Chapter I: INTRODUCTION

Today, India has changed with the aid of information technical changes in all corners of life. It simply requires single click of mouse to get a task completed and achieve the desired objective. After accepting the globalization, policy for Indian economy it is essential to adopt modern information techniques. This chapter presents the fundamental concepts of Information Technology (IT) and reviews of various relevant literatures in view of research subject. Background and importance of modern techniques and its fruitful utilization in various domain represented in this chapter. Then, identifies software engineering techniques used for development of software products and its research contributions which provides the motivation to use this methodology for studying another field application. Lastly, outlines of the subsequent chapters mentioned in this chapter.

1.1 Domain Knowledge

In around 1970, the Information Technology term arises in large scale in various sectors. People were trying to use this advance technology and skip the traditional way of working system. People were seeking the new way for traditional work cultural system and Information technology system is introduced. The three components Computer, Software, Hardware were introduced in lieu of established system among the various field. Information technology contains, the study, design, creation, utilization, and management of computer machine based system. Especially it includes various types of software and hardware applications. Now a day’s Information Technological applications are not solely to computer machines. In the field of IT is quickly moving from computer machine to physical small size with high speed in the form Mobile technology. It is going to develop with advanced features and internet facility. The most of work of human being is done by the software. The software made by the software engineers. The engineers have a wide knowledge to solve the problem efficiently and resolve the complex problem by using software methodology techniques. Software carried out most of the significant task with their appropriate goal.

Information Technology (IT) has a direct impact on the life and culture of the people. It is evident that value of IT will execute a role towards computing integration
and the all other field of applications and science. It will also control the prospects in industry, business science, engineering, and medicine etc. The information can’t be secured if it is not having resourceful IT System [37].

In the present competitive world, everybody’s running after accuracy, efficiency with highest speed. That can be possible only by using machine. All types of the tedious and mechanical work can be done by machine by providing precise sequence of specified instructions to it. Operations can be carried out on information without further human intervention and supervision [72]. The Information Technological concepts are able to streamline of our scheduled task. Now, the same concepts are entered in all sectors like education, travelling, industry, marketing, finance etc. Finance sector is one of the important and sensitive sectors of the Indian economy. Valuable use with proper development of savings and play the role in markets with instruments, institutions defined as system of finance. It consists of users, mediators and concern people. Growth and improvements concentrates the system should be upgraded and able to face the challenges in the market [42]. There has been evolving continuous changes to concentrate on IT during the recent years. It is the need of the hour to rely on IT. Computing facility spread across all over the sector and society also. It requires proper and systematic approach to get solutions with the help of this modern techniques and methodology. Software Engineering provides a correct way to develop and maintenance of the software product.

We have studied Software engineering methodologies carefully and it has found that we can use these techniques for studying external field application. We have used these techniques as a reference model for studying other than software product process. This model can be used for other than software product development which can be treated as an external field application in our research study. We have selected Urban Cooperative (Non-Scheduled) Bank (UCB) as External Field Application (EFA).
1.2 Application Study

In a National plan co-operation became a vibrant instrument for achieving the social objectives. The recognition and achievement of a systematic economic development led to the designing of new inventions in social democracy. Hence co-operation was launched in India as a protective measure for handling the problems of rural indebtedness [49]. Co-operative finance domain is one of the prime sectors in India. It has been started functioning almost 100 years ago and significant parameter in financial institution. It is regulated by RBI with the act of 1949 and 1965. Earlier functioning of the banking was done by manually. But in the present scenario, most of them have adopted computerization system and some are still in the pipeline. Since long back people are working on atomization system in the urban cooperative banks. Now, it is time to take feedback and review of the system. Therefore, it is necessary to do the study on the existing system in the banks. It is the need of the hour to streamline the urban co-operative sector to stay afloat in the competitive market.

Urban cooperative bank (UCB) system in India is network mainly to the grass root level. The main functioning of UCB is micro-banking system. It is sensitive finance sectors related to agricultural which is a backbone of economy. Due to their micro-banking system, it is convenient to gather relevant data. Therefore, it is necessary to do the study of adoption of information technological advancement tool in UCB by using techniques of software engineering model.

1.3 An Engineering Approach

Sequential set of instructions along with relevant documents includes the software. It contains complete set of information about the software like manuals, execution kit, supporting documents for installation etc.

