CHAPTER II
LITERATURE REVIEW

2.1. Introduction

It is focused on answering the following questions on six main themes namely:

1. Financial literacy - What does financial literacy mean and what is the need? What is the impact of financial illiteracy on personal financial decision making? Whether financial education can augment financial literacy or financial wellbeing? Should financial literacy be a national priority?

2. Financial behaviour - How financial literacy improves financial behaviour?

3. Financial intelligence - Whether financial knowledge/financial intelligence helps in effective financial decision making? Whether following the process is crucial for taking effective financial decisions?

4. Money Management Tools - Whether financial tools enrich the analysis and understanding of personal finance, help in better financial planning, help in setting financial goals, help in tracking of personal finances, and making more appropriate financial decisions?

5. Fuzzy Logic - Why fuzzy logic? What are the strengths of fuzzy logic? What are the existing research done on fuzzy logic in the field of economics and finance? Whether fuzzy logic can be used to build a model?

2.2. Financial literacy impacts financial decision making

Financial literacy matters a lot for financial decision-making. Financial literacy is the ability to use knowledge and skills to manage financial resources effectively for financial well-being. It includes any program that addresses the knowledge, attitudes, and behavior of an individual toward financial topics and concepts (Gale & Levine, 2010; Holden, Charles, Laura, Deanna & Beatriz, 2009). Financial literacy provides people with clear and transparent information to help them make the best decision to fulfill financial needs (Panday, 2009).
Lusardi (2008) demonstrates widespread financial illiteracy among the masses. According to him, most individuals cannot perform simple economic calculations and lack knowledge of basic financial concepts. One reason people fail to plan for retirement, or their planning is not successful, may be because they are financially illiterate. In this case, they may fail to appreciate the role of compound interest, inflation, and risk (Lusardi, 2003). Financially illiterate households make poor choices that affect not only the decision makers themselves, but also their families and the public at large (Gale & Levine, 2010). Lusardi (2008) mentions that failure to plan for retirement, lack of participation in the stock market, and poor borrowing behavior can all be linked to ignorance of basic financial concepts. Cole and Shastry (2008) write that a society, that expects individuals to take responsibility for managing their finances and to determine how much to save, is in trouble if its citizens are ill-equipped to make wise financial decisions.

Financial education is the process by which people improve their understanding of financial products, services and concepts so they are empowered to make informed choices, avoid pitfalls, know where to go and act to improve their present and long term financial well-being. Financial education programs should be encouraged to promote financial awareness and encourage people to make better financial decisions (Maria, 2013). Cole and Shastry (2008) describes four-part model of education in which financial education aims to increase financial knowledge, which improves financial behaviours and decision and finally financial outcomes such as money saved. Consumer Bankers Association believes consumer financial education is important and is committed to the goal of expanding financial education and improving consumers' understanding of the complexities of consumer financial services-whether in mortgages, credit cards, student loans, deposit products, or all the ways in which consumers interact with financial. CBA also support financial literacy programs in public schools. Lusardi and Mitchell (2006) examine that the provision of financial education via retirement seminars can foster savings and also the allocation of portfolio components into complex assets such as stocks. Financial education might impact borrowing behaviour, discount rates, and risk-aversion. Households with higher levels of education are more likely to participate in financial markets, and show more responsible financial behaviour such as writing fewer bounced checks, and paying lower interest rates on mortgages (Eccles, Ward, Goldsmith...
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The increasing complexities of the financial landscape coupled with the economic difficulties illustrate the need that financial literacy should be a national priority to prepare households for an economic future (Gale & Levine, 2010; Condon, 2010). Understanding financial literacy is of critical importance for policymakers; it can aid those who wish to devise effective financial education programs targeted at young people (Lusardi, Mitchell & Curto, 2009; Lusardi & Mitchell, 2009; Lusardi, 2008). Widespread financial literacy might also provide broad social and economic gains as vulnerable households make better financial decisions (Braunstein & Welch, 2002). To enhance such decision making, the government should have a policy of fostering financial and economic education for the society (Cole & Shastry, 2008). Improving financial literacy has become an important goal of policy makers and businesses (Eccles et al., 2013). Launching a campaign to place financial literacy on the national curriculum, Gill Ball, finance director of Birmingham University equalizes the increasing level of individual indebtedness as the financial equivalent of global warming (Bellman & Zadeh, 1970).

