1.1 Introduction

Finance is the life blood of economy. If there is no proper method of application and it will react negatively and diverse state the future of the Business Enterprises. According to Cronje et. al (1991), a financial function is one of the aspects of a business enterprise and a department that is involved with finances of the business is known as a financial department. Financial Management, as a discipline, is interlinked with other activities that occur within a business organization such as production, marketing, purchasing, personnel functions, and etc.

The finance function consists of the people, technology, processes, and policies that dictate tasks and decisions related to financial resources of a company. Depending on the organization and the industry in which it operates, this function may be simple or complex. Some finance functions are overstaffed that is, they rely on individuals to perform both advanced and simple tasks while others are highly automated relying on people for decision making and policy setting exclusively. Regardless of the ratio of people to technology, the goal of the finance function is to serve the organization's financial needs while laying a platform for the future. This means handling clerical tasks, providing information to the organization and setting financial policies and strategies that will serve the company in the future. To succeed in these three broad areas, the small and emerging business
must be prepared to develop a finance function that both suits its needs and can adapt the growth and changes of the business. The first step is to develop an adequate finance function. To do this, it is important to understand the component parts.

**Component Parts**

The finance function consists of two basic component types: (1) concrete components and (2) soft components. Concrete components include all aspects of infrastructure including technology, software applications, and processes, as well as the people who manage them. Soft components include the standards, strategies, models, and vision that drive the finance or accounting aspect of the business. Each component stands on its own to an extent; however, ultimately all components must be woven together in a way that serves the overall organization objectives. It is not enough that all component parts exist; rather they must exist in harmony with one another, yielding synergies that serve the company's needs today and provide for the future.

**Concrete Components**

The term infrastructure, in this context, refers to all relevant concrete components of the finance function. These components may already exist in the organization in some fashion, although they are not thought of as infrastructure. Regardless of how they were classified,
these components were assessed for their usefulness and either purchased or developed. In order for certain tasks to be undertaken on a regular basis, tools and processes must be put in place to manage them. Items of infrastructure can be classified into three major categories: (1) finance organization, (2) information systems, and (3) processes.

The term finance organization refers to the people responsible for conceptualizing, implementing, and following through with all finance and accounting related tasks and initiatives, as well as the technological tools they employ. The finance function works best when people with the right qualifications are matched with the right tasks. When the proper technological tools are put in the mix, the finance organization will excel and serve the needs of the organization.

**Staffing**

Enlisting the right people for the job is a challenge in any business. When certain aspects of the finance organization are lacking, it is easy for employers to lose sight of essential employee skill needs. Not only the right people and also the total number of employees should be optimum in an organization.

This human element of the finance organization can be a powerful resource for the organization if the right people are a part of the team and if they are allowed to generate and implement new ideas.
Expecting people to not only perform their tasks but also optimize the way their function fits in with the business will provide value to the organization and provide meaningful career development for employees. Personnel should be allowed to isolate all business needs and drivers, determine the impact of these on the organization, and be rewarded for the business strategy that results.

**Technology**

Nothing is more important than providing people with the right tools for the job. This means appropriately configured computers, communication devices, and planning tools. Simply buying the best technology may not always be the answer. A mistake repeated every day by executives and business owners is fall a prey to vendors claim that if the smartest or best machine is purchased, the users’ objectives will be met. The nature of the tasks to be performed must be taken into account before staffs are outfitted with technology. Will desktop computers suffice or will staff need laptops instead? Will finance staff need cell phones or other types of communication linkage? How about planning devices do staff need personal digital assistants or other wireless devices to share documents and information remotely? Knowing whether staff will be performing tasks in one central location or performing tasks on the road will drive decisions for technology.
The term ‘information’ system refers to the backbone technology servers, switches, operating systems, protocols, and software applications that will drive the finance function. Distinguished from technology defined earlier, information systems have a broader impact on the entire platform of the organization’s technological capability. This term is used more on a macro-level as opposed to the term ‘technology’. Information systems give organizations the ability to gather data in the business environment and translate it to knowledge. They also provide the ability to communicate information and data within and outside the organization. Information systems provide a basis for evaluating customers while allowing them to provide feedback to the organization. This aspect of infrastructure also allows the organization to link with information systems of customers and companies in the same industry to achieve synergies in buying, forecasting, billing, and collecting customer payments.

