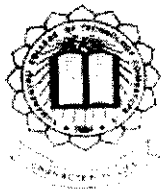

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ANALYSIS OF SOFTWARE ISSUE REPORTS AT COGNIZANT TECHNOLOGY SOLUTIONS, COIMBATORE

by

N.MOHANA

Reg No.71206631028

of

Department of Management Sciences
Kumaraguru College of Technology
Coimbatore

A PROJECT REPORT

submitted to the

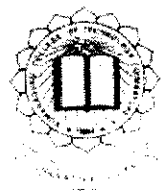
FACULTY OF MANAGEMENT SCIENCES

in partial fulfilment of the requirements
for the award of the degree

of

MASTER OF BUSINESS ADMINISTRATION

May 2008



Department of Management Sciences

KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641006

BONAFIDE CERTIFICATE

Certified that this project report titled **"ANALYSIS OF SOFTWARE ISSUE REPORTS IN COGNIZANT TECHNOLOGY SOLUTIONS, COIMBATORE"** is the bonafide work of Ms.N.MOHANA **(Reg No: 71206631028), who** carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

FACULTY GUIDE

DIRECTOR

Evaluated and vice-voce handled on 02/07/08

EXAMINER I

EXAMINER II

DECLARATION

I, hereby declare that this project report entitled as "ANALYSIS OF SOFTWARE ISSUE REPORTS IN COGNIZANT TECHNOLOGY SOLUTIONS, COIMBATORE", has been undertaken for academic purpose submitted to Anna University, Chennai in partial fulfilment of requirement for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of Mr. S. Mohanavel, Senior Lecturer/ MBA, during the academic year 2007-2008.

I, also declare hereby, that the information given in this report is correct to the best of my knowledge and belief.

Place: Coimbatore

Date: 02/07/08

N. Moh

(N.MOHANA)

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To whomsoever it may Concern

This is to certify that **Ms.N.Mohana (Roll No. 06MBA28)** a student of KCT Business School, Kumaraguru College of Technology, had undergone a project between 10/01/08 and 05/05/08 titled **ANALYSIS OF SOFTWARE ISSUE REPORTS** at **Cognizant Technology Solutions India Pvt.Ltd** under the guidance of Mr.Sreekanth Kurella (Assistant Manager Projects).

The duration of the project was from January 2008 to May 2008.

We wish her all the success for her future endeavors

For Cognizant Technology Solutions India Pvt. Ltd.

Prabhu Chari
Asst. Manager - Human Resources

May 8, 2008

Cognizant Technology Solutions India Pvt. Ltd.
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EXECUTIVE SUMMARY

COGNIZANT TECHNOLOGY SOLUTIONS INDIA PVT. LTD. is one of the best performing company in the Indian IT industry. Company's strength lies in its "Client-first" culture of customer satisfaction, resulting in unique "Cognizant customer experience". The company is widely recognized for its superior Transition and Knowledge Transfer processes and close cultural fit with clients. As a result, it remains the only company able to service a combination of requirements from a large customer base within a shorter time frame.

The project strives to analyze the Software Issue Reports prevailing at Cognizant Technology Solutions (Coimbatore) and to provide considerable recommendations for better Issue handling process for the company.

The analysis of Software Issue Reports has revealed us the importance, need, time and effort of Support Teams in resolving the defects and various types of requests posted by the clients; also the software developed by the company has met its requirements, the performance of the company in sense of their support team, the completion of issues in scheduled time period. The issue handling of software is done to filter the defects in it. The analysis shows the number of defects occurred in various applications and the various types of requests posted to the company and their resolvement in accordance with the due date.

The data used for the study were Secondary in nature. Secondary data were Software Issue Reports collected from the database of the company. The method adopted for the study is historical research. It is based on the study of past and current records of existing delinquent customers to analyse the default status of their account and its significance in order to draw a conclusion. The research design used in this study is descriptive research design. It answers the questions who, what, where, when and how. A descriptive study is undertaken in order to analyse the Software Issue Reports of the company. The number of samples collected for the study and analysis is 554 during the

period from 30th May'07 to 15th January'08.

The tool used for analysis of is Microsoft-Excel, a spreadsheet application written and distributed by Microsoft. Percentage analysis was the method used to analyse various Software Issue Reports of the Company, to appraise the performance of Support Team, to find out the application which has most number of issues, their completion status, and the kind of requests posted by their respective clients. The Column and Pie charts were used for the analysis of given data.

From the data we can only obtain the details of who has handled, what application has been handled, what kind of request posted by the client has been resolved? and their delivery status. But, the analysis does not reveal the actual review works (software design changes) carried out by the support team of the organisation for the queries posted by the users of various modules of different applications. It does not furnish the procedures followed to enhance the project. We cannot know how the issue handling process is going on in the company for the posted requests which is the important limitation of the study.

Based on the analysis and findings, conclusions were drawn to improve the future Software issue handling process of the company.

Sample data

	Date	Task Description	Application	Type of Request	User ID	User Name	Reviewer ID	Reviewer Name	Due Date	Completed On	Status	Remarks
	1/2/2008	Seat Location – Liberty Targit7	MAST	Clarification	143398	Duraisamy, Savitha	146059	Srinivasan, Sreenath	1/2/2008	1/2/2008	Closed	
	1/2/2008	Seat Allocation	MAST	Clarification	153352	Sheriff, Shebir	161761	Nampoothiri, Smitha	1/2/2008	1/2/2008	Closed	
	1/2/2008	MAST Access Permission	MAST	Service Request		Raghavendran, Archana	146059	Srinivasan, Sreenath	1/2/2008		Closed	I didn't get the mail
	1/3/2008	Seats Allocation	MAST	Clarification	130743	Prabakaran, Raguraman	103575	Sreekanth Replied	1/3/2008	1/3/2008	Closed	
	1/3/2008	IE ver	Others		140694	Ganesan, Nandha			Open			
	1/3/2008	Seat Allocation in MAST.	MAST	Service Request	102386	Krishnan, Raghavendra	145703	Mathivanan, Evelin Hycinth Silvia	1/3/2008	1/3/2008	Closed	

