

Predicting Financial Literacy Level in Vuca World: A Case of Indian Retail Individual Investors

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Abstract: *This study attempts to assess the financial literacy level of retail individual investors (RIIs) of Gujarat, India. The performance test was used as a data collection instrument to measure the financial literacy level RIIs. The median percentage of correct answer of the sample was considered to frame the financial literacy level and classify the investors into two sub groups. Out of total 385 respondents, 40.78% of the respondents are considered as investors with a higher level of financial literacy and 59.22% of respondents are considered as investors with a relatively lower level of financial literacy. The effect of investors' demographic and socio-economic variables on their financial literacy was measured through binomial logistic regression. The study found that investors' gender, age, monthly income, stage of life cycle, type of workplace activity, number of times shop around, and years of investment experience are found to be significant predictors of their financial literacy. Current education level is found to be non-significant predictor of financial literacy. This specific finding asks policy makers and government to educate the investors on the topic of personal finance.*

Keywords: *Financial literacy, demographic and socio-economic variables, binomial logistic regression, retail individual investors.*

I. Introduction

The current global economic crisis has sparked a heightened awareness of the importance of financial literacy and the need for financial education. In VUCA world, the need for financial skills has grown rapidly over the last decade because financial markets have been deregulated and credit has become easier to obtain as financial institutions compete with other for better market share, leading to an increase in spending and a rapid rise on both personal and household debt levels. The growing complexity of financial products, coupled with financial innovations, and the increasing transfer of financial risk to households have put enormous pressure and responsibilities on households for future financial security. The result is a myriad of financial products often with incomprehensible features and services, leaving many people ill-equipped to cope up with the sophisticated financial needs. This rapidly changing economic climate makes personal money management more challenging than ever before.

Financial illiteracy or low of financial literacy is resulted into the lack of healthy financial ways of thinking, lack of necessary financial knowledge and difficulties in applying financial knowledge. Financially illiterate individual either voluntarily do financial exclusion or will get the financial information from unreliable sources, the analysis of which may be resultant into the misallocation of private wealth can cause social decline and increase public expenditure in the form of social security. Absence of this knowledge and skill pose a variety of risk to individual, societal and economy as a whole.

Consequently, economies around the world increasingly consider financial literacy as a key pillar for the development of sound financial systems. In the last decade, financial literacy has gained the attention of policy makers, regulators, governments, and several other organizations. Substantial efforts have been made and resources have been developed by the financial education providers to promote financial literacy through a multitude of financial education programs. The crucial challenge faced by financial education providers is how to ensure that knowledge transferred through financial education programs translates into increased financial literacy and subsequent financial behavior by providing continuous information and knowledge.

In India, policy makers have recognized financial literacy as an essential life skill. Developing and promoting financial literacy through financial education has become an important policy priority to complement financial consumer protection, inclusion and prudential regulation. Several organizations jointly work to deliver financial education including regulatory authorities, banks, NGOs, financial planners; financial services institutions, self-regulatory organizations, employers, and so on. In India, the government has set up the Investors Education and Protection Fund (IEPF) with the objective to support activities relating to investor education, awareness and protection. The role of IEPF is to educate, empower and protect investors by equipping them with information and fundamental knowledge and skills to evaluate their saving/investment/credit options,

and enabling them to understand the implications of alternative financial decisions. At present, there is no baseline data available in the Indian context with regard to financial literacy, even though efforts to promote financial literacy through financial education have been going on for several years. Accordingly, the key research questions for this study are framed. Firstly, what is present level of financial literacy of retail individual investors? Secondly, do demographic and socio-economic variables are significant predictors of their existing level of financial literacy? Thirdly, how to predict the investor financial literacy based on the demographic and socio-economic variables? Attempting these research questions, this study may provide useful insight to those who are in the field of financial literacy. This paper continues with a review of literature, research methodology, discussion on data analysis and results of this empirical study. The paper concludes with the discussion on academic and practical implications of the study, and also provides directions for further research.

II. Review Of Literature

UNESCO (2003) proposed an operational definition that attempted to encompass the several different dimensions of literacy. It had defined literacy as an “ability to identify, understand, interpret, create, communicate, compute and use printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential and to participate fully in their community and wider society” (p. 13). The term literacy is one that has been adopted by practitioners from a variety of backgrounds. Accordingly, Noctor, Stoney and Stradling (1992) have introduced, conceptualized and defined the term ‘financial literacy’ as “the ability to make informed judgments and to take effective decisions regarding the use and management of money” (p. 4). Hogarth (2002) stated that “personal financial literacy is the ability to read, analyze, manage and communicate about the personal financial conditions that affect material well-being”. Review of literature claims that the researchers in the field of financial behavior have given more in-depth description to the word “financial literacy”.

Over the last several years, the issue of financial literacy and financial education has risen on the agendas of educators, community groups, businesses, government agencies, organizations, and policy makers. A number of researches have also been done in the past, on the issue of financial education, either from a policy perspective or a pragmatic perspective as may be considered as the ultimate pillar of any financial system, as it complements the important aspects like greater transparency, policies on consumer protection and regulation of financial institutions.