2.3. Financial literacy improves financial behaviour

Financial literacy is crucial to effective financial decision making with respect to budgeting, debt management, wealth creation, retirement planning etc.

Financial decision making requires the abilities to reason, retrieve information and perform quantitative tasks regarding money (Tannahill, 2012). It is the ability to make informed judgments regarding the use and management of money and wealth (Gale & Levine, 2010; Holden, Charles, Laura, Deanna & Beatriz, 2009). Those who are more financially knowledgeable are much more likely to have planned (Lusardi, 2008).

Financial literacy can have positive effects on financial behavior. Increased financial literacy could help individuals understand their saving situations better, save more, and attain higher economic status and more economic security (Lusardi et al., 2009; Barcus, 2011). In words of Maria (2013), individuals who attended credit counselling programs for 3 years were able to reduce their debt and improve their credit card handling. Rooij,
Lusardi, and Alessie (2007) use questionnaire for the Dutch DNB Household Survey to show that financially sophisticated households are more likely to participate in the stock market. Lusardi (2003) describes that households with greater financial sophistication are more likely to participate in risky assets markets and invest more efficiently. He demonstrated a strong link between financial knowledge and financial behavior. Lusardi and Mitchell (2006) took several new steps in linking workers’ financial literacy to their success at retirement planning and their accumulation of retirement wealth. According to their opinion, financial literacy may influence household saving outcomes by influencing planning patterns. There are empirical observations that financial literacy is associated with higher retirement wealth. Lusardi and Tufano (2009) find a strong relationship between debt literacy and financial experiences. In particular, those who have the highest levels of debt literacy are less likely to face problems with debt, while those with lower levels of debt literacy tend to judge their debt as excessive. Braunstein and Welch (2002) suggest that better financial literacy could encourage greater personal saving and improve financial and economic security on retirement. He finds that respondents who attended high school in states mandating financial education reported saving rates 1.5 percentage points higher than those who did not. Warschauer and Sciglimpaglia (2012) mention that the economic benefits that an individual / family receive by completing the financial planning process are divided into three areas: increasing wealth, preventing loss, and smoothing consumption.

On Debt Literacy, Lusardi and Tufano (2009) highlight the need for relevant and effective financial literacy information. People with low financial literacy are more likely to have problems with debt. On Retirement Preparedness, Lusardi and Mitchell (2006) mention that people with low financial literacy are less likely to participate in the stock market, less likely to choose mutual funds with lower fees, less likely to accumulate wealth and manage wealth effectively and less likely to plan for retirement. Lack of planning is pervasive among older workers, according to Lusardi study in 2000 and 2002. These findings show that many workers lack the information necessary for making saving decisions and poor planning is the primary result of financial illiteracy.

Carol's mission is to promote financial intelligence in all levels of society and families by educating them on the necessity of understanding their financial behavior and how it affects their money. She teaches skills that empower them to manage their money better
through the use of simple and easily understood tools and techniques (as cited in Yip & Sang, 2009).

2.4. Financial Intelligence enhances effectiveness of financial decisions

Financial intelligence is the gathering of information of financial relevance, to understand its effect and interpretations, and predict its behavior and outcomes. It helps in improving decision-making skills and boost control over finances (Berman, Knight, & Case, 2006). According to Dedrick, Financial intelligence goes beyond the provision of financial information and advice. It is the ability to know, monitor, and effectively use financial resources to enhance the well-being and economic security of oneself, one’s family, one’s business. We need the awareness to know what state we are in so we know where we are going. Having good financial IQ is not about saving tons of money or dumping them into mutual funds. It is building a wealth of assets that will generate money.