	Date	Task Description	Application	Type of Request	User ID	User Name	Reviewer ID	Reviewer Name	Due Date	Completed On	Status	Remarks
	11/23/07	Unable to access MYSPACE	MYSPACE	Bug fix		P.R Ajesh	145776	Cheruvattor, Vinjusha	11/23/07	11/23/07	closed	Solved over phone
	11/23/07	No records found	CBE Certification	Clarification	163008	Narayanasamy, Sasikala	149801	Thangaraj, Mathavi	11/23/07	11/23/07	closed	
	11/23/07	Canteen deductions	Canteen bills	Clarification	171230	Admin Helpdesk, MVC	163062	B.Jeyasenthil	11/23/07	11/23/07	closed	
	11/26/07	RE: Firewarden updation	CBE Firewarden	Clarification	139272	Manicam, Gopalakrishnan		Sreekanth replied	11/26/07	11/26/07	closed	
	11/26/07	MAST update to increase the Seat count for PBC SRQ	MAST	Service Request	156741	Ramiah, Senthil kumar	141374	R. Nivetha	11/26/07		closed	No reply from the customer
2	11/26/07	Canteen Deductions for November 07	Canteen bills	Clarification	171230	Admin Helpdesk, MVC	163062	B.Jeyasenthil	11/26/07	11/26/07	closed	

	12/26/07	BSLI Project ID	Travel MVC	Clarification	113915	Boopathi, Tamilselvi	153653	Stalin, Saral S	12/26/07	12/26/07	closed	No reply from the client
	12/26/07	MAST error	MAST	Service Request	133169	Jagadamma, Baiju	145703	Mathivanan, Evelin Hycinth Silvia	12/26/07	12/26/07	closed	
	12/26/07	Seat for NSS	MAST	Service Request		CoimbatoreSeats	145703	Mathivanan, Evelin Hycinth Silvia	12/26/07	12/26/07	closed	
	12/28/07	MAST error	MAST	Service Request	104579	Arumugam, Harikrishnan	161761	Nampoothri,, Smitha	12/28/07	12/28/07	In Progress	
	12/28/07	MAST issue	MAST	Bug Fix	140694	Ganesan, Nandha	146059	Sreenivasan, Srinath	12/28/07	12/31/07	closed	
	1/3/08	IE ver	Others		140694	Ganesan, Nandha					Open	

ACKNOWLEDGEMENT

It is inevitable that thoughts and ideas of other people tend to drift into the subconscious when one feels to acknowledge helping derived from others. I acknowledge to all those who have helped me in this project work.

I would like to thank the God, almighty for his guidance without whom this project wouldn't have become reality.

I wish to express my deep gratitude to Dr. Joseph V. Thanikal, Principal, KCT, for his guidance and encouragement to complete my project work.

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I owe my heartfelt gratitude to Mr. S. Mohanavel, Senior Lecturer, KCT Business School, for his help and valuable guidance given to me through out my project.

I express my sincere thanks to Mr. Prabhu Chari, HR Department, Assistant Manager, Cognizant Technology Solutions, Coimbatore (KCT Campus), for granting permission to do my project work.

I extend my sincere gratitude to Mr.Sreekanth Kurella, Assistant Project Manager, Cognizant Technology Solutions, Coimbatore (KG Campus), for his guidance to complete my project successfully.

Lastly I thank all the employees in the organization who were involved knowingly or unknowingly to make this project work successful.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Software Engineering:

Software Engineering is the establishment and use of sound engineering principles in order to obtain economically software that is reliable and works efficiently on real machines. Software Engineering can also be defined as the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is simply said as the application of engineering to software.

Software Engineering encompasses process, methods and tools.

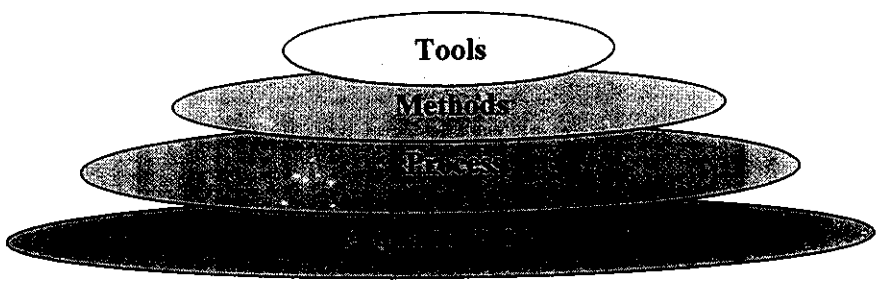

Figure 1.1 Software Engineering layers

The software *process* forms the basis for management control of software projects and establishes the context in which technical methods are applied, work products (models, documents, data, reports, forms etc.) are produced, milestones are established, **quality is ensured**, and change is properly managed. Software Engineering *methods* encompass a broad array of tasks that include communication, requirement analysis, design modeling, program construction, testing and support. Software Engineering *tools* provide automated or semiautomated support for the process and the methods. The tools are integrated, so that information created by one tool can be used by another.

In this project we focus on the management issues and the process-specific activities that enable the organisation to ensure that it does the right things at the right time in right

way. A manufacturer wants to minimize the variation among the products, thus *variation control* is the heart of quality control. In software industry, each concern not only focuses in minimization of defects, but they would like to ensure the variance in number of bugs is minimized from one release to another, also they would minimize the differences in speed and accuracy of their hotline support responses to customer problems. A **defect** is defined as a deviation between the specification and the implementation, detected after release to the customer (or the next activity in the software process). A **bug** is defined as any deviation between the customer's expectation, the specification, and/or implementation.