The prior research has shown that the level of financial literacy varies with demographic and socio-economic variables of people. For example, on the variable of **gender**, female are less financially literate than male (Chen & Volpe, 2002; Beal & Delpachitra, 2003; OECD studies, 2005; Hussein et al., 2009), female are less knowledgeable in some areas of personal finances (Danes & Hira, 1987; Chen & Volpe, 1998) and women experience more problems in managing their finances than men (Martinez, 1994; Lewin, 1995). With regard to **age**, prior studies found that not only those who are under the age of 30 years (Chen & Volpe, 1998; Commonwealth Bank Study, 2004; OECD (U.K.) Study, 2005), but also, who are at both the extremes of age profile (ANZ Bank Study, 2003; OECD (Australia) Study, 2005) possess lower financial literacy than others.

There is evident that financial literacy does vary with **education** of an individual. The studies identified those having lower level of education are less financially literate (ANZ Bank Study, 2003; Commonwealth Bank Study, 2004; OECD (Australia & Korean) Study, 2005; Hussain et al., 2009). While on the variables of **monthly income**, those with lower monthly income are found to be less financially literate than those withdrawing higher monthly income (Chen & Volpe, 1998; Beal & Delpachitra, 2003; ANZ Bank Study, 2003; OECD (Australia & U.K.) Studies, 2005). Studies show that the **stage of life cycle** is also one of the important predictors of financial literacy. Past studies found that those who are young single (Chen & Volpe, 1998; ANZ Bank Study, 2003; Commonwealth Bank Study, 2004; OECD (Australia & U.K.) Studies, 2005), single parents (Schegen & Lines, 1996) are less financially knowledgeable than others. Financial literacy of individuals is also influenced by their employment structure (ANZ Bank Study, 2003; Commonwealth Bank Study, 2004; OECD (Australia) Study; Hussain et al., 2009), **years of work experience** they possess (Chen & Volpe, 1998; Beal & Delpachitra, 2003) and **type of workplace activity** in which they are engaged in (ANZ Bank Study, 2008; Hussain et al., 2003).

Studies also found an association between financial literacy and **years of investment experience** (ANZ Bank Study, 2005) and **number of times investors shop around/make inquiry** while investing (ANZ Bank Study, 2005). Prior studies also found that financial literacy does vary with the risk tolerance of individuals (Beal & Delpachitra, 2003). While the prior research has provided evidence that there is an association between individuals’ demographic and socio-economic variables and their financial literacy level. However, there are some limitations. For example, many studies covered selected areas in personal finances, neglecting others. Furthermore, the validity of the survey instruments is questionable because of the limited number of items included in the questionnaires as well as self-assessment questions were also used that leads to overconfident in

the respondents. These limitations are compounded by the fact that many prior studies only report the levels of financial literacy based on certain selected target groups such as college students, retirees etc. and attempted to find their level of financial literacy based on selected demographic variables. None of the previous studies have examined do demographic and socio-economic variables together influence the level of financial of investors. This is particularly important for fastest growing country like India, where there is no baseline data available.

III. Research Methodology

This study was conducted in the state of Gujarat, which is one of the progressive states of India. According to the population census of India (Government of India, 2011), the literacy rate in Gujarat shows an upward trend and is at 79.31%. Of that, male literacy stands at 87.23%, whereas female literacy is at 70.73%. In 2011, the literacy rate in Gujarat stood at 69.14% of which males and females were 78.49% and 57.80% literate, respectively (Government of Gujarat, 2011, p. 30).

In present study, Exploratory and Descriptive research design methods have been used, wherein researcher has explored the financial literacy level of retail individual investors in Gujarat State and then described the impact of their demographic and socio-economic variables on financial literacy level. The non-probability convenient sampling technique was chosen. Retail individual investors (above the age of 18 years) were considered as a population for this study. Sampling unit is an object for which the data being gathered. For this study, all households in the state of Gujarat who make were considered as sampling unit. Sample is an individual. Total sample size of 384 investors. To determine the sample size, researcher has taken 95 per cent level of confidence at 5 per cent tolerance error as population was unknown. Applying the formula of $n = p(1 - p) / (z/e)^2$, it was found that required sample size was 385.

Data collection was done through primary and secondary sources. A detailed questionnaire was prepared and administered on retail individual investors in the State of Gujarat that consists of Performance Test to measure financial literacy level possessed by them. Literature on financial literacy documented that there are two approaches that have been employed to measure financial literacy, firstly, performance test and secondly, self - reported method. Performance tests are principally knowledge based, reflecting conceptual framework and/or construction. Most of the measurement of financial literacy has focused on the cognitive aspects of the concept and what people know or understand about financial matters because “to be financially literate, individuals must demonstrate knowledge and skills needed to make choices within a financial marketplace” (Huston, 2010, p. 309–310). The performance test as a method for measurement of financial literacy is most often conducted using a set of multiple-choice test questions and/or true–false test questions that are included in a larger survey instrument that asks about general or specific financial matters and behaviors (e.g., Hilgert, Hogarth, & Beverly, 2003; Lusardi & Mitchell, 2007; Lusardi, Mitchell, & Curto, 2010).