Processes are the protocols and procedures that envelop information systems. They leverage the impact of information systems and bridge the gap between raw systems capability and company-specific needs. Processes cannot be generic but must be customized and suited for a particular organization’s needs. To develop processes, the business owner or manager must have an acute knowledge of the organization and what it is trying to accomplish. To succeed in process
development, knowledge of employee capability, thresholds of technology, and limits of systems also must be firmly grasped.

**Soft Components**

Soft components of the finance function are the more advanced considerations of the function itself. Policies, standards, strategies, and analysis paradigms are examples of soft components. These components cannot be bought or replicated necessarily from an outside source; rather they are developed internally. It is management’s responsibility to develop the soft components of the finance function and maintain them as the company grows and adapts to its environment. The existence and relevance of soft components are good litmus tests for the strength of management. Companies that are lacking in this area put the organization at risk and leave development of the finance area to chance. Allowing the finance function to evolve on its own without a vision driven by strategies and formed with standards could create more problems than it solves.

Developing finance strategies, standards, and policies may be a luxury for the small and emerging business owner when compared to the day-to-day necessities of keeping the organization running. It is important to note, however, that most soft components of the finance function are not developed overnight. In fact, rarely are they complete or relevant for very long. Soft components are always developing and
changing as the business organization changes. Developing them should be embraced as an aspect of organizational culture. Although an organization may be able to enjoy success in its early years without attending to these components of the finance function, eventually issues in the business itself or business environment will demand them. For example, infrastructure may suit a small and emerging business in the short run, but increasing demands for information and new ways to serve customers may necessitate change in this area. Absent the vision for development or the strategy for addressing future data needs, the finance function always will be a step behind, which will result in perpetual short-term decision mode. This may be costly in the long run as managers purchase unscalable technology to solve an immediate need, only to find themselves repurchasing more technology a short time later to accommodate evolving needs.

Well-thought-out soft components will make development of all aspects of the finance function second nature. For example, developing financial analysis paradigms that are relevant to the organization’s business fundamentals will drive IS needs. These paradigms will in turn drive the level of qualifications of personnel. Strategies then can be developed that implement relevant software applications, technological tools, communication devices, and so on. This illustrates how all aspects of the finance function cascade off the soft components. Practically speaking, the small and emerging
business owner may not be focused on the mid- and long-term time horizon. Therefore, codifying areas of vision, strategy, and policy in the finance area may not be practical. It is important to note, however, that being aware of developing soft components at the early stage of the organization will greatly benefit the business owner or manager as the business matures. The high rate of change in the business in its early years may render soft components irrelevant overnight. Laying a foundation of thought and intent to develop this aspect of the finance function will become that much easier as the business owner or manager matures with the business and becomes more savvy in developing strategy.

1.2 Scope of the study

Human Resource Department has gone to a high extreme level at present. The restructuring of Human Resource Department will ensure more benefit for the Business Enterprises by way of productivity and core competency among the skilled personnel. Today the world is living on high challenging and high-tech development for their survival. The financial capabilities of one organization are managed by skilled and talented personalities. It recovers different verticals, different models, different skills and different competencies. The present study focuses on all the areas of Business Enterprises and the scope is very wide in terms of Liberalization, Privatization and
Globalization. To strengthen the economy and to achieve the global benefits the study is having good features.

1.3 Conceptual Frame Work

People are the real assets of an organization. If treated well, they can take organizations to commanding heights. A Human Resource Development stress that human beings have the potential to do things better and hence it is a very positive concept in the human resource management. It is based on the belief that an investment in human beings is necessary and will invariably bring in substantial benefits in the long run.