Software Engineering treated as a layered technology. It has shown in figure 01. It is beneficial and respected profession which is based on well-experimented principles and its techniques are used for the development of software product. In this discipline various software development models are available. Stages are found in development models. During the development of software product, the product has to undergo various operations for building the desired product.
The figure 01 shows the layers of software engineering process. By using such process the intelligent software product is produced which satisfies the customer requirements. An engineering approach to software engineering is characterized by practical, orderly, and measured developments of software. The principal aim of this approach is to produce satisfactory systems on time and within budget. There is good reason for tackling the problem of planning, developing, evaluating, and maintaining software using the engineering approach. Quite simply, this approach is needed to avoid chaos in developing software. The engineering approach is practical because it is based on proven methods and practices in software development. The approach is orderly in cases where the sequencing and definition of software engineering team activities and products is mapped to software process models tailored to fit client needs. The benefit of this mapping is that it facilitates the management of the software process. Finally, this approach is measured. During each phase of the software process, software metrics are applied to the products that have been produced. The goal of this part of the engineering approach is to gauge the quality, cost, and reliability of what has been produced. A better understanding of software results from measuring it. This is really a quite crucial part of the approach, since software measurements serve as indicators telling us whether to go forward or backward in the software process. To be successful, development of software systems requires an engineering approach. The need for an engineering approach to
developing software was first suggested at a NATO conference in 1968 (Naur & Randell, 1969) [43].

1.3.1 Software Development Process

Whichever model is finally chosen, product building operations gets through a series of steps known as the “Software Development Process”. This process gets through a series of steps known as the “Software Development process”. This process helps to create timely, high quality software.

Each process model has strengths and merits that make it suitable for specific applications. However, all process is the same so far as some activities are concerned. These activities by default are required to be carried out whether the software is simple or complex, small or large. The software process comprises activities, task and deliberations.

Common Activities: These are common to all software development and mandatory. The activities relate to:

A1. Planning, scheduling, tracking and control of activities
A2. Technical reviews: design, architecture, and program
A3. Software Quality assurance
A4. Documentation
A5. Risk Analysis
A6. Measurements of efforts, resources, costs and budgets for planning and building development standards

The task is made of well defined precise work breakdown, each having a clear measurable goal of achievement, is known as Milestone. When a couple of such milestones are achieved in succession, a deliverable pertaining to the software is completed. When several such tasks are completed and delivered a software process is completed in all respect [82].
1.4 Literature Review

It is observed that the most of the research were focused on integral computer machines relevant software engineering concepts. They highlighted on structural part of the process methods, frame work and its significant methodology. Recently, research mentioned in future enhancement for the development of product to use the art of clean
room software engineering concepts. The technique for software development and its associated technology are used for the restricted purpose and have its own limitations. Process models, framework, project planning, metrics etc. are the parameters used to produce client satisfaction software products. This technique is just used in software development only. But it may also be useful for external study field. Referred the various paper published with the relevant subject on IEEE internet websites, Magazines, Journals, Reserve Bank of India magazine, RBI reports and journals, relevant conference proceedings, books on Software Engineering, computer Science, Information technologies and urban Co-operative bank schedules. Followings are the literature review presented here for the development of research subject.

**Thomas, R (1994)**

The author expressed his opinion on software crisis. Software crisis was found before fifty years ago. Still the crisis is working with the people. To overcome the problem software engineering approach is required.

**Hankley, B (1995)**

As per the opinion of author, use of modern techniques approach like software oriented products are supporting to increase the target and achieve the goal. It requires proper training for development and process of software product.

**Keller, T. (1997)**

The author expressed his views regarding the Software Product Development and project maintenance that were the mature process. It is applying the highest level of principle. During the year of 1970s, Space Shuttle avionics software represents almost software engineering practices and approaches.

**McCauley, R. (1998)**

Author recognize the computer based courses in order to introduce the software engineering discipline. Provided various courses in different levels. Author frame the teaching techniques and features for the software developers.

**Chung-Horng Lung (2000)**

In this paper author explained significance of software architecture. As per the view of author, software architecture explanation is not available. Explained with certain relevant example where the concept is used.
Michael N. Huhns (2001)
This paper produced a new way regarding the production of robust software. Motivation is there with reference to this approach. The way of explaining the concept like correct software and reusable software.