To measure basic financial literacy level (skills, knowledge, and understanding of basic financial concepts, principles and numeracy that individual should possess), a detailed performance test was prepared containing 20 questions and administered on investors of Gujarat State. Out of these, 13 questions were taken from the scale developed by Maarten van Rooij, Annamaria Lusardi, and Alessie Rob (2009). These questions ranging from numeracy, interest compounding, inflation, time value of money, functioning of stock market, diversification, risk-return trade-off of two assets, risk, money illusion, relationship between investment time horizon and fluctuation, concept of asset allocation, and relationship between interest and asset price. The rest of the seven questions were based on investment concept, financial worth, disposable income, understanding of types of accounts, consumer right and responsibility, knowledge of authority and Know Your Customer (KYC). With the help of these, personal (face to face) interviews of the respondents were performed. Based on the review of literature following research hypothesis was framed.

Ho: There is no significant association between investors’ demographic and socio-economic variables and their financial literacy level.

IV. Data Analysis And Discussion

Table 1 represents the sample profile of the respondents.

Table 1 Profile of Sample

Variables	Categories	Frequency	Percentage (in %)
Gender	Male	305	79.23
	Female	80	20.77
Age Group	18 to 25 years	89	23.11
	26 to 35 years	76	19.74
	36 to 45 years	96	24.93
	46 to 55 years	75	19.48

	56 to 65 years	49	12.72
	66 years and above	0	0.00
Education	Primary	24	6.23
	Secondary	45	11.68
	Higher secondary	46	11.94
	Diploma	29	7.53
	Graduation	119	30.90
	Post-graduation	122	31.70
Monthly Income (in Rs.)	Rs. 10,000 and less	113	29.35
	Rs. 10,001 to Rs. 15,000	99	25.71
	Rs. 15,001 to Rs. 20,000	71	18.44
	Rs. 20,001 to Rs. 25,000	60	15.58
	Rs. 25,001 and above	42	10.90
Stage of family life cycle	Young single	67	17.40
	Young married without children	67	17.40
	Young married with children	95	24.67
	Middle age married with children	101	26.23
	Middle age married without dependent children	33	8.57
	Older married	22	5.71
	Older unmarried	0	0.00
Employment Structure	Full time salaried	228	59.22
	Part time salaried	42	10.90
	Casual	10	2.59
	Self Employed	66	17.14
	Housewife	14	3.63
	Retired	20	5.19
	Unemployed	2	0.51
	Others	2	0.51
Type of workplace activity	Finance related work activity	96	24.93
	Non finance related work activity	279	72.47
	Other	10	2.60
Years of work experience	Less than five	71	18.44
	6 Years to 10 years	63	16.36
	11 years to 20 years	77	20.00
	21 years to 30 years	113	29.35
	More than 30 years	61	15.85
Number of times shop around/make inquiry while investing	Zero	87	22.60
	1 to 3	151	39.22
	4 to 6	111	28.83
	More than 6	36	9.35
Years of Investment Experience	Less than 1	70	18.18
	1 to 5 Years	133	34.55
	5 to 10 Years	104	27.01
	More than 10 Years	78	20.26
Risk Tolerance	Lowest risk tolerance	24	6.20
	Moderate Risk tolerance	69	17.90
	High risk tolerance	140	36.4
	Highest risk tolerance	152	39.50

For measuring financial literacy, investor/respondents' total score was calculated as the percentage of correct answers (Lyons et. al., 2007), by attempting the total twenty questions. The median percentage of correct answers of the sample was considered as a base to frame financial literacy level and/or to classify the subgroups. The respondents with scores above median are considered as respondents with higher financial literacy and hence classified as higher financially literate and respondents with equal and/or below median are considered as respondents with relatively lower level of financial literacy and hence classified as lower financially literate.

Frequency analysis reports values of mean and median percentage of correct scores for the entire survey, calculated on the basis of survey responses collected from each investor (respondent). Results show that on average respondents answered 56.90 questions correctly. The median percentage of correct scores is 56.00.

As explained above, this median percentage of correct scores of the sample was considered to frame financial literacy level and/or to classify the respondents in to different subgroups. The respondents with scores above 56.00 were considered as respondents with higher financial literacy and hence classified as higher financially literate and respondents with the equal and lower than 56.00 were considered as respondents with relatively lower level of financial literacy and hence classified as lower financially literate presents the overall respondents' score on financial literacy test.

The overall results shows that out of 385 respondents 40.78% respondents (n=157) scored higher than the media, which is 56.00, and hence these respondents are considered as investors with higher level of financial literacy. The rest of the 59.22% of respondents (n=228) have scored equal and/or lower than median. These investors are considered as respondents with relatively lower level of financial literacy and hence classified as lower financially literate. The logistic regression was used to identify the effect of these mentioned predictors (independent variables) on financial literacy level (dependent variable). Binary logistic regression is used to check the hypothesis concerning the relationship between two types of variables independent variables are categorical, or a mix of continuous and categorical, and dependent variable is a categorical variable and is divided into two categories. Binomial (or binary) logistic regression is a form of regression which uses binomial probability theory, does not require linearity of relationship between the independent variables and the dependent and does not require normally distributed variables. It helps the researcher to estimate the specific nature of such a relationship and also allows to predict the values of one variable, if we know or estimate the other variables. To check the hypothesis investors' demographic and socio-economic variables such as, investors' age, gender, education, monthly income, stage of family life cycle, employment structure, type of workplace activity, years of work experience, number of times shop around while investing, years of investment experience, and risk tolerance are considered as independent variables and financial literacy level (divided into two categories) considered as dependent variable. To frame a binary logistic regression, the various parameters of model i.e. model chi-square, Omnibus tests of model coefficients, test of significance between independent and dependent variables, strength of relationship model (analyzed with the help of -2LL, Cox & Snell R-square and Nagelkerke R-square), Wald statistics, Exp(B). Finally, to find out "how good/strong the classification model is predicting relationship between independent and dependent variables?" the classification table was analyzed. The coding of variables are presented in Table 2.