Software Quality Control:

Quality Control involves the series of inspections, reviews, and tests used through out the software process to ensure each work product has met the requirements placed upon it. Since Quality Control and Assurance are very important for any business we should know about Software Quality. Hence, Software Quality is defined as the "Conformance to explicitly stated functional and performance requirements, explicitly documented development standards, and implicit characteristics that are expected of all professionally developed software." Software Quality also includes the Cost of Quality, which includes all the costs incurred in the pursuit of quality. Quality costs may be divided into costs associated with *prevention, appraisal* and *failure.*

Software Quality Assurance is composed of a variety of tasks associated with two different constituencies-the software engineers who do technical work and an SQA group (software engineers, project managers, customers, sales people and individuals) that has responsibility for quality assurance planning, oversight, record keeping, analysis and reporting. SQA group that conducts the following activities:

- Prepares an SQA plan for a project.
- Participates in the development of the project's software process description.
- ***Reviews*** software engineering activities to verify compliance with the defined software process.

- Audits designated software work products to verify compliance with those defined as part of the software process.
- Ensures that deviations in software work and work products are documented and handled according to a documented procedure.
- Records any non compliance and reports to senior management.

Software review:

Review is "a process or meeting during which artifacts of software product are examined by project stockholders, user representatives, or other interested parties for feedback or approval". Software Review can be on technical specifications, designs, source code, user documentation, support and maintenance documentation, test plans, test specifications, standards, and any other type of specific to work product, it can be conducted at any stage of the software development life cycle. Purpose of conducting review is to minimize the defect ratio as early as possible in Software Development Life Cycle. As a general principle, the earlier a document is reviewed, the greater will be the impact of its defects on any downstream activities and their work products. Magnitude cost of defect fixing after the release of the product is around 60-100x. Reviews are scheduled as milestones on the detailed software development schedule. A review typically consists of the following steps:

- Delivering the finished design or document to be reviewed.
- Preparing a presentation of the material to be reviewed.
- Scheduling the review as part of the development process.
- Presenting the review to an internal or external review board and other interested parties.
- Collecting requests for action from the review board members.
- Documenting the review with minutes and summarizing the requests for action.
- Providing a resolution plan for each request for action.
- Updating the review documentation with the status of each action as it changes.
- Incorporating feedback from the review into the design, documentation, and subsequent reviews.

Reviews are the filters in the software process workflow. They are used to remove the faults and failures in the process. **Fault** in software engineering is defined as an incorrect step, process, or data definition in a computer program which causes the program to perform in an unintended or unanticipated manner. **Failure** can be defined as the inability of a system or component to perform its required functions within specified performance requirements.

The primary objective of technical reviews is to find the errors during the process so that they do not become defects after release of the software. The obvious benefit of Formal Technical Reviews is the early discovery of errors so that they do not propagate to the next step in the software process. An **Error** can be defined as any observed event (incident) or detected deviation between the specification and the implementation. A number of industry studies (TRW, NEC, Mitre Corp., among others) indicate that design activities introduce between 50 and 65 percent of all errors (and ultimately, all defects) during the software process, however, Formal Technical Reviews have been shown up to 75 percent effectives in uncovering design flaws.

Review can be formal or informal. Informal reviews are referred as walkthrough and formal as inspection. Software review consists of design review, inheritance review, delivery review, and document review.

Walkthrough:

Walkthrough is a method of conducting informal group/individual review is called walkthrough, in which a designer or programmer leads members of the development team and other interested parties through a software product, and the participants ask questions and make comments about possible errors, violation of development standards, and other problems or may suggest improvement on the article, walkthrough can be pre planned or can be conducted at need basis and generally people working on the work product are involved in the walkthrough process. The purpose of walkthrough is to find problems and to discuss alternative solutions.

Inspection:

Inspection in software engineering refers to, peer review of any work product by trained individuals who look for defects using a well defined process. An inspection might also be referred to as a Fagan inspection after Michael Fagan, the inventor of the process. Commonly inspected work products include software requirements specifications and test plans. The goal of the inspection is to identify and repair defects.

Milestone:

Within the framework of project management, a **milestone** is a terminal element that marks the completion of a work package or phase, typically marked by a high level event such as completion, endorsement or signing of a deliverable, document or a high level review meeting. In addition to signaling the completion of a key deliverable, a milestone may also signify an important decision or the derivation of a critical piece of information, which outlines or affects the future of a project. In this sense, a milestone not only signifies *distance traveled* (key stages in a project) but also indicates *direction of travel* since key decisions made at milestones may alter the route through the project plan.

Formal Technical Review:

A Formal Technical Review is the software quality control activity performed by software engineers. It includes a class of reviews namely walkthrough, inspections, round robin reviews, and other small group technical assessments of software. Each FTR is conducted as a meeting and will be successful only if it is properly planned, controlled, and attended. Different types of reviews can be conducted as part of software development activities. An informal meeting around the coffee machine is a form of review. A formal presentation of software design to an audience of customers, management, and technical staff is also a form of review. In this report, however, we focus on the *formal technical review*, sometimes called a *walkthrough or an inspection.* A Formal Technical Review (FTR) is the most effective filter from a quality assurance standpoint. Conducted by software engineers (and others) for software engineers, the FTR is an effective means for uncovering errors and improving software quality. A **Checklist** helps the review leader to structure the FTR and helps each reviewer to focus on important issues.

During the FTR, a reviewer actively records all issues that have been raised. These are summarised at the end of the review meeting and a review issues list is produced. In addition. a formal technical review is completed. A review summary report answers three questions.

- What was reviewed?
- Who reviewed it?
- What were the findings and conclusions?

The data obtained from the company would also contain many issues in it. The study and analysis done on the data will reveal us the active participation of the reviewer's in solving those issues during the review session.

Software reviews are "filters" for the software process. That is, reviews are applied at various points during software development to uncover errors and defects, can then be removed. Software reviews "purify" the software engineering activities.

