

# Product Innovations through Financial Engineering

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Rapid changes in the corporate finance, bank finance and investment finance have changed the scenario of financial markets. With the growing competition, the traditional product portfolios of financial institutions are being replaced with more complex products, which have given birth to a new discipline known as financial engineering. In the fast changing environment, it is being viewed as the lifeblood of financial innovation – the process that seeks to adapt existing financial instruments and processes and to develop new ones so as to enable the financial entities to meet the changing needs of customers and to cope up more effectively with the changing world. Today's complex financial products are featured with significant overlapping in terms of benefits and cost associated. To remain relevant in the market place and to win substantial market share, financial institutions must bring innovation in the existing product line through financial engineering. Through this paper, the author would like to throw a light on the concept of financial engineering, motivating factors, need for product innovations through financial engineering and suggest the strategies for the same.

**Keywords:** Product Innovation, Financial Engineering, Financial Services

## Introduction

Post 1991 period has witnessed phenomenal growth and development in the Indian financial systems. Introduction of liberalization, globalization and privatization have brought the competition not only in banking sector but also among the non banking financial institutions. In addition to this, changes in the customer preferences, explosive growth in information technology etc. have also played an important role in bringing about innovations in the financial services industry. Financial services and their providers have truly become global in many areas and no institutions can rest assured on only success in its own country as a benchmark for its overall performance. Today's Indian financial system is characterized by existence of various financial innovations in the field of corporate finance, bank finance and investment finance.

## Innovation defined

Dictionary defines innovation as “the introduction of something new and replacement of old ways”.

Webster's Collective Dictionary defines ‘innovation’ as “to introduce as or as if new”, with the root of word deriving from the Latin word “novus” or new”<sup>1</sup>. Much of the theoretical and empirical work on innovation in financial economics has been done surrounding the financial securities and financial institutions.

Financial innovation is a dynamically evolving process affecting functioning and development of the global financial markets. Financial innovation with the inherent characteristics of risk and uncertainty contribute to the efficiency of the global markets.

**In the financial services sector “radical innovation” has changed the entire picture of world financial markets, while some “incremental innovations” act as fillers to correct market imperfections.**

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<sup>1</sup> Webster's Ninth New Collective Dictionary (1988).

The concept of financial innovation is broadly explained by Eugenio Domingo Solans of European Central Bank as: “It refers both to technological advances which facilitate access to information, trading and means of payment, and to the emergence of new financial instruments and services, new forms of organizations and more developed and complete financial markets”<sup>2</sup>.

Peter Tufano (2002) in Financial Innovation mentioned: “Innovation includes the acts of invention (the ongoing research and development function) and diffusion (or adoption) of new products, services or idea.”

In his paper he suggests that “financial innovation is an ongoing process whereby private parties experiment to try to differentiate their products and services, responding to both sudden and

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gradual changes in the economy”.

Financial innovation creates new financial technologies, institutions, markets and instruments and is defined as either “product” or “process” innovation.

Michael Porter (1990) defines “Innovation is defined broadly to

include both improvements in technology and better methods or ways of doing the things. It can be manifested in product changes, new product approaches to marketing, new forms of distribution, and new conception of scope.”

This definition is closely linked to the financial services innovations, as financial innovation is the fact of creating and popularizing new financial instruments as well as new financial technologies in the markets. This definition includes approaches to conceptualization and management of the same. The broad types of innovations can be distinguished: product and process innovation. Product innovations are various offering for investment in savings,

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<sup>2</sup>Speech by Eugenio Domingo Solans, Member of the Governing Council and of the Executive Board of the European Central Bank, delivered at the 38<sup>th</sup> SEACEN Governors Conference and 22<sup>nd</sup> Meeting of the SEACEN Board of Governors on “Structural Change and Growth Prospectus in Asia – Challenges to Central Banking”, Manila, February 13, 2003, European Central Bank, <http://www.ecb.int/press/key/date/2003/html/sp030213.en.html>. last accessed on January 21, 2010.

derivative contracts, mortgage backed securities, risk management tools etc., those basically investors buy; whereas process innovation includes finding the new ways of distributing the financial products and services, processing transactions, or pricing the transactions, which is an organized system for delivering one or more products in an efficient and effective way.

Thus, the financial services industry is witnessed from cost- saving innovations to revenue enhancing innovations, and from in-house development to outsourcing and alliances.