The recognition of the importance of financial planning means creating and evaluating financial statements for financial wellbeing. The financial information of an individual is contained in financial statements. Three basic financial statements that are of great significance are balance sheet, profit & loss account and cash flow statement (Warschauer & Sciglimpaglia, 2012). Financial statements serve as the basis for financial planning, analysis and decision making. It is needed to predict, compare and evaluate one’s earning ability (Panday, 2009). Financial statements give the knowledge that can help in leading and managing money more effectively (Yip & Sang, 2009). Some entrepreneurs think they don’t need to undergo financial sector but as they grow in their company, they need to see and understand the information contained in three basic statements. Managers who are financially intelligent understand the basics of financial measurement (Berman, Knight & Case, April, 2008).

Financial intelligence arms managers with accessible, jargon-free information to manage their balance sheet and practical strategies for improving their financial performance. Financial intelligence gives non-financial managers the financial knowledge and confidence for their everyday work (Berman et al., 2006). Financial intelligence helps IT managers to understand what is happening in their company from a financial perspective. Financial intelligence shows them how to use the information to work and
manage more effectively (Malagoli, Giovanni, & Magni, 2005). Even an HR manager need to understand the basics of financials, and has to apply financial rules, assumptions and estimates. He can use the information to analyse the numbers in greater depth and to make financial decisions (Berman et al., March, 2008).

Lamba (2010) emphasised that non finance people feel that finance is something complicated and beyond the scope of their understanding. Finance is an integral part of everyone’s life and financial principles are based on pure and simple common sense. The ability to take financially intelligent decisions is financial management. It is the ability to understand the impact of every decision on net worth or economic position and to ensure that all the actions should be taken to strengthen economic position and do nothing that weakens it.

In the words of Kiyasaki (2008), the one reason people lack this financial intelligence is they want money but not the process. It is the process that makes them rich not the money. Many people fail to become rich because they don’t value the steady process of becoming financially smarter and richer. He added, ‘Financial intelligence and ultimately financial IQ can help solving money problems. Financial intelligence is that part of our mental intelligence we use to solve our financial problems. Financial IQ is the measurement of that intelligence. The integrity of all five financial intelligence i.e. making more money; protecting that money; budgeting; leveraging the money; and improving the financial information, is required if a person wants to grow rich and stay rich. Financial intelligence helps to understand and use financial information. Learn financial intelligence to earn more. The key to success is education.

Wattles (2007) mentions that the science of getting rich is an exact science like algebra or arithmetic. There are certain laws which govern the process of acquiring rich; once these laws are learned and obeyed by a man, he will get rich with mathematical certainty.

2.5. Money management tool automates the PFM process

The amount of manual work required along with frequent updates of financial data made it impossible to predict it with accuracy, justifying the need of tool that automates the process. Staying on the top of personal finances can be quite difficult. It’s difficult to earn but it is more difficult to keep track of what to do with ones earnings. Katiyar (2011)
says, ‘Is there a way to know exactly what you are worth today, right now, at this very instant? In the current economic environment it is essential to equip consumers with the necessary tools to make informed financial choices. A money management tool save a person from complicated job of bookkeeping. They manage personal finances on the web, on the desktop and even on phone (Matt, 2009; Bhatia, 2010). A person needs to see all their accounts in one place in real time, track and analyze his spending, and achieve financial goals (Javelin Strategy & Research, 2009). Real effectiveness of budgeting and cash flows depends on the person’s way of living and his goal setting. The success of a money management plan reflects how accurately a person has identified his and his family’s goal (McNitt, 2013).

Budgeting is the best way to check how much financially responsible a person is (as cited in Best Personal Finance Software Comparisons and Review, 2013). An individual with a budget surplus may choose to pay down debt or increase spending or investment. Learning how to budget for a surplus is essential for achieving financial integrity (Khan, 2012). In the paper named ‘Examining the behavioural aspects of budgeting’ authors explains the process of budgeting that involves setting strategic goals/objectives and developing forecasts for revenues, costs, cash flows & other important financial factors. The budget seeks to achieve optimal money allocation, cost awareness and quantification of profits become relevant. A comparison of actual results against budgeted projections provides a basis for evaluating performance and signals the need for corrective action (Raghunandan, Ramgulam, & Raghunandan, 2012).