Formal Technical Review Tools:

Computer-based formal technical review is still in its infancy. Tool support for FTR includes the following:

- CodeStriker is a PERL CGI script that supports collaborative code review.
- Reasoning developed a unique toolset and process for automated software inspection of COBOL and C/C++ applications. This service, InstantQA, inspects applications for critial and crash causing defects
- Review Program is a commercial tool developed by Software Development Technologies Corporation. It runs on Windows and Unix platforms.
- CheckMate enables a software inspection group to automatically inspect C and C++ source code against a pre-determined coding policy. CheckMate is available for all Windows platforms with UNIX/VMS and support for Visual Basic under development.
- Asynchronous/Synchronous Software Inspection Support Tool (ASSIST) is a generic tool designed to allow the enforcement and support of any inspection process.

ASSIST is freely available for research purposes. It currently runs on SunOS 4.1.3, Solaris 5.1 and OSF/1 platforms. It requires Python 1.4 and Tcl 4.0 / Tk 7.4

- CSRS, a system developed by the Collaborative Software Development Laboratory at the University of Hawaii. CSRS includes an FTR process modelling language allowing it to implement a wide variety of review methods.
- Scrutiny, an on-line inspection system developed by Bull HN Information Systems in conjunction with the University of Illinois.
- ICICLE, an inspection-based system developed by BellcoreCSI, an inspection-based system developed at the University of Minnesota. See Mashayekhi93 for details. Contact John Riedl (*riedl@cs.umn.edu*) for more information.
- INSPEQ, a system supporting the "phased inspections" review method.
- Remote Inspection, a commercial expert review service for Microsoft Windows products.

Software Testing:

Software testing is a set of steps into which they can place specific test case design techniques and testing methods. To perform effective testing, a software team should conduct effective Formal Technical Reviews for avoiding many errors. Testing is conducted by the developer of the software and for large projects independent test group.

To conduct reviews, a software engineer must expend time and effort and the development organisation must spend money. A review may even fail to uncover the newly generated errors and errors from previous steps, resulting in some number of errors that are passed through. In some cases the errors passed from previous step are amplified by current work, which are known as latent defects. So while conducting reviews the company should be very cautious

1.2 REVIEW OF LITERATURE

1. **Cognizant's** GIFTS-IOMI project development team or organization has performed the **Formal Review and Analysis Reports for Issue Resolution** on NASA's **Geosynchronous Imaging Fourier Transform Spectrometer (GIFTS)- Indian Ocean METOC Imager (IOMI) Mission**[1].

2. **Investigating Training Effects on Software Reviews: a Controlled Experiment**

The **software review**/inspection task is a labour and time intensive activity. Naturally, any activity aimed at improving the performance of inspectors would be deemed favourable to both practitioners as well as to researchers. The control group undertook no training; the other 3 treatments were process training, process training with practice and process training with worked examples. The results show practice and worked examples proceeding process training, were both very promising training approaches. They did not affect false positive identification. However, their relative benefits were less clear[2].

3. **Towards Capability Maturity in Software Review**

Software review facilitates software projects with better technologies sharing, reduced rework, robust design, and early removal of defects. In order to exploit its power, **software review** should be well organized in software projects. A framework is proposed here to well conduct the SQA activities with **software review**. This paper argues that **software review** is not only an important approach to quality control, but also is essential to software quality assurance. Four levels for **software review** are presented in this paper, which can be followed to be mature of capability to produce high quality software product[3].

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[1] *Title: Software Project Management Plan Eff. Date: 6 Nov 2001*
Document No: GIFTS-01-007 Version: 1.1Document Owner: John C. Hinkle

[2] *Land, L.P.W. Tan, B.C.Y. Bin, L. Sch. of Inf. Syst., New South Wales Univ., Sydney, NSW, Australia* ***Empirical Software Engineering, 2005. 2005 International Symposium on*** *17-18 Nov. 2005 page(s): 11 pp.*

[3] *Zhejiang Gongshang University, China.* ***Computer Software and Applications Conference, 2007. COMPSAC 2007 - Vol. 1. 31st Annual International*** *24-27 July 2007 Volume: 1 page(s): 629 - 630*

4. An Exploratory Study of Software Review in Practice.

Five in-depth semi-structured interviews were conducted with different IT organizations. From the interviews' results, the typical issues for conducting **software review** include (1) selecting right reviewers to perform a defect detection task, (2) the limitation of time and resources for organizing and conducting **software review** (3) no standard and specific guideline to measure an effective review for different types of software artifacts (i.e. requirement, design, code and test cases). Thus the result shows that the experience (i.e. knowledge and skills) of reviewers is the most significant input influencing **software review** performance[4].

5. Exploring the Relationship between Experience and Group Performance in Software Review

The aim is to examine the important relationships between experience, task training and **software review** performance. Subjects were required to detect defects from a design document. The main findings include (1) role experience has a positive effect on **software review** performance; (2) working experience in the software industry has a positive effect on **software review** performance; (3) task training has no significant effect on **software review** performance; (4) role experience has no significant effect on task training; (5) working experience in the software industry has a significant effect on task training[5].

6. Software Reviews, the State of the Practice

A 2002 survey found that many companies use **software reviews** unsystematically, creating a mismatch between expected outcomes and review implementations. This suggests

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[4] *Yuk-Kuen Wong, Univ. of Technol., Australia*
***Management of Engineering and Technology, 2003. PICMET '03. Technology Management for Reshaping the World. Portland International Conference on** 20-24 July 2003 page(s): 301 - 308*

[5] Wong, Y.K. Wilson, D. Univ. of Technol., Australia. **Software Engineering Conference, 2003. Tenth Asia-Pacific** , 2003 page(s): 500 - 509

that many software practitioners understand basic review concepts but often fall to exploit their full potential[6].