### **Importance of Financial Innovation**

The market imperfection in terms – regulation, taxes, information asymmetries, transaction costs etc. prevent participants in the economy from the benefits of efficiently obtaining the functions they need from the financial system. Financial innovations serve as the optimal solutions to various basic problems and/or responses to opportunities lying in

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the imperfect financial markets, and hence bring market perfection. Peter Tufano (2002) discussed some of the key arguments for innovation in financial services.

1. Innovation exists to complete inherently incomplete markets.
2. Innovation persists to address inherent agency concerns and information asymmetries.
3. Innovation exists so parties can minimize transactions, search or marketing costs.
4. Innovation is a response to taxes and regulation
5. Increasing globalization, Technological shocks and risk motivate innovation.

## **Financial Engineering**

According to John Finnerty (1988), “Financial engineering involves the designing, the development and implementation of innovative financial instruments and processes, and formulation of creative solutions to problems in finance”.

This definition has given due consideration to the word ‘innovative’ and ‘creative’, which emphasizes on introduction of revolutionary new product such as first swap, first mortgage backed securities, first unit linked insurance plan, first marriage insurance policy etc. it also involves idea of an extension of an existing product like creation of a mutual fund with a new focus, introduction of new security trading on the exchange. The term also emphasizes on the piecing of the existing products and processes to fit a particular set of circumstances prevailing in the market or demanded by the consumers. The objective behind this may be to reduce the risk associated with the existing product or firm’s financial risk, to reduce the cost of firm’s fund raising, to reduce the cost of delivering the product/ services, to reduce the threat of competition by making innovations harder to be copied by the rivals, to attract the customers base or create a new market by redesigning the existing products, to gain some accounting tax benefits, or to exploit market inefficiency.

Marshal J. F. and Bansal V. K. (1993) defines “financial engineering is the life blood of financial innovation – the process that seeks to adapt existing financial instruments and processes and develop the new ones so as to enable financial market participants to cope more effectively with the changing world in which we live”.

B. Eales (2000) defined financial engineering as, “the process of financial engineering can be ... viewed as the ‘fine tuning’ of an existing financial product to improve its return or risk characteristics in light of changing market conditions. It can be considered as a process which allows existing financial products to overhauled and restructured to take advantage of changed taxation, legal or general economic climate”.

**Financial engineering is continuously focusing on risk reward trade-off by developing the high yield investment avenues for the investors.**

The scope of financial engineering is not limited to corporate finance and its institutional applications. Most of the financial innovations which have taken place in the recent time have been directed towards retail i.e. at consumer level. In addition to corporate finance, nowadays, financial engineering has been extended to investment and money management, risk management, personal financial planning, and relationship marketing too. In the investment and money management, financial engineering is continuously focusing on risk reward trade-off by developing the high yield investment avenues for the investors. By applying the concept of repackaging and overcollateralization, financial engineer tries to transform the high risk investment instruments to low risk investment instruments.

In today's deregulated market with the severe competition, financial institutions are constantly introducing new products and services to gain the market share. To create new customer base and to retain the existing customers, they continuously add new features and/or benefits in the existing products. It does not mean that traditional, off-the-shelf instruments cannot accomplish the desired results. But from the investors point of view, they desire more benefits attached to the product while investing in the same. On the other hand, for institutions or companies, sometimes the nature of financing is decided by cost consideration, set of features attached to an instrument, or combination of instruments attached to it, as well as the circumstances prevailing in the economy.

### **Factors contributing to the growth of financial engineering:**

The factors contributing to the growth of financial product and process innovations through financial engineering are intensified international competition, tax asymmetries and tax advantage, reduction in the transaction cost due to increased operational efficiency, increase in the price and interest rate volatility, advances in the financial theories, reduction in agency cost, regulatory and legislative changes, increased liquidity, increased competition due to globalization, liberalization and deregulation, the explosive growth in information technology, accounting benefits, increased customer involvement to choose the right instrument among the myriad of products.

### **Understanding the Financial Needs**

The Indian financial system consists of large number of consumers who park their funds in financial products that are created by the financial institutions to meet their specific demands. Many financial institutions are successful to satisfy the basic financial needs of the customers in terms of saving and/or investment objectives or motives. But, today's conservative investments do not allow the investors to bring the expected rate of return and to cope up with the inflation. The demographic, and socio economic variables play an important role while deciding the hierarchical needs of saving motives. In order to understand the market needs, it is crucial to understand the hierarchy of financial needs for the innovation and delivery of the financial products.