Table 2 Study Variables: Dependent and Independent Variables for Logistic Regression

Variables	
Dependent variables (DV)	
Financial Literacy	Categorical variables '0' if respondent possesses lower level of financial literacy, '1' if respondent possesses higher level of financial literacy
Independent (Explanatory) variables (IV)	
Gender	Dichotomous variable '1' for male, '2' for female
Age	Multinomial variable with value of '1' for 18 to 25 years, '2' for 26 to 35 years, '3' for 36 to 45 years, '4' for 46 to 55 years and '5' for 56 years and above (ordinal)
Education	Multinomial variable with value of '1' for primary, '2' for secondary, '3' for higher secondary, '4' for diploma and '5' for graduation, '6' for post-graduation (ordinal)
Monthly income	Multinomial variable with value of '1' for uptoRs. 10,000, '2' for Rs. 10,001 to 15,000, '3' forRs. 15,001 to Rs. 20,000, '4' for Rs. 20,001 to Rs. 25,000 and '5' for Rs. 25,001 and above (ordinal)
Stage in family life cycle	Multinomial variable with value of '1' for young single, '2' for young married without children, '3'for young married with children, '4' for middle age married with children and '5' for middle age married without dependent children, '6' for Older married (ordinal)
Employment structure	Multinomial variable with value of '1' full time salaried, '2' part time salaried, '3'for casual, '4' for self-employed and '5' for housewife and '6' retired, unemployed and others
Type of workplace activity	Dichotomous variable '1' for working in financial (services) related industry, '2' for working in non-financial (services) related industry)
Years of work experience	Multinomial variable with value of '1' for less than 5 years, '2' for 6 to 10 years, '3' for 11 to 20 years, '4' for 21 to 30 years and '5' for years and more (ordinal)
Number of times shops around	Multinomial variable with value of '1' for zero, '2' for 1 to 3 times, '3' for 4 to 6 times, '4' for more than 6 times (ordinal)
Years of investment experience	Multinomial variable with value of '1' for less than 1 year, '2' for 1 to 5 years, '3' for 6 to 10 years, '4' for more than 10 years (ordinal)
Risk tolerance level	Multinomial variable with value of '1' for lowest risk tolerance, '2' for moderate risk tolerance, '3' for high risk tolerance, '4' for highest risk tolerance (ordinal)

The logistic regression was used to identify the effect of each of above mentioned predictors (independent variables/explainable variables) on financial literacy level (dependent variable). Each independent variable has as many parameters as categories, but one is redundant, so, researcher needs to specify a reference category. The equation 1, the coefficients in the regression function represent the effect of each subgroup compared with a reference group, which is arbitrarily selected. For example, for gender, the reference category is male, for age, the reference category is age group of 18 to 25 years; for education, the reference category is Primary, i.e. who has completed primary education; for monthly income, the reference category is first, i.e. the respondents who earn monthly income less than Rs. 10,000. Similarly for stage in family life cycle, the reference category is young single; for employment structure, reference category is respondent who is full time salaried; for type of workplace activity the reference group is respondents working in financial services related industry. Reference category for years of work experience is respondents having a work experience is less than 5 years; for number of times investor shop around while investing, the reference category is first, i.e. zero (respondents who do not shop around at all/ do not make inquiry at all while investing); reference category for years of investment experience is first, i.e. less than 1 year. Reference category for risk tolerance is the first one, i.e. lowest risk tolerant.

Beginning Block: Block 0 (Step 0) presents the results with the constant included before any coefficients (i.e. those relating to independent variables) are entered into the equation. Logistic regression compares this model with a model including all the predictors (independent variables) to determine whether the later model is more appropriate or not. Table 3 suggests that if we knew nothing about the predicted variables under study and guessed that a person would not fall under higher level of financial literacy, then the result would that only 59.2% cases are correctly classified.

Table 3 Classification Table^{a,b}

	Observed		Predicted		
			Level		Percentage Correct
			Low	High	
Step 0	Level	Low	228	0	100.0
		Higher	157	0	0.0
	Overall Percentage				59.2

a. Constant is included in the model.

b. The cut value is 0.56

Table 4 shows, at initial step (i.e. step 0), in the constant model without considering any independent variables in the equation of logistic regression. The significant value is 0.000 ($p < 0.05$). This value permits the researcher to proceed further for defining final model.

Table 4 Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0	Constant	-0.373	0.104	12.943	1	0.000*	0.689

* $p < 0.05$

Once the significance of constant model checked, the researcher has developed the final model by considering all independent variables under study, which may determines the impact of multiple independent variables presented simultaneously to predict membership of one or other of the two dependent variable categories. Further to assess whether each of the independent variables included in the model make a significant contribution to the model, to evaluate the model fit and its significance as well, of the final model of logistic regression, a variety of statistical tests for model fit are performed, as shown below.