7. Software Defect-Removal Efficiency

Defect-removal efficiency-the percentage of bugs eliminated by **software reviews**. inspections and tests-is a powerful software quality metric that should be understood by everyone in the software business. Many top companies have used this metric since the 1960s. In fact, one of the most common attributes of "best in class" companies is that their software managers, programmers and quality assurance staff know their defect-removal efficiency levels. This rather simple metric can lead to some very sophisticated analyses and change "quality" from an ambiguous, amorphous term to a tangible factor[7].

8. Software Review for Automatic Test Equipment

The nature of test set programming can be tedious and repetitive. A test engineer can often fall victim to puffing blinders on when programming by overlooking errors when reviewing their own work. To avoid this, it makes sense to treat software like a published work where a reviewer, independent of the original programming team, checks the software for design, quality, and errors. This type of independent review process is comprised of four major steps: Receiving, Processing, Reporting, and Following-Up. It can be conducted and repeated throughout the development life cycle to improve the quality of the software. Early involvement can influence design changes that could lead to simpler and more manageable software. Several errors can be detected prior to its release by reviewing the software with software tools such as PC-Lint/spl trade/ or Understand for C++/spl trade/. Having the discipline to follow this simple process can bring about software manageability for future modifications, easier to read software, and software that contains fewer errors[8].

---

[6] *Ciolkowski, M. Laitenberger, O. Biffl, S. Kaiserslautern Univ. of Technol., Germany* ***Software, IEEE*** *Nov.-Dec. 2003 Volume: 20 , Issue: 6 page(s): 46 - 51*

[7] *Jones, C. Software Productivity Res. Inc., Burlington, MA, USA.This paper appears in:* ***Computer*** *: April 1996 Volume: 29 , Issue: 4 page(s): 94 - 95*

[8] *Barela, S. NSWC Corona Div., USA* ***Autotestcon, 2005. IEEE****. 26-29 Sept. 2005On page(s): 30 - 35*

9. Validating the Defect Detection Performance Advantage of Group Designs for Software Reviews: Report of a Replicated Experiment

It is widely accepted that software development technical reviews (SDTRs) are a useful technique for finding defects in software products. The normative SDTR literature assumes that group reviews are better than individual reviews. Recent debates centre around the need for review meetings. It is found that an interacting group is the preferred choice over the average individual and artificial (nominal) groups. The source of performance advantage of interacting groups is not synergy as was previously thought, but rather in discriminating between true defects and false positives identified by individual reviewers. As a practical implication, nominal groups may be an alternative review design in situations where individuals exhibit a low level of false positives[9].

10. AUSTERE: a system for AUtomated STandard softwarE Review

Since 1988 the Banca d'Italia has had a software quality system, based on UNI EN 2900x standard (derived from ISO 9000), which defines methods, techniques and tools required for the production process and software control. The paper describes a prototype (AUSTERE) for quality control automation and standardization[10].

11. Experimental Evaluation of the Cost Effectiveness of Software Reviews

A new metric for evaluating the cost effectiveness of technical reviews is described. The proposed metric is based on the degree to which testing costs are reduced by technical reviews. The metric can be interpreted as combining two conventional metrics. Using an experimental evaluation of the conventional metrics and the proposed metric for data collected in an industrial environment, the authors show the validity and usefulness of the

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[9] *Pek Wee Land, L. Jeffery, R. Sauer, C. New South Wales Univ., Australia;*
Software Engineering Conference, 1997. Proceedings. 1997 Australian *29 Sept.-2 Oct. 1997 page(s): 17 - 26*

[10] *Fabrizi, S. Procopio, R. Russo, D. Banca d'Italia, Italy;*
Software Engineering Standards Symposium, 1993. Proceedings., 1993*, 30 Aug.-3 Sept. 1993 page(s): 325 - 334*

proposed metric. In particular, they present a method to estimate a value of the proposed metric by using only the values obtained at review phase[11].

12. **The effectiveness of software development technical reviews: a behaviorally motivated program of research**

Software engineers use a number of different types of software development technical review (SDTR) for the purpose of detecting defects in software products. This paper applies the behavioral theory of group performance to explain the outcomes of **software reviews**. Its contributions are to clarify our understanding of what drives defect detection performance in SDTRs and to set an agenda for future research. In identifying individuals' task expertise as the primary driver of review performance, the research program suggests specific points of leverage for substantially improving review performance. It points to the importance of understanding software reading expertise and implies the need for a reconsideration of existing approaches to managing reviews[12].

13. **Quantitative Modelling of Software Reviews in an Industrial Setting**

Technical reviews are a cost effective method commonly used to detect software defects early. To exploit their full potential, it is necessary to collect measurement data to constantly monitor and improve the implemented review procedure. This paper postulates a model of the factors that affect the number of defects detected during a technical review, and tests the model empirically using data from a large software development organization. Since development projects within Product Realization Centre for Optical Networking (PRC-ON) usually spend between 12% and 18% of the total development effort on reviews, it is essential to understand the relationships among the factors that determine review success. One major finding of this study is that the number of detected defects is primarily determined by the preparation effort of reviewers rather than the size of the reviewed artifact. In addition, the size of the reviewed artifact has only limited influence on review effort. Furthermore,

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[11] *Kusumoto, S. Matsumoto, K.-i. Kikuno, T. Torii, K.,Osaka Univ., Japan;* ***Computer Software and Applications Conference, 1991. COMPSAC '91., Proceedings of the Fifteenth Annual International,*** *11-13 Sept. 1991 On page(s): 424 - 429*

[12] *Sauer, C. Jeffery, D.R. Land, L. Yetton, P. Templeton Coll., Oxford Univ., UK ;* ***Software Engineering, IEEE Transactions on*** *Jan. 2000 Volume: 26 , Issue: 1 On page(s): 1 - 14*

consistent ceiling effects in the relationship between size and effort with the number of defects detected. These results suggest that managers at PRC-ON must consider adequate preparation effort in their review planning to ensure high quality artifacts as well as a mature review process[13].