Figure 1 shows that financial need hierarchy is similar to Maslow's need hierarchy theory, which defines that the lower, basic needs pertaining to human survival must be met before the higher needs can be addressed, which are not directly related to the survival but relate to the life enhancement and quality of life. The theory is also applicable while defining the hierarchy structure of saving motives in financial behavior of an individual.

**Figure 1: Maslow's Hierarchy of needs and financial need hierarchy**

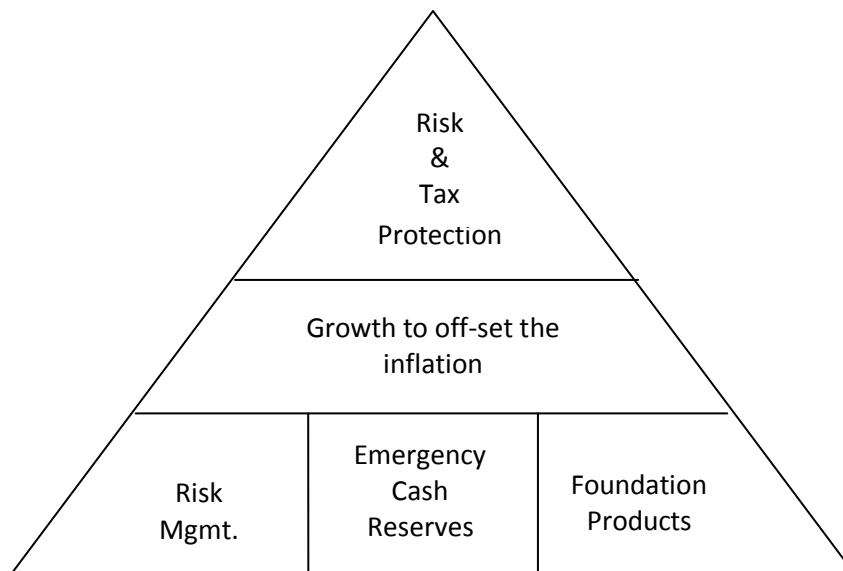


- **Survival money:** The money that an individual spends simply to survive.
- **What-if money:** The money required to protect the life.
- **Freedom money:** The money needed to do the things that bring joy and fulfillment to the life.
- **Gift money:** This is the replacement for “love”.

- **Dream money:** This is the intangible “self-actualization” level where an individual finds true happiness and meaning.

The financial services are divided mainly into two categories: Saving/ investment services can be viewed as the instruments for financing current consumptions based on current earnings and credit services i.e. loans/ liabilities are the instruments for financing current consumptions based upon the future earnings. Households’ ownership of investments and credit instruments have been hypothesized to depend on their financial needs (or objectives) and abilities (resources) to acquire these financial assets and liabilities (Katona, 1960). The combination of financial need priorities and resource availability at different stages of household’s life cycle influences the sequence in which financial services are acquired by the household. Most of the major institutions in the financial services industry, use their own version of the “pyramid of financial independence”, shown in figure 2, which shows how individuals park their financial resources into a variety of investment instruments over time.

**Figure 2: The pyramid of financial independence**



(Source: Applying latent trait analysis in The evaluation of prospects for cross selling of financial services, W. A. Kamakura et. al., 1991)