Top managers are agreeing that identifying the right people and aligning them for innovation is their single greatest struggle and that the most important drivers of innovation are the organization’s culture and people. Innovation, agility and competitive advantage all are conditional to an effective workforce.

Organizations that take full advantage of this new reality will gain competitive advantage, but only if they understand their workforce strengths, vulnerabilities and opportunities. Using human capital forecasting and modeling can help to design and modify current business plans that align the workforce with business goals. It can also help to see upcoming skills gaps and trends to plan accordingly.
This will help to gain a better understanding of what your workforce needs to look like to properly sustain and maintain the business.

Mathematical finance is the branch of applied mathematics concerned with the financial markets. The subject has a close relationship with the discipline of financial economics, which is concerned with much of the underlying theory. Generally, mathematical finance will derive, and extend, the mathematical or numerical models suggested by financial economics. Thus, for example, while a financial economist might study the structural reasons why a company may have a certain share price, a financial mathematician may take the share price as a given, and attempt to use stochastic calculus to obtain the fair value of derivatives of the stock.

Financial Mathematics is a flourishing area of modern science. Since the pioneering days of Black, Scholes and Merton, the subject has developed rapidly into a substantial body of knowledge. Its numerous applications have become vital to the day to day functioning of the world's Business Enterprises. As a consequence, a solid command of the principles and techniques of quantitative finance is essential for a responsible approach to the trading, asset management, and risk control of complicated financial positions.

Financial mathematics is a peripheral science and is generally regarded as a mathematical branch. One can visualize Mathematical Finance as a very good decision making tool in the hands of the
Finance experts to optimize the cash outflow and inflow and to reduce the risk.

1.4 Objectives of the Study

To examine the mathematical ideas and its relevance for the Business Enterprises in order to optimize the Recruitment Cost by using Queuing Theory Application and Transportation Programming Application.

To discuss the Portfolio selection using Operations Research Models like Integer Programming Technique and Preemptive Goal Programming Technique.

Accounting Beta application is used to analyze, the risk-return relationship and profitability performance of the Business Enterprises.

1.5 Statement of the Research problem

The study is going to plunge into the area of Mathematical Models to optimize the cost of recruitment in order to balance the human resource inventory of the Business Enterprises. As well as to minimize the risk and maximize the return related to the portfolio decision making situations.
1.6 Research Design

The study is descriptive and analytical research based on secondary data. The data has been collected from various websites. A sample of 30 public limited companies has been selected for a period of five years from April 2000 to March 2004. The selected sample covers roughly 60% of the population.

The collected information is converted into database for application of mathematical models in order to derive the findings.

In view of analyzing the risk-return relationship and profitability performance of Business Enterprises based on selected Industries, the following hypothesis was tested and proved.

\[ H_0 : \text{The risk taking nature and the outcome are independent.} \]
\[ H_1 : \text{The risk taking nature and the outcome are dependent.} \]

1.7 Review of Literature

A new simulation methodology for quantitative risk analysis of large multi-currency portfolios was introduced by Farshid Jamshidian & Yu Zhu (1997). Bernard Taylor, W & Arthur Keown, J (1978) described and demonstrated a goal programming model for project selection when both profit and nonprofit motivated projects are in competition for scarce resources.
Nicole El Karoui & Monique Jeanblanc-Picque [1998] presented the solution of a portfolio optimization problem for an economic agent endowed with a stochastic insurable stream, under a liquidity constraint over the time interval \([0,T]\). Yaozhong Hu and Bernt Oksendal [1998] discussed regarding the optimal time to invest when the price processes are geometric Brownian motions. P.J. Hunt and J.E. Kennedy [1998] have studied how market prices for standard interest rate products can be used, under the assumption of a one-factor model, to imply the joint distribution of zero coupon bonds of differing maturities at a fixed date \(T\) in the future.