1.3 STATEMENT OF PROBLEM

From the given data we have to analyse and find out the performance of review teams, the kind of requests posted to the company, the types of applications handled, the review completion status. All the analyses are to be made for overall 7 months and individual monthly analyses are to be made to know the above mentioned. The performance of many Support teams who are performing on various issues posted to company in the given period of data has to be found out to appraise their performance. Likewise there are many types of applications and requests handled in the company at a given period of data, from them we have to found out which application is handled most and which kind of request is handled most and their completion status. So that the effort applied on the issue handling process is clearly known. Particularly the Completion status would show the project management skill of the company. The analysis can be done by percentage analysis method, to know the efficiencies. The study and analysis has to be done, to find out the need and importance of issue handling in the process of software development.

1.4 OBJECIVES OF THE STUDY

MAJOR OBJECTIVES:

- to analyze various Software Issue Reports of the Company,
- to appraise the performance of Support Team based on the number of applications they worked; the type of request they have handled and their work completion.
- to find out the application, which has most number of issues, their completion status, the kind of requests posted by the various applications and

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[13] *Laitenberger, O. Leszak, M. Stoll, D. El Emam, K., Fraunhofer Inst., Germany;*
*: **Software Metrics Symposium, 1999. Proceedings. Sixth International**, 4-6 Nov. 1999On page(s): 312 - 322*

- to find out what type of requests that has been posted to company by their clients and the supporters work on it, in the obtained period.

MINOR OBJECTIVES:

- to investigate that the application under issue-handling meets its requirements.
- to ensure that the software has represented according to the predefined standards and
- to ensure the projects more manageable.

1.5 SCOPE OF THE STUDY

The Analysis of software issue reports would reveal us the importance, need, time and effort of support teams in resolving the defects and various types of requests posted by the clients. Also the software developed by the company has met its requirements, the performance of the company in sense of their Support team, the completion of issues in scheduled time period. The issue handling of software is done to filter the defects in it. The analysis would show the number of defects occurred in various applications and the various types of requests posted to the company and their resolvement in accordance with the due date.

1.6 RESEARCH METHODOLOGY

Research methodology is a way to systematically solve the research problem. It shows all the details of data which have been used for the research and procedures, followed in the study.

1.6.1 TYPE OF THE STUDY

The method adopted for the study is historical research. It is based on the study of past and current records of existing delinquent customers to analyse the default status of their account and its significance in order to draw a conclusion.

The research design used in this study is descriptive research design. It answers the questions who, what, where, when and how. A descriptive study is undertaken in order to analyse the Software issue reports of the company.

1.6.2 SAMPLE DESIGN

The number of samples collected for the study and analysis is 554 software issue reports from the company.

1.6.3 METHOD OF DATA COLLECTION

It was obtained from the database of the company from the period 30th March 2007 to 9th January 2008, for which the study and analysis has been made.

1.6.4 TOOLS FOR ANALYSIS

In order to analyse the Software Issue Reports of the company the following tool has been used.

- Microsoft-Excel

MS Excel (full name Microsoft Excel) is a spreadsheet application written and distributed by Microsoft for Microsoft Windows and Mac OS X. It features calculation, graphing tools, pivot tables and, except for Excel 2008 for Mac OS X, a macro programming language called VBA (Visual Basic for Applications). It is overwhelmingly the dominant spreadsheet application available for these platforms and has been so since version 5 in 1993, and is bundled as part of Microsoft Office. Excel is one of the most popular microcomputer applications to date. Due to MS Excel's foundation on floating point calculations, the statistical accuracy of Excel has been criticized, as has the lack of certain statistical tools. Excel proponents have responded that some of these errors represent edge cases and that the relatively few users who would be affected by these know of them and have workarounds and alternatives. Excel also supports the second date format based on year 1904 epoch. The latest version 12.0.0 (2008) of MS Excel has been released on January 15, 2008.

1.7 LIMITATIONS:

From the data we can only obtain the details of who has handled? What application has been handled? What kind of request posted by the client has been resolved? and their delivery status. But,

1. The analysis does not reveal the actual review works (software design changes) carried out by the support team of the organisation for the queries posted by the users of various modules of different applications.

. 2. It does not furnish the procedures followed to enhance the project, to clarify the doubts of clients/users, the methodologies to handle the bugs in the developed software and the proceedings of service provided to clients/users.

3. We cannot know how the Issue handling process is going on in the company for the posted requests which is the important limitation of the study.

4. The project schedule for performing the issue handling process is not known-for every individual application.

1.8 CHAPTER SCHEME:

The FIRST CHAPTER is introductory in nature. This chapter tells about the objectives and scope of the study and its limitations.

The SECOND CHAPTER conveys about the history of the COGNIZANT TECNOLOGIES, Coimbatore, highlighting the origin and development, objectives and production, financial and working of the company, development programmes and plan of the company.

The THIRD CHAPTER gives the macro and micro scenario with respect to the software industry.

The FOURTH CHAPTER presents the data analysis and interpretation.

The FIFTH CHAPTER gives summary of findings and concludes the study with relevant suggestions.

CHAPTER 2

ORGANISATION PROFILE

2.1 HISTORY OF ORGANIZATIONS:

Software firms are the one which are booming as the years move on. In India the major players are Cognizant Technology Solutions, Infosys, Wipro and Satyam. Cognizant Technology Solutions are a leading provider of information technology, consulting and business process outsourcing services. With more than 35 global delivery centers and over 55,000 employees, they combine a unique onsite/offshore delivery model infused by a distinct culture of customer satisfaction. A member of the NASDAQ-100 index and S&P 500 Index, Cognizant is a Forbes Global 2000 company and is ranked among the top information technology companies in Business Week's Info Tech 100, Hot Growth and Top 50 Performers listings.