### **The scope of Financial Engineering in financial services industry**

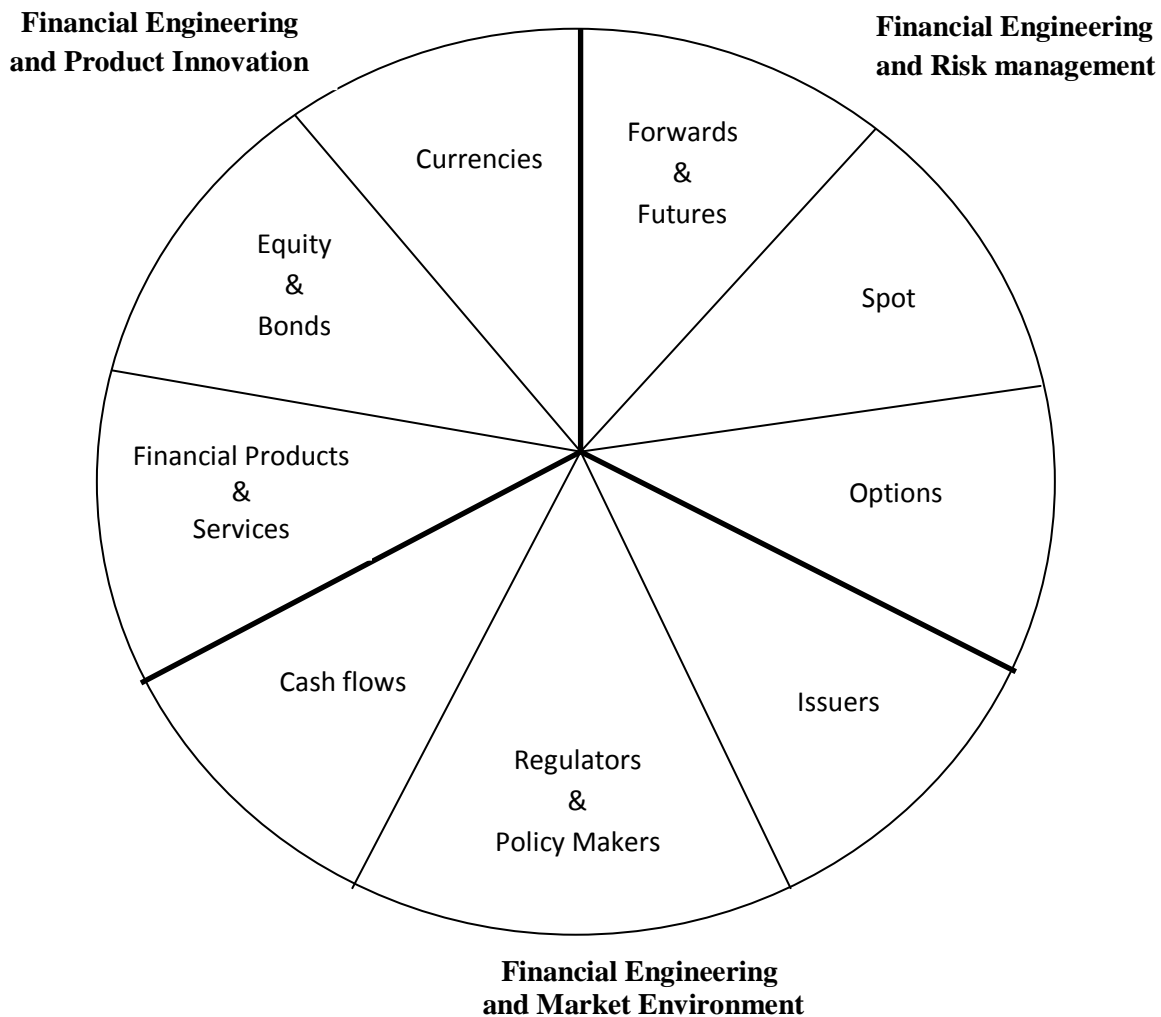
Financial institutions constantly look for various ways to innovate or distribute the products through financial engineering that may appeal to the investors, satisfy their needs, create the competitive advantage and may result into cost saving or revenue enhancing financial product innovations. The financial engineering process is shown in the following manner.

Merton's (1992) functional decomposition identified six functions delivered by financial systems: (1) moving funds across time and space; (2) the pooling of funds; (3) managing risk; (4) extracting information to support decision-making; (5) addressing moral hazard and asymmetric information problems; and (6) facilitating the sale and purchase of goods and services through a payment system.

**The real task of the financial sector is to play supplementary role to the true economy.**

In the recent time, much has been said and written about the meltdown of financial markets and economies, Even the economy of India has not been isolated from it. The impact of which, we have seen in the financial markets. The financial services institutions, corporate enterprises, exchanges and regulatory authorities are facing the challenges and are required to respond to competitive pressures to hold their position in the market. Much of the debates and comments of the various governments and research agencies concluded that – to overcome the situation we should study the fundamentals and follow a simple approach. The real task of the financial sector is to play supplementary role to the true economy. The challenges should be considered as opportunities for innovation through financial engineering.

**Figure-3: The scope of financial innovation through financial engineering.**



These all say that, the financial engineering is not limited to product innovation and development, but it also includes introducing the new sources of fund to raise the money by issuers, introducing the trading of new securities or processes on the exchanges, and finding the new ways of managing the risk associated with the investment, and use of information technology to find out the innovative ways to distribute the financial products and/or services. These opportunities may be; increase in transaction volume at the exchanges, quick responses to the changes taken place in market regulations, competing on the cost, finding out the new mode of delivery of the product or service, speed up the flow of data with the standardization, adoption of technology, understanding and satisfying the customer needs for process or product innovation.