Model Chi-square

The overall significance is tested by Model Chi square, which is derived from the likelihood of observing the actual data under the assumption that the model that has been fitted accurately. Two hypotheses were developed to test in relation to the overall fit of the model.

H₀: The predictors do not have significant effect.

As shown in Table 5, model chi square has 39 degrees of freedom, a value of 420.876, with a significant value of 0.000 ($p < 0.05$) ($\chi^2(39) = 420.876, p < .01$). Hence, the null hypotheses is rejected and it is concluded that predictors do have a significant effect, with the model containing only the constant indicating that

the predictors do have a significant effect and create essentially a different model. So, researcher need to look closely at predictors and from the later tests determine whether the independent variables are the significance of predictors.

Table 5 Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	420.876	39	0.000
	Block	420.876	39	0.000
	Model	420.876	39	0.000

The likelihood ratio test is based on -2LL ratio. It is a test of the significance of the difference between the likelihood ratio (-2LL) for the researcher’s model with predictors (called model chi square) minus the likelihood ratio for baseline model with only a constant in it. Significance at the 0.05 level or lower means the researcher’s model with the predictors is significantly different from the one with the constant only (all ‘b’ coefficients being zero). It measures the improvement in fit that the explanatory variables make compared to the null model. Chi square is used to assess significance of this ratio. The significance test for the final model chi-square (after independent variables added) is the researcher’s statistical evidence of the presence of a relationship between the dependent variables and the combinations of the independent variables.

H- L Test

An alternative to model chi-square is the Hosmer and Lemeshow test which divides subject into 10 observed groups of subjects and then compared the number actually in the each group (observed) to the number predicted by the logistic regression model (predicted) (Table 6).

Table 6 Contingency Table for Hosmer and Lemeshow Test

		Level = Low		Level = High		Total
		Observed	Expected	Observed	Expected	
Step 1	1	39	39.000	0	0.000	39
	2	39	38.999	0	0.001	39
	3	39	38.989	0	0.011	39
	4	38	38.883	1	0.117	39
	5	37	37.382	2	1.618	39
	6	31	26.529	8	12.471	39
	7	4	7.699	35	31.301	39
	8	1	0.494	38	38.506	39
	9	0	0.024	39	38.976	39
	10	0	0.001	34	33.999	34

From Table 6, it can be seen that the 10 ordered groups are created based on their estimated probability; those with estimated probability below 0.1 form one group, and so on, up to those with probability 0.9 to 1.0. Each of these categories is further divided into two groups based on actual observed outcome variable (success, failure). The expected frequencies for each of the cells are obtained from model. A probability (p) value is computed from the chi-square distribution with 8 degree of freedom to test the fit of the logistic model. If H-L goodness of-of-fit test statistic is greater than 0.05, as researcher wants for well-fitting model, the researcher fails to reject null hypothesis that there is not difference between observed and model-predicted values, implying that the model’s estimates fit the data at an acceptable level. That is, well-fitting models show non-significance on the H-L goodness-of-fit test. This desirable outcome of non-significance indicates that model prediction does not significantly differ from the observed.

Table 7 Model fitting information:

Test of Significance between Independent and Dependent Variable:

Hosmer-Lemeshow Test

Model	Chi-square	Df	Sig.
Final	11.930	8	0.154*

*p>0.05

Table 7 summarizes the existence of relationship between the independent variables and the independent variable was supported. Furthermore, the probability of the model chi-square 11.930 with degree of freedom 8 is significant with 0.154 ($\chi^2 (8)=11.930, p > .05$), which is higher than the required level of significance i.e. 5%. This enables the researcher not to reject the null hypothesis and to conclude that there is no difference between observed and model-predicted values, implying that the model's estimates fit the data at an acceptable level. That is, well fitting models show non-significance on the H-L goodness-of-fit test concludes that here is no difference between researcher's model (observed) and model predicted by the logistic regression (predicted) (that SPSS refers to) The results of the logistic regression concludes that dependent variable is significantly explained by the given set of independent variables. In other words, independent variables (predictors) have significant effects in predicting the dependent variable.

Amount of variation explained by the model

The logistic regression computes correlation measures to estimate the strength of the relationship. In logistic regression, commonly used measures of model fit are based on the likelihood function and are *Cox & Snell R square* and *Nagelkerke's R square*. Both these measures are similar to R^2 in multiple regression and these correlation measures do not really tell much about the accuracy or errors associated with the model. In Table 8, the model summary provides approximation only. Cox and Snell's R-square attempts to imitate multiple R-square based "likelihood". The Cox and Snell R square is constrained in such a way that it cannot equal 1.0, even if the model perfectly fits the data. This limitation is overcome by the Nagelkerke's R square (Malhotra, 2008). Moreover, Nagelkerke's R^2 is widely used and the most reported measure of Pseudo R-square measures among the others such as Cox and Snell. The Nagelkerke modification that does range from 0 to 1 is a more reliable measure of the relationship. Nagelkerke's R^2 is normally be higher than the Cox and Snell measure. For present study, from Table 8, indicates that 66.5% of the variation in the dependent variables is explained by the logistic model. It is also found that Nagelkerke's R^2 value was (0.897), indicating a strong relationship of 89.7% between the predictors and the prediction or high level of percentage variance is explained by the independent variables.