Cognizant Technology Solutions was founded in 1994 as a captive arm of Dun & Bradstreet Corporation. It started trading since 1998.By 1996 it started looking at third- party clients and began servicing the IT company leveraging India to get listed on NASDAQ and the first company to be assessed enterprise-wide against mature industry process certifications such as P-CMM level 5, BS 7799, SEI-CMMi Level 5. By 2004 it was acknowledged as a leading provider of IT services by industry analysts such as Gartner, Forrester, AMR and IDC and was also added to the prestigious NASDAQ 100 index among companies that defined newer business paradigms.

Cognizant Technology Solutions is one of the leading providers of IT services. It is focused on delivering strategic information technology solutions that address the complex business needs of its clients. The company is committed to partnerships that sustain long-term, proven value for customers by delivering high quality, cost effective solutions.

Cognizant consultancy becomes more customer centric by creating new ways to deliver bottom-line benefits to customers. It provides the services to its customers through unique delivery model employing split project teams that combine technical/functional coordination and relationship management personnel at customer locations and larger

execution and support teams at offshore centers in India. It processes and procedures are tuned to make the best use of this model leveraging two time zones for faster delivery and cost effective solutions.

The vision of the firm is "To be the most preferred software services partner for Fortune 1000 and blue chip customers, worldwide". It has a well framed mission which is "To co-source perfectly engineered software solutions that add competitive advantage to our clients, through long-term partnerships". The firm has a goal which is framed as "Making our customers businesses stronger by empowering them to be more responsive to their customers and to the competitive environment".

BRANCHES: The firm which is headquartered in Teaneck, New Jersey has its presence through out the globe. It has state-of-the-art software development centers, in India (Bangalore, Mumbai, Chennai, Coimbatore, Hyderabad, Cochin, Kolkata & Pune). United States and Canada.

FINANCIAL EXPERTISE:

Revenue for 2007 increased to $2.136 billion, up 50% from $1.424 billion for 2006. GAAP net income was $350.1 million, or $1.15 per diluted share, compared to $232.8 million, or $0.77 per diluted share, for 2006. Diluted earnings per share on a non-GAAP basis were $1.27. GAAP operating margin was 17.9%.

Excluding stock based compensation expense of $35.9 million and a $5.9 million non-cash operating expense charge resulting from the recently enacted fringe benefit tax on the exercise of stock options in India, non-GAAP operating margin was 19.8%. Reconciliations of these non-GAAP financial measures to GAAP operating results and diluted EPS are included at the end of this release.

Revenue Mix 2007:

North America: 83%, Europe: 16%, Asia: 1%

Financial Services: 47%, Healthcare: 24%, Manufacturing/Logistics: 15%, Other: 14%

2.2 MANAGEMENT AND GOVERNANCE:

Cognizant is a private firm and is basically US based multinational firm with

Table 2.1: Management and Governance

Lakshmi Narayanan	Vice Chairman.
Francisco D'Souza	President and Chief Executive Officer.
Gordon Coburn	Chief Financial and Operating Officer.
Chandra Sekaran	The President & Managing Director.
Rajeev Mehta	Global Delivery and as Chief Operating Officer, Global Client Services.
Vishnu Potty	The Director of Coimbatore center.

The company's leadership team leads by example with integrity, respect and a keen eye on building collaboration at every level of its organization.

2.2.1 BOARD OF DIRECTORS

- John E. Klein, Chairman of the Board, Cognizant
- Lakshmi Narayanan, Vice Chairman, Cognizant
- Robert W. Howe, Chairman, ADS Financial Services Solutions
- Robert E. Weissman, Chairman, Shelburne Investments
- Thomas M.Wendel, Former Chief Executive Officer, Bridge Information Systems
- Francisco D'Souza, President and CEO, Cognizant
- John Fox, former Vice Chairman of Deloitte & Touche

2.3 ORGANIZATION STRUCTURE

The Organizational Structure in Cognizant is a top down structure with support areas functioning at all level.

