies that such effect is positive that the Customer Satisfaction would increase by 0.254 for every unit increase in Knowledge and this coefficient value is significant at 1% level. The Coefficient of X_3 is 0.109, which represents the partial effect of Knowledge on Customer Satisfaction, holding the other variables as constant. The estimated positive sign implies that such effect is positive that the Customer Satisfaction would increase by 0.109 for every unit increase in Customer Engagement and this coefficient value is significant at 5% level. The Coefficient of X_4 is

0.111, which represents the partial effect of Deployment of Modern Technology on Customer Satisfaction, holding the other variables as constant.The estimated positive sign implies that such effect is positive that the Customer Satisfaction would increase by 0.111 for every unit increase in Deployment of Modern Technology and this coefficient value is significant at 1% level.The Coefficient of $X_2$is 0.254, which represents the partial effect of Customer Benefits on Customer Satisfaction, holding the other variables as constant.The estimated positive sign implies that such effect is positive that the Customer Satisfaction would increase by 0.262 for every unit increase in Customer Benefits and this coefficient value is significant at 1% level.

Based on Standardised Coefficient, Customer Benefits (0.280) is the most important factor followed by Knowledge (0.250), Attitude (0.194), Deployment of Modern Technology (0.131) and Customer Engagement (106).

The analysis reinforces the fact that an investor gives prime importance to the benefits expected before deciding on investing in any insurance policy.

Structural Equation Model (SEM) on the Factors of CRM

Structural Equation Model (SEM) is a statistical modelling technique widely used in developing a model as an outcome of a research study. It can be used as a combination of factor analysis and regression analysis or path analysis.

Variable Summary (Group number 1)

The model contains the following variables (Group number 1)

I. Observed, endogenous variables

Attitude (att_tot)

Knowledge(know_tot)

Customer Engagement (eng_tot)

Deployment of Modern Technology (tech_tot)

Customer Benefits (ben_tot)

Customer Satisfaction (CS_tot)

II. Unobserved, exogenous variables

Customer Relationship Management (CRM)

e.1 Error terms for Attitude

e.2 Error terms for Knowledge

e.3 Error terms for Customer Engagement

e.4 Error terms for Deployment of Modern Technology

e.5 Error terms for Customer Benefits

e.6 Error terms of Customer Satisfaction

Variable counts (Group number 1)

Number of variables in the model: 13

Number of observed variables: 6

Number of unobserved variables: 7

Number of exogenous variables: 7

Number of endogenous variables: 6

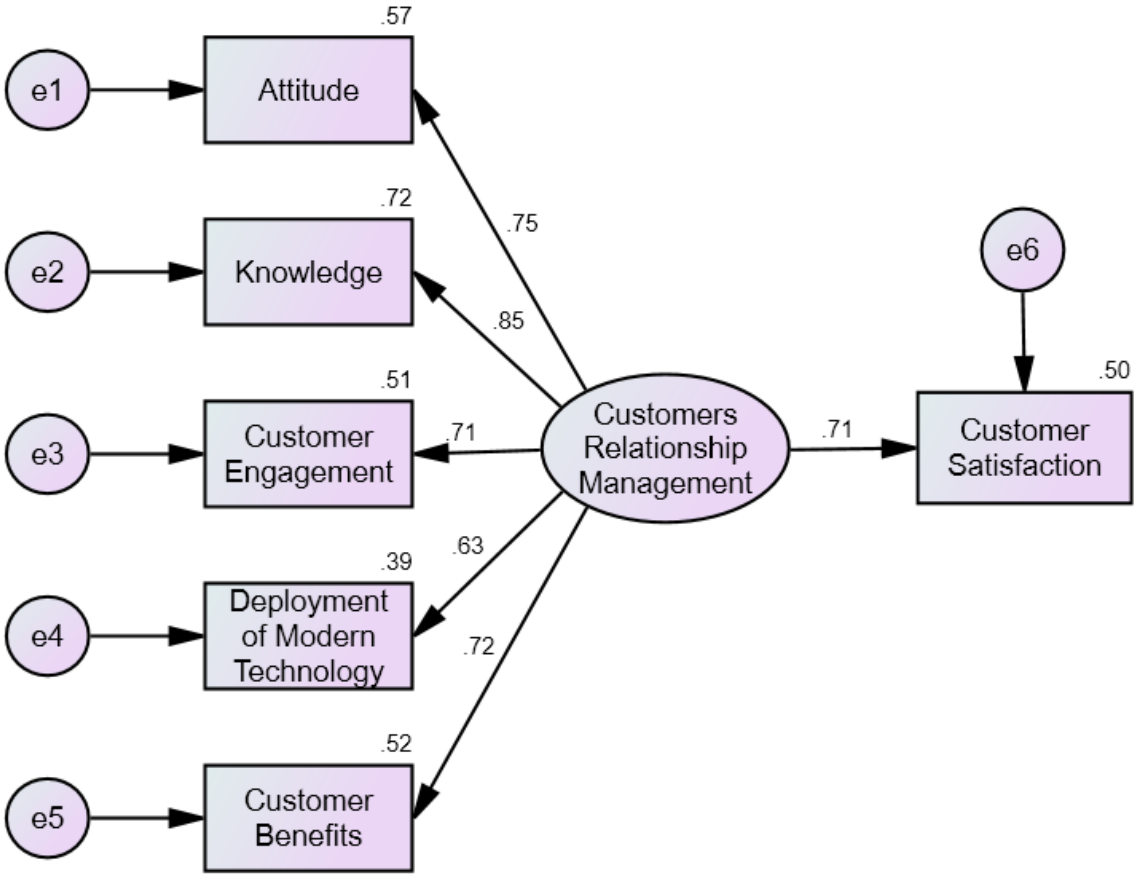

Figure 1. Sem Model

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Table 2.