C. M. Woodside (2001)
It is observed by the author, while executing the system, there should be a tool, required to observe the performance and efficiency of work. Software architecture and its behavior properties provides resources to achieve the task.

Len Tiu Wright (2002)
Author expressed his views with reference to IT industry and marketing concepts. To provide the correct direction and guidelines for improvement of upcoming IT companies and their brand.

Clarke, J (2003)
Author expressed his views on metaheuristic techniques. Such techniques have been applied in Economic Modeling, Financial, and Business also these techniques have been applied in various Software Engineering areas.

Author focused the concept of engineering with reference to software Engineering and defined clear view of approaching towards the concept. First go through detailed information about the software and then, to understand the view of Engineering.

The main intention of the author in this paper is to express his views on the concepts of verification and validation regarding models creation's. Design model expressed with reference to same concepts for proper development of product and system.

Jackson, M. (2007)
Generally, software system is developed by traditional way. But it requires three important parameters such machine, requirement and environment which contains sufficient capacity to create the software products.
Dillon, T.S. (2008)
The author expressed his views in this paper, use of ontology’s in different aspects of software engineering. The techniques helpful for Software Development in conjunction with project management and ontology of software engineering.

Dongsun Kim (2008)
Author proposed the new educational technique by providing the toolkit with the new relevant software information. People, process and technology, these are three significant parameter on which kit is based and provides new direction to achieve the knowledge

Ellis, H (2008)
It is very important to understand how the software engineering disciplined is progress. What are the techniques and methodology to make the proper success in the software development path?

As per the opinion of author, Software based production that requires engineering views. Then it produces software based production. Concentrate on basic foundation that to produce well develop technology.

Lago, P. (2009)
Author suggested that, successful completion of Project requires proper course of software engineering which reduce the gap of theory-practical. Mostly concentrate on technical information in project course. Software engineering is well discipline structure. Also it includes issues of non-technical in the project.

According to author, in the competition era, the need of software solutions in business is very important for upgradation. Author provides new architecture concepts for development of software products.

Iqbal, M (2009)
Author described the comparison of overall process of software development product in view of concerned people. Provides the activities list and software development model process to reduce effort for achievement of process.
Dakhli, S. (2009)
In the research papers contains information about software engineering and system which provides lack of sophistication process. Most of the people which are relevant to educational system and professionals provide the solution to overcome the problem of software crisis and proper development of software process.

A.M. Nageswara (2009)
In view of software development, software effort estimation plays an important role in determining the success or failure of a software project. The feasibility study for taking up a software project must include effort required to design and develop the project and schedule. These parameters will give an idea of the cost involved in taking up such projects. Therefore, it is crucial that effort estimates are reliable. Unrealistic estimates will lead to disastrous consequences for both the developer and user.

Software product development is a growing sector therefore, it requires to provide exact knowledge of software engineering and motivation to the key parameters of academic system. Training to be arranged for the software engineering knowledge purposes

Fendler, J. (2010)
The Software Engineering discipline has incorporated new concepts to face the upcoming challenges. It needs new methods and techniques for teaching and learning process. By globalization new movement spread across the world.

Literature survey is covering the theory of Information technologies, co-operative financial sectors, and similar type of projects, study reports. Visited subject related internet sites and referred the various books for preparation of basic model for the study work. Conceptual literature consisting theories and various concepts. Personal discussions have been done with the bank management, officers, employees, customers, vendors, Information Technologies experts and related people etc.

It has found that in most of the significant research papers, software engineering methodology are going to use in latest applications though it has some challenges and it requires more research in that.

Josh Dehlinger [45] suggested adoption of advanced application with respect to software engineering methodology. Advanced technology emerges for personal devices.
The mobile applications use for this device. Faster computing power and communication requires in the today’s technology market. Therefore software engineering techniques should be link to such personal devices applications.

**Barbara G. Ryder** [7] studied the programming concepts for software development. For development of software product requires various phases of software development lifecycle model. Software product should undergo to these phases. Some phases are important for coding and maintain proper discipline to build the software product.

**Thomas Østerlie** [79] suggested that software engineering discipline research papers have very important role in open source software development. In the SE research literature on OSSD, it has found that the more research requires for achieving clear views and further improvement in OSSD.