### **Financial engineered products:**

On risk-reward line, equity and debt can be seen on the two extreme points. Majority of the financial engineered products are found to be in between these two points.

Product innovation through financial engineering can be done under the umbrella of traditional investment alternatives as well under the modern tools too. Indian corporate sector has witnessed innovation in financial products through financial engineering, where attempts have been made to reduce the risk associated with the instruments, to change some of the basic characteristics of the instruments and to provide the good amount of return with safety.

Following are the illustrations of instruments which came into existence as a result of the process financial engineering.

**Financial engineering and equity and debt products:** Non-voting shares, differential voting rights, employee stock options, sweat equity shares, callable and puttable common shares, ADRs GDRs,

IDRs, warrants, World Equity Benchmark Shares (WEBS) etc. are the innovative financial products came into existence through financial engineering in equity class. Whereas, convertible bonds, zero coupon bonds/ debentures, deep discount bonds, secured premium notes, floating rate bonds, catastrophic bonds, dual currency bonds, foreign bonds and euro bonds, Triple Option Convertible Debentures (TOCD), index bonds, Indian Corporate Collateralized Debt Obligation Fund (ICCDO Fund) are come under the debt category. There are hybrid instruments too like convertible preferred shares.

### **Financial engineering and mutual funds:**

Mutual fund is a financially engineered product which comprises of the characteristics and benefits of direct stock market investments. It is an investment tool through which investors can

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achieve diversification at low investments and with lower cost of fund management. Mutual funds have diversified investments spread in calculated proportions among securities of various economic sectors. In Indian financial markets, some of the mutual funds provide the life insurance cover to the investor.

### **Financial Engineering and Insurance:**

In the past, the higher amount of premium in the traditional insurance policy, narrow product line for the insurance policy was available to the people to choose a suitable policy. In the individual customer segment, endowment and money back plans were available while in the corporate segment group insurance, gratuity and superannuation plans were available.

But, after the liberalization of Indian financial market, many new and private insurers came with innovative engineered products, which focused on providing customized products – products that contain innovative features – to the customers. It was observed that in the Indian market, only endowment and money back policies were popular among consumers. Private insurers came up with need-based insurance policies such as whole life policies, term insurance policies as well – products designed according to needs of the customer. Even to deliver more benefit to the customer they have indentified and introduced riders attached with the product. ULIP is one such product which has come about as a result of financial innovation where part of the premium paid is used for insurance and the other part is used for investment to give a certain amount of return to the investor on the money invested.

Majority of the private life insurance companies have introduced the children's education plan, retirement and pension plan to meet the specific need based upon the time frame. Moreover, to

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get the benefit of capital market investment, ULIPs came into existence, which is an important outcome of the financial engineering in the insurance segment. The basic principles on which ULIP is operational are: 1. offering the insurance cover to an investor and 2. Investing the savings element in the capital market which offers market linked returns. To

give more flexibility to the investors, ULIPs offer the various funds so that the risk can be diversified and return can be secured. These funds are consisting of various levels of debt, equity and fixed income securities. Insurance has successfully entered into capital market with “insurance backed bonds” making almost all the risk tradable. Insurance companies in association with the banks have started the bundling of various risk like weather, mortality, emissions, environmental shocks etc. and issuing the bonds against them. Some of the insurance policies have started to provide insurance cover against life lost or disability incurred due to terrorism attacks.

Under the general insurance policy, the marriage insurance policy has been innovated, wherein the insurance companies would insure the cost of weddings against the postponement or cancellations wedding ceremonies for certain reasons, under which claims would be entertained only for losses due to external factors like accidents, catastrophes or unintentional man-made disasters or disruptions.

#### **Financial engineering and banks:**

Banking sector has brought not only the product/ service innovation but also organizational and technological innovations, which has replaced the traditional portfolio of the banks. Consumers have started to demand anytime-anywhere delivery of financial services along with an increased variety in deposit/investment and credit products. Severe competition forces the banks to focus on customer relationship management by delivering the sophisticated services with the use of technology. E-banking services, mobile banking, electronic mode of payment methods, ATM, platform automation, PC banking, reverse mortgage etc. are the revolutionary innovations which can be termed as financial process engineering, have taken place in the banking sector.