Variables in the SEM Analysis Regression Weights: (Group number 1 - Default model)

Variables			**Unstandardised co-efficient (B)**	**S.E of B**	**Standardised co-efficient (Beta)**	**t value**	**p- value**
ben_tot	<---	CRM	2.762	0.173	0.723	15.968	<0.001**

tech_tot	<---	CRM	2.900	0.219	0.626	13.221	<0.001**
eng_tot	<---	CRM	2.734	0.175	0.712	15.631	<0.001**
know_tot	<---	CRM	3.744	0.186	0.850	20.147	<0.001**
att_tot	<---	CRM	3.144	0.186	0.754	16.918	<0.001**
CS_tot	<---	CRM	3.166	0.205	0.705	15.430	<0.001**

**denotes highly significant at 1% level

From the above Table Unstandardised Coefficient of CRM on Customer Benefits is 2.762 which represents the partial effect of CRM on Customer Benefits, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that Customer Benefits would increase by 2.762 for every unit increase in CRM and this coefficient value is significant at 1% level.

Unstandardised Coefficient of CRM on Deployment of Modern Technology is 2.900 which represents the partial effect of CRM on Deployment of Modern Technology, holding the other path variables as constant. The estimated positive sign implies that such effect is positive thatDeployment of Modern Technology would increase by 2.900 for every unit increase in CRM and this coefficient value is significant at 1% level.

Unstandardised Coefficient of CRM Customer Engagement is 2.734 which represent the partial effect of CRM on Customer Engagement, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that Customer Engagement would increase by 2.734 for every unit increase in CRM and this coefficient value is significant at 1% level.

Unstandardised Coefficient of CRM on Knowledge is 3.744 which represents the partial effect of CRM on Knowledge, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that Deployment of Knowledge would increase by 3.744 for every unit increase in CRM and this coefficient value is significant at 1% level.

Unstandardised Coefficient of CRM on Attitude is 3.144 which represents the partial effect of CRM on Attitude, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that Deployment of Attitude would increase by 3.144 for every unit increase in CRM and this coefficient value is significant at 1% level. Unstandardised Coefficient of CRM on Customer Satisfaction is 3.166 which represents the partial effect of CRM on Customer satisfaction, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that Customer Satisfaction would increase by 3.166 for every unit increase in CRM and this coefficient value is significant at 1% level.

Based on Standard Coefficient CRM on Knowledge (0.850) is the most influencing path in the SEM model followed by CRM on Attitude (0.754), CRM on Customer Benefits (0.723), CRM on Customer Engagement (0.712), CRM on Customer Satisfaction (0.705), and CRM on Deployment of Modern Technology (0.626).

For the purpose of testing the hypothesis is framed as follows.

Null Hypothesis H_0:The hypothesised model has a good fit.

Table 3.

Model Fit Summary of SEM

Indices	Value	Suggested Value
Chi-Square Value	32.335	
DF	9	
Chi-square value/DF	3.593	<5.00(Hair e.t.al .1998)
GFI	0.921	>0.90(Hu and Bentler. 1999)
AGFI	0.917	>0.90(Hair et.al. (2006)
CFI	0.922	>0.90(Daire et.al. 2008)
RMR	0.068	<0.08(Hair et.al. 2006)
RMESA	0.056	<0.08(Hair et.al. 2006)

From the Model Fit Summary of SEM shown in above Table, it is seen that the calculated value of Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) are greater than 0.9, indicating a good fit. The calculated Comparative Fit Index is greater than 0.9 recording a perfect fit and the Root Mean Square Residual (RMR) value is less than 0.08 and the Root Mean Square Error of Approximation (RMESA) value is also less than 0,08, both indicating a perfect it.

The aim of developing SEM is to understand the effects of factors of CRM on Customer Satisfaction in the operations of LIC. The study affirms and develops an instrument to find out the intensity of each factor of CRM in contributing to the customer satisfaction. Based on the viability and statistical significance of the important parameter estimates it can be stated the model represents a brief account of the present study. The model can be very well employed by LIC in further strengthening of the CRM practices for enhancing the Customer Satisfaction.

Findings

The analysis reveals the fact that the first and foremost thing is Customer Benefits while deciding upon the selection of an insurance service provider. The human factors which mostly influences CRM practices are the attitude of employees to the customer and level of knowledge of the employees as regards to the products and the service of the company. For

an effective communication with customers strengthening the above factors are highly essential. Any gap in those aspects in meeting customer expectations can be filled up by providing proper training to the employees. The Regression equation obtained as an outcome of multiple regression analysis shows the degree of relationship between the dependent and independent variables identified for the study. The Structural Equation Model is perfect fit and depicts the strength of each variable of CRM in contributing to the customer satisfaction.

Conclusion

The study highlights the relationship of variables of CRM practices in LIC of India and presents a SEM model incorporating the study variables and its effects on enhancing Customer Satisfaction. There is further scope for expanding the study to more branches and districts in the Southern Region and also to other regions coming under LIC of India.

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