Most of the literature related to EFA containing the following type of theory which is useful to the proposed study work –

**N. Ramu (2009)**
The author explained the status of first UCB in TamilNadu. The Urban Cooperative Banking (UCB) system has come a long way since 1904 when the first UCB was started at Kancheepuram in Tamil Nadu. UCBs remain not-for-profit, owned and controlled by the members who use their services. They are unit banks of the American model rather than branch banks of the British model.

**N Ganesan (2009)**
Author explained the study regarding the efficiency of State Cooperative Banks (SCBs) and District Central Cooperative Banks (DCCBs) in India during the period of 2002-06. Further, author explained the important characteristics of banks with reference to competition and economy.

**Amit Basak (2009)**
The author mainly focused on efficiency in UCBs. He explained his views with respect UCB functioning. UCB is the significant element of financial Institution in our country. They performed the remarkable in the recent years but some of them need to improvement.

The following theory is mentioned in software engineering books which will be supporting to carry out research study -
Earlier the computers were very slow and there was a lack of sophistication compared to today’s machines. People wrote their programs by intuition. Software Engineers accumulated past innovative experience of writing good quality of programs. This is the basic foundation of Software engineering. Software engineers systematically organised the essence of all past programming experience and created various types of techniques, methodology and discipline. In other words they took efforts to produce software product by systematic manner, cost effectively with engineering approach. It is mainly based on Soft skill communication, economics, Management and Computer Science etc. Software industry has become one of the important factors in the economies of the industrialized world.

In 1968 NATO software engineering conference held in Garmisch, Germany under the chairmanship of F. L. Bauer. Eminent personalities in the field of software engineering have defined software engineering term in different ways.

According to Fairley define software engineering in 1979 that Software Engineering (S.E.) is the techniques and methodology for development of software product in systematic, cost effective and disciplined manner.

Sommerville [Sommerville 1989]: Software Engineering is a discipline for building software product by using engineering approach [6].

1.5 Scope of the Study

In the present scenario’s major economical and technical changes are undergoing in industrial and financial revolution through the new information-processing technology. Especially in finance sector it has a significant role for overall development. After identifying the subject (research area) and referring the relevant literatures, it has been found that in most of the literature, the information technologies have a wide application area. However, in finance sector major changes have been made. Due to these drastic changes we have chosen to do the study on urban cooperative bank system. After completing step by step procedure for automation process, now it is required to take the review of the system.

People used information technological tools to manage and process the information. Atomization process use in the financial sector for transaction system. This
type of working methodology is used in the financial Institute since long years. The Urban Co-operative bank sector is mostly related to all classes of people like businessmen, industry, agriculture, labor, small entrepreneurs, workers etc. It has been changing complete culture and working methodology. Therefore, it has a wide scope to study the existing modern transaction system in the financial sector mainly in urban cooperative bank (non schedule) system.

For that purpose we are going to utilize software engineering model based techniques for theoretical evaluation of atomization process. In the literature survey it has been found that the software engineering technology has monopoly for the development of software product and it is observed that such technology is not used for study purpose in any other different field. So why not this technology be tested on the external field application intentionally for this study. It requires framework, structure, plan and controlling parameters for research field. Such type of theory and planning is available in the software engineering subject.

With reference to our formulated hypothesis, we have selected urban cooperative bank (non schedule) as an external field application for the study. Followings are the literature review presented here for the development of research subject and selection for external field application. The stages of more efficient process are to understand, develop, execute and testing the product which is based on automation with the help of software. Specially, In Indian financial system cooperative banks are important role in structured sector. Particularly it incorporates both the applications software as well as hardware which support basic transaction of the financial Institution. The cooperative banks in Indian banking system are important segment of the organized sector. They have improved and efficient by providing the financing to agriculture and providing services to other economic units in the which are not organized part of the economy. This research is the study to analyze IT support to the basic transaction of urban cooperative (non-scheduled) banks.

Urban cooperative bank (UCB) system in India is network mainly to the grass root level. The main functioning of UCB is micro-banking system. It is sensitive finance sectors related to agricultural which is a backbone of economy. Due to their micro-banking system, it is convenient to gather relevant data. Therefore, it is necessary to do the study
of adoption of information technological advancement tool in UCB by using techniques of software engineering model.