Financial Planning equip a person with the strategy needed to make his financial future happy and secure. It assists in financial decision making and tracking income, expenditure and investment performance (Halan, 2008). Successful money management emphasized the need to understand the various types of expenses and keep a thorough tracking of the same. Calculating one’s expenses accurately is prerequisite for the development of workable financial plan (McNitt, 2013).

The personal finance management tool ‘Vault’ attempts to facilitates wealth creation through investing and discipline. This software helps in recording of financial transactions, scan important documents, create and maintain household budget, generate wealth statements and plan retirement and financial independence. It connects to internet for current stock market, mutual fund, gold, silver rates and bank statements so that
valuations are always up to date. This tool has all the features that enable the common man to record, track, and monitor his wealth with a view to grow it simply by better planning. It helps to create better control of the finances (Athawale, 2010). Mint.com is an application in personal finance. It allows tracking spending. MoneyMobile app launched in 2013 combines account aggregation capabilities, functionally syncing financial information to provide users with a meaningful personal financial management tool that makes users to manage their finances (Ngo, 2010).

2.6. **Fuzzy Logic helps simulate the human thought process**

The key elements in human thinking are not numbers, but labels of fuzzy sets, that is, classes of objects in which the transition from membership is gradual rather than abrupt. The pervasiveness of fuzziness in human thought processes suggests that much of the logic behind human reasoning is not traditional two-valued or even multivalued logic, but logic with fuzzy sets, fuzzy algorithms, and fuzzy rules of inference. The paper by Zadeh (1973) presents a method which mirrors the fuzziness of human behavior and thereby provides a more realistic basis for analysis of humanistic systems. In the opinion of Stango (2007), while taking financial decisions, individuals often have self-control problems, overly optimistic expectations, and heuristics that do not align well with traditional concepts of rationality. These behavioral aspects of financial decision-making have important real-world effects. Fuzzy logic has the characteristics to deal with such situations and fuzzy math may be applied in household finance for improving financial decision making. Fuzzy logic seems to be a reliable tool for describing the value of a financial variable, since the complexity of real-life situations is handled through “vague” variables and “vague” interactions, which better replicate human mind as well as economic phenomena. Also, a fuzzy approach, unlike classical ones, seems to be capable of integrating qualitative and quantitative analysis (Malagoli, Giovanni, & Magni, 2005).

Fuzzy logic is an approach to computer science that mimics the way a human brain thinks and solves problems. Fuzzy logic is a paradigm to introduce human subjectivity into objective science and a method to model and use human knowledge and senses as they are, without complicating abstraction. It has also seen its tremendous power used in business, finance, and management (Bih, 2006). Fuzzy logic allows decision making with estimated values under incomplete/uncertain information. It has the capability of
representing vague data and allows mathematical operators and programming to apply to
the fuzzy domain. Fuzzy Logic is suitable for uncertain & approximate reasoning,
especially for the system that is difficult to derive with a mathematical model (Cox,
1994; Kahraman, 2008). Traditional multi-criteria decision-making methods cannot
provide best decision support because they are incapable of modeling qualitative human
thinking process. On the other hand, fuzzy logic is widely recognized as a tool with the
ability to compute using words to model qualitative human thinking processes in the
analysis of complex systems and decisions (Liu, Liang, Yeh, & Chen, 2009). Decision
making process is a complicated phenomenon. People are uncertain about their choices.
Thus it is imperative to design a model that can map human perception (Chatterjee,
Chowdhury, & Mukherjee, 2010).

The perspective of fuzziness could enhance our understanding of the development of
real economies. The concept of evolution of fuzzy logic has gained a certain attention in
economics. The application of fuzzy to the social sciences has great possibilities and it
has great scope. Fuzzy logic is possibly the greatest intellectual breakthrough of a
lifetime and most certainly has a place in the social sciences. In fact, it is utterly essential
because people are far more complex than can be described with a logic that only admits
yes or no, true or false, answers to questions (Klir & Folger, 1988; Stolz, 1997; Zadeh,
1977). Fuzzy logic is a powerful tool that has been used in diverse fields of applications
ranging from engineering to business or finance (Low & Poon, 2008).