Table 8 Strength of the Relationship Model

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	99.678 ^a	0.665	0.897

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than 0.001.

Variables in the equation:

The variables in the equation Table (Table 9), has several important elements. The Wald statistic and associated probabilities provide an index of significance of each predictor in the equation. The Wald statistic has a chi-square distribution. In Table 9, in the second column, the value of 'B' is the estimated co-efficient, with standard error, S.E. (refer third column of the same Table). The ratio of 'B' to S.E., squared, equals to Wald statistic. The simplest way to assess Wald statistic is to take the significant values (as shown in the sixth column of the same Table) and if it is less than 0.05, then reject the null hypothesis as the variable does make a significant contribution and further it is to be concluded that the parameter is useful to the model.

"Exp(B)" column in Table 9 represents the extent to which raising the corresponding measure by one unit influences the odd ratio. In other words, "Exp(B)", or odd ratio, is the predicted change in odds for a unit increase in the predictor. The "exp" refers to the exponential value of B. When Exp(B) is less than 1, increasing values of the variable correspond to the decreasing odds of the event's occurrence. When Exp(B) is greater than 1, increasing values of the variables correspond to increasing odds of the event's occurrence. In other words, if value of Exp(B) exceeds 1, then odds of an outcome occurring increase; if the figure is less than 1, any increase in the predictor leads to a drop in the odds of the outcome occurring. For example, co-efficient of GEN1 is negative (B=-5.382) and also negative relationship is displayed from other measure i.e. value of exponential coefficient (0.005), which is less than 1. This indicates that lower the value of GEN1, predicted probability of gender belonging to higher level of financial literacy group will decrease by 0.005 times. In other words, the GEN1(Female) is found to be significant (as p=0.000) with the coefficient value (-5.382), which indicates that female are more likely to fall under the lower level of financial literacy group, as its Exp(B) values is 0.005, which is less than 1. A Wald test is used to test the statistical significance of each coefficient (b) in the model. A Wald test calculates a Z statistic. This Z value is then squared, yielding a Wald statistic with a chi-square distribution.

Table 9 Significance of each Individual Predictor on Dependent Variable

Categorical Variables	B	S.E.	Wald	Df	Sig.	Exp(B)
GEN ^b	--	--	--	--	--	--
GEN1	-5.382	1.549	12.074	1	0.001*	0.005
AGE ^b	--	--	--	--	--	--
AGE1	0.512	1.309	0.153	1	0.696	1.668
AGE2	5.648	1.530	13.634	1	0.000*	283.707
AGE3	4.457	1.717	6.734	1	0.009*	86.204
AGE4	1.218	1.790	0.463	1	0.496	3.381
EDU ^b	--	--	--	--	--	--
EDU1	1.544	1.427	1.169	1	0.280	4.681
EDU2	0.790	1.457	0.294	1	0.588	2.203
EDU3	-1.516	1.790	0.717	1	0.397	0.220
EDU4	0.649	1.391	0.217	1	0.641	1.913
EDU5	-2.500	1.715	2.126	1	0.145	0.082
INC ^b	--	--	--	--	--	--
INC1	0.668	1.124	0.353	1	0.553	1.950
INC2	-0.674	1.160	0.338	1	0.561	0.509
INC3	2.428	1.213	4.007	1	0.045*	11.338
INC4	2.349	1.334	3.100	1	0.078*	10.471
LIFESTAGE ^b	--	--	--	--	--	--
LIFESTAGE1	-4.079	1.782	5.241	1	0.022*	0.017
LIFESTAGE2	-2.203	1.593	1.912	1	0.167	0.110
LIFESTAGE3	-3.512	1.797	3.823	1	0.051*	0.030
LIFESTAGE4	-3.014	1.978	2.322	1	0.128	0.049
LIFESTAGE5	-4.453	2.449	3.306	1	0.069**	0.012
EMPT ^b	--	--	--	--	--	--
EMPT1	-1.056	1.323	0.637	1	0.425	0.348
EMPT2	-0.413	2.124	0.038	1	0.846	0.662
EMPT3	-1.555	1.008	2.380	1	0.123	0.211
EMPT4	5.191	2.236	5.388	1	0.020*	179.672
EMPT5	-1.283	1.462	0.770	1	0.380	0.277
WORKACTI ^b	--	--	--	--	--	--
WORKACTI1	-2.897	0.759	14.575	1	0.000*	0.055
WORKACTI2	-4.937	2.198	5.044	1	0.025*	0.007
WORKE ^b	--	--	--	--	--	--
WORKE1	-1.500	1.241	1.460	1	0.227	0.223
WORKE2	-1.486	1.309	1.288	1	0.256	0.226
WORKE3	-2.523	1.634	2.385	1	0.123	0.080
WORKE4	-0.975	1.605	0.369	1	0.543	0.377
NOOFTIMESHOP ^b	--	--	--	--	--	--
NOOFTIMESHOP1	0.521	0.915	0.324	1	0.569	1.683
NOOFTIMESHOP2	6.100	1.369	19.854	1	0.000*	446.063
NOOFTIMESHOP3	5.092	1.756	8.413	1	0.004*	162.760
INVESTEX ^b	--	--	--	--	--	--
INVESTEX1	1.737	1.625	1.143	1	0.285	5.683
INVESTEX2	8.029	2.128	14.233	1	0.000*	3.0693
INVESTEX3	7.423	2.126	12.193	1	0.000*	1.6743
RT ^b	--	--	--	--	--	--
RT1	-1.927	1.377	1.959	1	0.162	0.146
RT2	-0.463	1.573	0.086	1	0.769	0.630
RT3	-1.427	1.819	0.616	1	0.433	0.240
Constant	-3.078	3.090	0.992	1	0.319	0.046