1.6 Problem Statement

According to Boehm (BOE76a), software engineering involves “the practical application of scientific knowledge to the design and construction of computer programs and the associated documentation required to develop, operate, and maintain them”. The main focus of software engineering discipline is to building the software product systematic, disciplined and cost effective [68]. Keeping this view we have used these techniques as a reference model for studying External Field Application (EFA).

Urban Cooperative Bank (Non-Scheduled) system in India is network mainly to the grass root level. The main functioning of Urban Cooperative Bank (UCB) is micro-banking system. It is sensitive finance sectors related to agricultural which is a backbone of Indian economy. Since long back people are working on atomization system in the urban cooperative banks. Now, it is a time to take feedback and review of the system. Therefore, it is necessary to study the existing system in the banks by using techniques of software engineering model. It is the need of the hour to streamline the urban co-operative sector to stay afloat in the competitive market.

Due to their micro-banking system, it is convenient to gather relevant data. Therefore, it is feasible to do the study of adoption of information technological advancement tool in UCB by using software engineering techniques and methodology.

1.7 Research Goal

The information system is paramount concern to the banks in today’s business environment. The frame structure belongs to software a development technique that contains structure, plan, and control the process of developing an information system. The obtainable techniques comfortable to various respective projects depend on available resources.

With reference to above relevant information the main objective is to study the induction of IT tools in urban cooperative bank in light of software engineering concept.

With the help of this initial information the followings are some of the objectives are studied -

To study the Information Technology in view of research study
To study the use of Information Technological means in the system
To study the past transaction system
To study the feedback of the past transaction system
To study the existing transaction system
To study the work culture of customer, employee and management
To study the feedback of the existing transaction system
To study the service provided by the system in view of customer relation
To study the view of management, employee and customers review
To study the Software Engineering in view of research study
To prove that how software engineering techniques are useful for this research purpose
To study the feedback of implemented technology
To study on collected data and information by applying various methods

Today’s need is to inspect how the people use modern technological means in deep root level organization like urban cooperative finance sector. On the basis of various questionnaires, direct interviews with bank management, bank officers, employees, vendors, businessmen, industrialist, agricultural people, labor auditors etc. After receiving the relevant data and information to prepare a model base study and to draw the conclusions by applying software engineering’s standard methods. Atomization system is implemented in the co-operative financial sector since long time back. Now this is the time to take review of applied technology. It is necessary to analysis the existing system and to prepare performance model by using software engineering techniques. We propose the software development life cycle techniques to keep as a role model for this research study.

1.8 Thesis Outline
Chapter - I: INTRODUCTION

In this chapter we have investigated the appropriate research domain and planned to use the techniques and methodology of software engineering concept for studying External Field Application (EFA). This is done by using important theory approach and referring the literature review of the various research papers of international journals, books, projects, from internet websites etc. and the latest research work done till today in the software engineering subject area. This chapter following points has been covered
Feasibility study has been done for the purpose of the problem statement

Initial literature review with respect of the external field application study has been finished and further extension study work is proceed

The selection of External field application has completed. The Urban Co-operative Bank (Non-scheduled) has been treated has External Field Application (EFA) in this study.

In this phase the Objectives of research study work are determined.

Chapter II: SOFTWARE SYSTEM TOOLS

In this chapter we have proceeded the study work from chapter –I. The subject area and objectives has been finalized while working on chapter first. We have finalized in this chapter various tools, techniques and methodologies to achieve the objectives. We have understood the subject theoretical conceptualization in view of research subject. We have studied the basic foundations of the subject. We have made in this chapter various transparent ideas about research domain. Following are various relevant significant theories to make objectives fulfilled.

We have discussed in this chapter foundation of Software Engineering concepts. How it is important to analyze the basic foundations of the subject and concern with research domain. What are the hidden techniques to build the various software products? By understanding the basic concept of subject, it will be helpful to clear the research views. Various Software Life cycle Models (SDLC) and its significant characteristics, software crises, the remedies of software, etc has been studied in this chapter. Comparative study and Selection of Software Life Cycle Model has been finalized.

Lastly, the following points have been covered in the chapter.

- The techniques of Software Engineering model as a role model for the research study is understood. We found it supportive and maintained proper coordination of the study and analysis
- It is very important to go through different kind of steps and proposed schedule that helps to produce a timely and high quality result
- The various types of software tools, software process models and software engineering methods have been adopted successfully
A software development methodology is referred to the raw skeleton for the particular research domain for systematic investigation to established facts and values. The skeleton/frame work is used for the planning of the quality research. The proper structure and the control the relevant process for development research process are established.