Eckhard Platen [1999], discussed a short term interest rate model by incorporating inflation rate, market variance, market net growth rate and market volatility trend. Tomas Bjordk & Andrea Gombani (1999) considered interest rate models in which the forward rates are allowed to be driven by a multidimensional Wiener process.

Andres Okesendal [2000] attempted to find the best investment strategy taking the fluctuating market into account. R. Bielecki and R. Pliska [2000] developed a continuous time risk-sensitive portfolio optimization model with a general transaction cost structure. A real analysis approach to stock price modeling was beautifully carried over by Rimas Norvaisa [2000]. Yuri Kifer [2000] introduced and studies new derivative securities based on theory and analysis of optimal stopping games. Phil Hunta, Joanne Kennedy, and Antoon Plessen
[2000] introduced a general class of interest rate models in which the value of pure discount bonds can be expressed as a functional of some low-dimensional Markov process.

Peter Carr, Xing; Jin, and B. Madan [2001] carried over a specific work related to the optimal investment in derivative securities. Reha Tutuncu, H. (2001) modified the Markowitz method to evaluate the optimal risky portfolio in a faster, more reliable, and more memory-efficient way in comparing with the standard approaches. Haim Reisman (2001) discussed in his paper the presence of transaction costs, there exists a variable price system in which prices of call options are arbitrarily close to the price of the stock. Bjarne Hejgaard & Michael Taksar (2001) presented a model for the financial valuation of a firm which has control on the dividend payment stream and its risk, as well as potential profit by choosing different business activities among those available to it.

A new approach to contingent claim valuation in general incomplete market models was introduced by Jan Kallsen (2002). Simon Babbs, H. (2002) presented a new family of yield curve modes, termed “Conditional Gaussian” and it provides both simplicity and extreme flexibility in constructing “market models”. Paolo Guasoni (2002) studied the general problem of an agent wishing to minimize the risk of a position at a fixed rate and obtained a minimization problem on a space of predictable processes with finite variation. Bruno Bouchard
(2002) obtained a dual formulation for the exponential reservation price using the utility maximization on the real line under proportional transaction costs.


Mendes and Leal (2005) proposed a new covariance matrix robust estimator which perform well under €-contaminated normal models and multivariate $t$-distribution. Someswar Kesh & Raja (2005) developed a qualitative reasoning model to develop a financial system.
Tomas Buus [2006] derived the optimal solution for transfer pricing with regards to resource allocation. Marianne, [2006] stated that the impact of the FSA has made on the financial services sector and on certain legislation since its introduction and also the author claimed that the FSA model has improved in terms of accountability. Miguel Sousa Lobo, Maryam Fazel & Stephen Boyd (2006) considered the problem of portfolio selection, with transaction costs, bounds on the variance of the return and bounds on different shortfall probabilities by using convex optimization methods.

1.8 Limitations

Except the queuing theory applications, all the other mathematical models are of deterministic type. Due to its deterministic nature all the relevant constant coefficient values should be known in advance before constructing the mathematical model. If not it will not be possible for us to construct the model. Also the data type should be quantitative in nature. These two situations can be viewed as the limitations.

1.9 Chapter Management

This research study has been chapterized into eight chapters. Thus the first chapter deals with the background on which various mathematical finance models related to managerial decision making have been developed. The second chapter describes an optimization model with queuing theory application for minimizing the recruitment cost in such a way that the vacancies are filled only through promotion and direct recruitment. The third chapter takes into consideration of optimizing the recruitment cost with the help of Transportation Programming Model and in this case also the vacancies are filled only by direct recruitment and promotion. Chapter four deals with a different type of optimization model for recruitment in which the vacancies are filled only through promotion, retention and demotion. The fifth chapter takes into account the optimization model of
minimizing the risk and return of Portfolio Selection. The sixth chapter describes an optimum investment decision making application based on the Integer Programming. Chapter seven analyses the application of CAPM in studying the risk-return relationship and profitability performance of corporate undertakings. The last chapter brings out the findings, suggestions and conclusion.