Note: ^b reference category, * p<0.05, **p<0.1

From Table 9, It Can Be Seen That Variables GENDER1, AGE2, AGE3, INC3, INC4, LIFESTAGE1, LIFESTAGE3, LIFESTAGE5, EMPT4, WORKACTI1, WORKACTI2, NOOFTIMESHOP2, NOOFTI MESHOP3, INVESTEX2 And INVESTEXP3 Are Found To Be Significantly Related To Financial Literacy Level. Overall, Among The All The Sub Groups, AGE1, AGE4, EDU1, EDU2, EDU3, EDU4, EDU5, INC1, INC2, INC4, LIFESTAGE2, LIFESTAGE4, EMPT1, EMPT2, EMPT3, EMPT5, WORKE1, WORKE2, WORKE13, WORKE4, NOOFTIMESHOP1, INVESTEX1, RT1, RT2 and RT3 are found to be non-significant predictors for financial literacy level.

The logistic regression model is as follows:

$$\begin{aligned} \text{Log} \left(\frac{p}{1-p} \right) &= B_0 + B_1(\text{GEN1}) + B_2(\text{AGE1}) + B_3(\text{AGE2}) + B_4(\text{AGE3}) + B_5(\text{AGE4}) \\ &+ B_6(\text{EDU1}) + B_7(\text{EDU2}) + B_8(\text{EDU3}) + B_9(\text{EDU4}) + B_{10}(\text{EDU5}) \\ &+ B_{11}(\text{INC1}) + B_{12}(\text{INC2}) + B_{13}(\text{INC3}) + B_{14}(\text{INC4}) + B_{15}(\text{LIFESTAGE1}) \\ &+ B_{16}(\text{LIFESTAGE2}) + B_{17}(\text{LIFESTAGE3}) + B_{18}(\text{LIFESTAGE4}) \\ &+ B_{19}(\text{LIFESTAGE5}) + B_{20}(\text{EMPT1}) + B_{21}(\text{EMPT2}) + B_{22}(\text{EMPT3}) \\ &+ B_{23}(\text{EMPT4}) + B_{24}(\text{EMPT5}) + B_{25}(\text{WORKEXP1}) + B_{26}(\text{WORKEXP2}) \\ &+ B_{27}(\text{WORKEXP3}) + B_{28}(\text{WORKEXP4}) + B_{29}(\text{NOOFTIMESHOP1}) \\ &+ B_{30}(\text{NOOFTIMESHOP2}) + B_{31}(\text{NOOFTIMESHOP3}) + B_{32}(\text{INVESTEXP1}) \\ &+ B_{33}(\text{INVESTEXP2}) + B_{34}(\text{INVESTEXP3}) + B_{35}(\text{RT1}) + B_{36}(\text{RT2}) + B_{37}(\text{RT3}) \\ &+ B_{38}(\text{WORKACTI1}) + B_{39}(\text{WORKACTI2}) \end{aligned}$$