Each of the available methodologies and techniques are needed to be best suited to specific kinds of projects, based on various technical, organizational and available resources.

**Chapter III: EXTERNAL FIELD APPLICATION**

In India requires healthy and efficient banking system for sound economy. It should be full proof and overcome the obstacles in various parameters for upcoming challenges [36].

This chapter is mainly focused on study work of External Field Application (EFA) with respect to fulfillment of research objectives. After studying the various techniques and methodology of software engineering subject, it’s time to test it on significant techniques and methodology in external field application. We have studied the origin of financial sector and its establishment. In this chapter the impact on society of cooperative financial sector is studied. The characteristics of co-operative financial sector are studied. The role of banking philosophy and its system with respect to our research study purpose is studied. We have prepared the questionnaires for receiving the information from EFA of different customer categories. Various important parameters in the banking systems were studied. We have prepared the data sheet so that all information of transactions are covered and display it at glance whenever it is required. Consulted the various authorities, interviews with the concern person, employee of financial sectors and various types of customers. We have studied in this chapter various computer networking and Information Technological tools which were useful in bank transaction system. We have concluded this chapter by covering following points-

- The questionnaires were prepared after studying the banks transaction System
- Customer categories for filling the data sheets were determined
- The questionnaires from the customers were filled up
The priorities of questionnaires on the basis of bank transaction system
After consultation with expert persons were finalized
The statistical methods for analyzing the data were determined
The good response from the clients was received

Chapter IV: RESEARCH TECHNIQUES

The systematic process of development of any software product will make it easy
to apply that product, to repair that product as well as to replace that product on the
demand of time. This systematic methodology is a basis of my research work. Following
points are adopted in this chapter.

- The techniques of software metric used in the study
- The techniques of research processes has reviewed
- The Work plan and methodology is overviewed
- The fulfillment of the objectives is reviewed

Chapter V: METHODOLOGY AND TECHNIQUES

The main intention behind this chapter is to focus on research objectives.
Visited the various locations of the field applications. Studied the various tools to handling
complexity. The design steps have been carried out which tools would be
suitable for the mentioned objectives. Studied the various tools of software engineering
subject and collected the data sheet forms. Analyzed and the checked the data sheet form
properly. Categorized the data sheet form. Determined and finalized, test significant
techniques and methodology for the external field application.

Different modules of the research project are created. Data collected from
questionnaires, service report, audit report, various types of customers and Information
from management and employee of the system are analyzed. The modules will make it
easy to analyze data for finding out the facts. We have covered the following points to
remove the ambiguity of different modules of the project.

- The complexity is reduced by using various types of tools
- It has proved that S.E. Techniques is capable for handling complexity
- The characteristics of various tools were determined
- The sampling data is reviewed
- The data analysis has been performed
Chapter VI: APPLICATION VIEW STUDY

The main aim of this chapter is to use various techniques and methods of software engineering and compare with the external field application (EFA). This was the aim to test the hypothesis on the comparison. In the earlier chapters we have studied the characteristics of Software Development Life Cycle (SDLC) models and its features. In this chapter work procedure model has been prepared with reference to Software Development Life Cycle (SDLC) model. We have selected Classical waterfall model for this study. During each phase of the life cycle, a set of well-defined activities were carried out.

Chapter VII: RESULT AND ANALYSIS

The important component used in this research study are literature reviews, techniques of software engineering, questionnaires, consultations, interviews, data sheet’s etc. After analyzing the components, some significant outcomes were found those are mentioned in this chapter. We have prepared different types of graphs. Graph-I is used to display at a glance, towards trends of system performance level. It is prepared on the basis of category wise data analysis. Each line in the graph shows the system view level on IT module system.
The Sandish Group is a research firm that analyzes software development projects. Their study of 9236 development projects completed in 2004 is summarized in figure 3 [Hayes, 2004]. Only 29% percent of the projects were successfully completed, whereas 18 percent were cancelled before completion or were never implemented. The remaining 53 percent of the projects were completed and installed on the client’s computer. However, those were over budget, late, or had fewer features and functionality than initially specified.