#### **Financial engineering and Stock exchanges:**

With the increased awareness and increased participation of direct investment in the capital markets, stock exchanges have brought in innovation in terms of technology, processes and introduction of trading of new securities. To overcome the limitations of physical handling of the securities, dematerialization of the securities has been done. With the introduction of the same

there was a need to create another financial institution/body, which can take the custody of the securities, facilitate the trading between the parties etc. As a result of these, NSCCL, Depositories, Depository participants and other intermediaries came into existence and which has replaced traditional brokers. Exchanges also started the trading of the new investment tools like ETFs, Gold ETFs, and REITs.

### **Financial Engineering and derivatives**

Derivative instruments are an outcome of financial engineering. To appreciate the contribution of financial engineering by quantifying risk, allocating risk and managing the risk through derivatives. Under which the currencies, futures, options, swaps and commodities are traded on the exchanges.

The major financial innovations taken place in India and principal motivating factors for the same are listed below.

**Table1: Financial innovation in India and principal motivating factors**

<b>Financial Product/ Services Innovations</b>	<b>Principal Motivating factor</b>
Equity linked saving schemes of mutual funds	To offer the benefits of stock market
Debt oriented schemes of mutual funds	Tax advantage
PCD/FCD	Pricing and interest rate regulation under CCI Act
Deep discount/Zero Coupon Bonds	Tax advantage
Puttable and callable bonds	Perceived volatility of interest rate
Stock index futures	Volatility of equity prices
Interest rate swaps	Volatility of interest rates
Currency swaps	Volatility of foreign exchange rates
Forward rate agreements	Volatility of interest rates
ATM	Technology
Screen based trading	Technology and to bring transparency
Dematerialization	To overcome the risk relating to physical handing of a

	security and faster settlement
Depositories	To make the transaction speeder and transparent
Electronic fund transfer	Technology
Money market mutual funds	Volatility of interest rates
Specialized mutual funds	Investors preference
Exchange traded options	Volatility of stock prices
Structured Finance	To meet the specific requirement of an issuer
Gold ETFs	To channelize the fund from traditional investment alternative of household to financial market
REITs	To enable investors to have an economic interest in real estate assets without the need to buy the physical property
Direct Market Access (DMA) Facility	To enable broker to offer their client direct access to the trading system of the exchange through the broker infrastructure without manual intervention of the broker. It offers a direct control of the client over orders, reduced time lag in execution of client orders, reduced errors caused by manual order entry, greater transparency, enhanced liquidity, lower cost for large orders and gainful use of speedily executed arbitrage strategies.
Platform automation	To offer personalized banking services to customers for all the transaction and services under one umbrella
Reverse Mortgage	To offer the fixed income to senior citizens against the mortgage of their residential/ real estate property
Project Finance	Risk sharing
PC banking	To offer the banking services from remote place
Marriage insurance	To insure the cost of weddings against the postponement or cancellations wedding ceremonies for certain reasons
National Spot Exchange Limited	To cut the intermediation in trade, help the farmers to

(NSEL)	reduce the cost while trading by intermediaries and enables farmers to offer better price discovery and correct the aberrations that exist in Local Mandi's and sometimes in future market.
Arbitrage Fund	equity and derivative funds providing an ideal way of realizing reasonable returns from equities with risk hedged by derivatives

### **Future of Product innovation through financial engineering**

Prevailing severe competition in the liberalized and faster growing financial markets resulted into an introduction of new products and services with the complex features by many financial market players. Sometimes, investors find themselves ill-equipped to cope up with the market to park their savings. Even, on the opposite side, market players cannot get the first mover advantage after introducing the new product or services because after introduction of new products, within a small duration of time, competitors started to copy the features of

**The financial services institutions should go for the product patents and copyrights for their financial engineered products, so that that they can get the benefits of the research for a longer period and will prevent competitors from offering similar or related financial products and services.**

the product to add the new product in their existing product portfolio. To prevent this, the product patents and copyrights should be made applicable to the financial services institutions, so that that they can get the benefits of their financial engineering research for a longer period and will prevent competitors from offering similar or related financial products and services. Financial



instruments, prospectuses, advertising etc. can be copyrightable. Even computer programs used to create, value, exchange, or otherwise to support financial products can be copyrightable. For this, patents can be used to gain the advantage of differentiation by using the patented computer programs.

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