where,

FL	=	Financial literacy level
P	=	The probability of a respondent with relatively higher level of financial literacy
GEN	=	1, if respondent is a female, 0 otherwise,
AGE1	=	1, if a respondent is in age group of 26 to 35 years, 0 otherwise,
AGE2	=	1, if a respondent is in age group of 36 to 45 years, 0 otherwise,
AGE3	=	1, if a respondent is in age group of 46 to 55 years, 0 otherwise,
AGE4	=	1, if a respondent is in age group of 56 years and above, 0 otherwise,
EDU1	=	1, if a respondent has completed secondary education, 0 otherwise,
EDU2	=	1, if a respondent has completed higher secondary education, 0 otherwise,
EDU3	=	1, if a respondent has completed diploma education, 0 otherwise,
EDU4	=	1, if a respondent has completed graduation, 0 otherwise,
EDU5	=	1, if a respondent has completed post-graduation education, 0 otherwise,
INC1	=	1, if a respondent's monthly income is Rs. 10,000 to Rs. 15,000, 0 otherwise,
INC2	=	1, if a respondent's monthly income is Rs. 15,001 to Rs. 20,000, 0 otherwise,
INC3	=	1, if a respondent's monthly income is Rs. 20,001 to Rs. 25,000, 0 otherwise,
INC4	=	1, if a respondent's monthly income is Rs. 25,001 and above, 0 otherwise,
LIFESTAGE1	=	1, if a respondent is young married without children, 0 otherwise,
LIFESTAGE2	=	1, if a respondent is young married with children, 0 otherwise,
LIFESTAGE3	=	1, if a respondent is middle age married with dependent children, 0 otherwise,
LIFESTAGE4	=	1, if a respondent is middle age married without dependent children, 0 otherwise,
LIFESTAGE5	=	1, if a respondent is older married, 0 otherwise,
EMPT1	=	1, if a respondent is part time salaried, 0 otherwise,
EMPT2	=	1, if a respondent is casual, 0 otherwise,
EMPT3	=	1, if a respondent is self-employed, 0 otherwise,
EMPT4	=	1, if a respondent is housewife, 0 otherwise,
EMPT5	=	1, if a respondent is retired, unemployed and others, 0 otherwise,
WORKEXP1	=	1, if a respondent's work experience is 6 to 10 years, 0 otherwise,
WORKEXP2	=	1, if a respondent's work experience is 11 to 20 years, 0 otherwise,
WORKEXP3	=	1, if a respondent's work experience is 21 to 30 years, 0 otherwise,
WORKEXP4	=	1, if a respondent's work experience is more than 30 years, 0 otherwise,
NOOFTIMESHOP1	=	1, if respondent shop around 1 to 3 times, 0 otherwise
NOOFTIMESHOP2	=	1, if respondent shop around 4 to 6 times, 0 otherwise
NOOFTIMESHOP3	=	1, if respondent shop around more than 6 times, 0 otherwise
INVESTEXP1	=	1, if a respondent's investment experience is 1 to 5 years, 0 otherwise,
INVESTEXP2	=	1, if a respondent's work experience is 6 to 10 years, 0 otherwise,
INVESTEXP3	=	1, if a respondent's work experience is more than 10 years, 0 otherwise,
RT1	=	1, if a respondent is moderate risk tolerance is , 0 otherwise,
RT2	=	1, if a respondent is higher risk tolerance, 0 otherwise,
RT3	=	1, if a respondent is highest risk tolerance, 0 otherwise,
WORKACTI1	=	1, if a respondent not working in finance related workplace activity, 0

otherwise,
 WORKACTI2 = 1, if a respondent's work activity is other, 0 otherwise,

Model fit

The Classification Table (Table 10) assesses the performance of the model by cross-tabulating the observed response categories with the predicted response categories. From Table 10, it is found that 95.6 % respondents were correctly classified. Table also shows that out of 235 cases predicted to be under low financially literate group, 223 cases were observed to be in low financially literate group, while 12 were in high financially literate group. Similarly, out of 150 cases predicted to be high financially literate group, 145 were correctly classified as high financially literate, while only 5 cases are under low financially literate group. So, out of total 385 cases, 368 (223+145) were correctly classified and only 17(12+5) cases were misclassified. From this, it can be said that (385-17)/385, or 95.60% of the cases were correctly classified with this model.

Table 10 Classification Table^a

	Observed		Predicted		Percentage Correct
			Level		
			Low	High	
Step 1	Level	Low	223	05	97.80
		High	12	145	92.40
	Overall Percentage				95.60

a. The cut off value is 0.56

By adding all the independent variables under study in the constant logistic regression, as explained above, it was found that after adding all the independent variables under study, now overall 95.60 % of respondents are correctly classified, as shown in Table 10. In other words, researcher can predict the final model with 95.60 % of accuracy, which was earlier 59.20% only (see Table 3).

V. Conclusion

This study concludes that investors' age, gender, monthly income, stage of life cycle, employment structure, type of workplace activity, number of times investors shop around while investing and years of investment experience are found to be significant predictors of financial literacy. However, investor's current level of education does not found to be a significant predictor of the financial literacy. This interesting findings calls for the attention of policy makers, financial planners, and educators to promote financial literacy through financial education and make the citizens to empower on the topic of personal finance so that they can make informed financial decisions.

In VUCA world, a cut throat competition is seen among the financial services providers to gain market share and be a leader by offering their products or services with continuous innovations. Instead of focusing more on supply side, these providers should come with the vision to empower their customers and make them free from complexities involved in financial decision, by providing them clear understanding about basics of financial decisions through a particular process. For this, it is crucial to understand their current level of financial literacy based on their demographic and socio-economic characteristics. This study is helpful to those who are planning to educate the people on the topics of personal finance and make them financially literate and empowered.

It complements the important aspects like greater transparency, policies on consumer protection and regulation of financial institutions. On the agenda, financial literacy should be on a common structure and a common approach so that it can be spread in a comprehensive manner. These efforts should aim at empowering consumers to understand and select the financial products and services that best suit their needs, goals and personal circumstances. The overall efforts by regulatory authorities, N.G.O.s and community groups should be structured in the direction to enable the individuals to develop the ability to make informed judgments, to be able to identify financial products and services that address their needs, to take effective decisions regarding the use and management of their money and to avoid to be a victim of bad selling.

This study has several limitations. Firstly, the data were collected by using non-probability convenient sampling method. So, limitations of this method are automatically applied to this study. Secondly, the data were collected from the urban areas state of Gujarat only; responses from rural areas may change the results. Thirdly, data were collected from retail individual investors, high net worth investors and SHG members are ignored for data collection.

Scope For Further Research

This study has focused identifying financial literacy level by considering demographic and socio-economic characteristics of the investors. One can expand the study by considering the effect of these variables on financial behaviors or effect of investors' financial literacy on various financial behaviors. One can also expand this study by collecting the responses from rural areas or other states of India.

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