Zadeh (2008) describes fuzzy logic as a precise logic of imprecision and approximate
reasoning. More specifically, fuzzy logic may be viewed as an attempt to formalize two
human capabilities. First, the capability to converse, reason and make rational decisions
in an environment of imprecision, uncertainty, incompleteness of information, and
conflicting information. Second, the capability to perform variety of physical and mental
tasks without any measurements and computations. The benefits of fuzzy logic are (a)
Fuzzy logic is flexible. With any given system, it is easy to layer on more functionality
without starting again from scratch. (b) Like a human expert all aspects of decision
making can be integrated into a decision system using fuzzy rules. (c) Decision systems
using fuzzy logic are easier and more cost-effectively to maintain. Before changing an
existing rule or adding a new one the impact of the changes to the overall decision system
has to be analyzed. As fuzzy logic systems require much less rules than conventional rule
Decision systems using fuzzy logic are more reliable (Meyer & Zimmermann, 2011). Kashani (2003) developed a new panoramic vision using fuzzy logic methodology. The results show a powerful association between the real and fuzzy estimated data, and explain the behavior of decision making in a pertinent way. It authenticates the fuzzy results and makes way for easy acceptability of fuzzy application. Chakraborty, Nanda and Majumdar (2007) developed a model to amplify the uncertainties of data inputs providing an approach to risk analysis. The goal is to capture and quantify the qualitative information of the project coordinators using linguistics variables and model the uncertain cash flow and discount rates as triangular fuzzy numbers. An example of fuzzy cash flows and fuzzy resultant net present value is computed from the model. According to Korol (2012), fuzzy logic can be a very useful and powerful tool in financial analysis and financial management. The aim of this paper was to evaluate the efficiency of fuzzy logic model in forecasting the financial situation of companies and households and to give the reader “the opened” structure of fuzzy logic model, that can be easily adopted to changed economic situation in the country or even adopted for implementation in different country or region of the world. Bouloiz and et al. in their paper, Modeling of an Organizational Environment by System Dynamics and Fuzzy Logic, mentions that fuzzy logic is used to account the qualitative and uncertain value of variables resulting from the phenomenon of perception. It can be used for modeling the safe behaviour of human factor. The theory of fuzzy sets are used to account for the qualitative, uncertain and linguistic character of the variables influencing human behaviour (Bouloiz, Garbolino, & Tkiouat, 2013). Sarkar, Sahoo & Sahoo (2012), in their article, Application of Fuzzy Logic in Transport Planning, state that fuzzy logic could be used successfully to model situations in which people make decisions in an environment that is so complex that it is very hard to develop a mathematical model. In other words, the number of inputs, the number of fuzzy sets used to describe fuzzy variables, and the number of rules generated by a fuzzy logic system. Fuzzy logic systems provide two other very important advantages. They can use existing linguistic knowledge very successfully, and they treat uncertainty in an appropriate manner.
2.7. Evaluation of reviewed literature

The reviewed literature revealed the following broad conclusions.

Going through the available literature that the researcher could lay his hands on so far, there appears to be a critical gap in understanding the process of personal financial management. The interrelation between degree of recording and evaluation of financial transactions on personal financial decision making has not been quantified till now.

Most of the literature revealed that the earlier studies were mainly related to widespread financial illiteracy existing in the society, poor financial behavior and poor financial decision making. Need for financial Intelligence gained through financial planning, budgeting, real time tracking and analysis is also stressed in the literature. Various money management tools exists which equip a person to make informed financial choices.

Fuzzy logic is an approach to computer science that mimics the way a human brain thinks and solves problems. The perspective of fuzziness could enhance our understanding of the development of real economies. Fuzzy logic is possibly the greatest intellectual breakthrough of a lifetime and most certainly has a place in the social sciences.

However fuzzy logic and modelling has not been used till now in the area of personal financial management. No systematic efforts have been made to introduce a fuzzy model to integrate all the elements of personal financial decision making process.

Keeping all this in mind the researcher has decided to look and probe into this critical gap and to conduct the study of the inter-relationship between the various steps and arrive at a mathematical model that can help understand how financial behavior impacts economic net worth. In other words, the model should forecast the likeliness of net worth creation for an individual based on his recording and evaluation level.