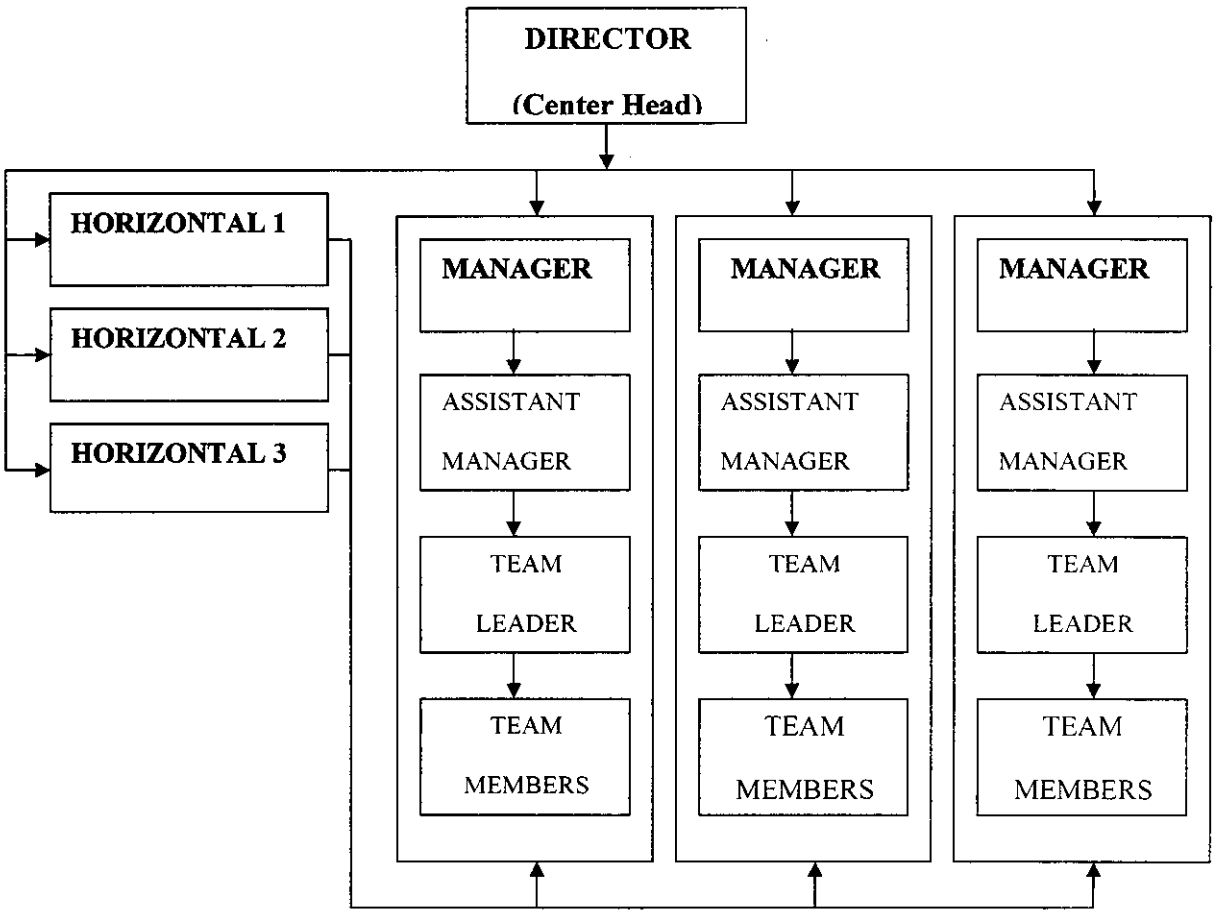


Figure 2.1

2.4 SERVICE PROFILE

The software solutions are provided to both Industries and Services.

2.4.1 SOLUTION INDUSTRIES

- Banking & financial services
- Information management, media & entertainment
- Insurance
- Manufacturing & logistics
- Communications
- Healthcare
- Life sciences
- Technology
- Retail & hospitality
- Healthcare

2.4.2 SOLUTION SERVICES

- Advanced Solutions Delivery
- Cognizant Business Consulting
- Data Warehousing & Business intelligence
- Information Security & Privacy
- Portals & Content Management
- Software Applications Services
- IT Infrastructure Services
- Program Management
- Supply Chain Management
- Customer Solutions Practice
- Enterprise Resource Planning
- Usability Engineering
- Business Process Outsourcing
- Testing Services

2.5 COMPETITIVE STRENGTHS OF THE COMPANY

The ingredients for the success of Cognizant are discussed below.

2.5.1 DIFFERENTIATION FACTORS

- 14 years of experience fusing the Two-in-a-Box TM Client Relationship Model with a seamless Global Delivery experience
- Multifaceted client partnership architecture yielding high customer value and continuous alignment with client teams
- Commitment to measuring full value of outsourcing with "Cognizant's Return on Outsourcing TM" proprietary methodology (ROO)1 based on proven record of delivering results
- Financial success and sound management record resulting in continuous innovation, new services and higher value creation.

2.5.2 KEY ATTRIBUTES

- "Client-first" culture of customer satisfaction, resulting in unique "Cognizant customer experience"
- Distinct identity: Born-global corporation, multicultural workforce and management, entrepreneurial leadership & culture
- Dedicated to building deep, sustainable and long-term client relationships based on collaboration, customization and quality
- Access to the best global IT and BPO resources and skills resulting in intellectual arbitrage advantage for their clients
- Financial re-investment strategy enabling optimal balance and value for global delivery model

- Widely recognized for superior Transition and Knowledge Transfer processes and close cultural fit with clients
- Integrated services approach and flexible business practices
- Industry/domain depth and expertise, according to a verticalized go-to-market approach and, their
    - Business culture
    - Domain expertise
    - Technical expertise
    - Quality of client base
    - Never let client down strategy

2.6 RECENT AWARDS & RECOGNITIONS

- Ranked 6th in Forbes 25 Fastest-Growing Tech Companies list (January 2008).
- Named to Fortune's list of 100 Fastest- Growing Companies for the 5th consecutive year (September 2007).
- Ranked 9th Fastest Growing in Business Week Info Tech 100 list (July 2007).
- Ranked 16th in Business 2.0 100 Fastest Growing Tech Companies (June 2007).
- Ranked 15th in Business Week Hot Growth Companies list (May 2007).
- Entered Forbes Global 2000 list (April 2007).
- Ranked 12th Business Week Top 50 Performers (March 2007).
- Named to CRO 100 Best Corporate Citizens (February 2007).
- Ranked 6th in Business Week Tech Top 50 list (December 2006).

2.7 FUTURE PLANS

Based on current visibility, the Company is now providing the following guidance:

- First quarter 2008 revenue anticipated to be at least $640 million.
- First quarter 2008 diluted EPS is expected to be $0.32 on a GAAP basis and $0.36 on a non-GAAP basis. Fiscal 2008 revenue expected to be at least $2.95 billion, up at least 38% compared to 2007.
- Fiscal 2008 diluted EPS expected to be at least $1.50 on a GAAP basis, and at least $1.67 on a non-GAAP basis.
- Total headcount by end of 2008 expected to be between 72,000 and 75,000.

CHAPTER 3

MACRO AND MICRO ANALYSIS

3.1 MACRO ANALYSIS

The IT industry includes software, telecommunications, wireless, Internet, hardware, peripherals, and computer and data services. Software and hardware segments of the industry accounted for 12.57% of total GDP in 2001.The commercial software industry of 2003 was a $175 billion economic engine with 2.3 million jobs worldwide. Over the last 30 years, an investment of $11 trillion has been made in information technology globally. The major achievements have been in productivity, manufacturing efficiencies, and education applications. Seven of the top thirty fastest growing occupations are projected to be IT-related.

2007 was a test of resilience for the Indian Information Technology – Business Process Outsourcing (IT-BPO) sector. Nonetheless, the sector successfully countered fresh headwinds of a slowing economy and a financial sector crisis in the US, and sharp appreciation of the INR against the USD, in addition to the already existing supply-side constraints – and maintained its double-digit revenue growth. Driving the sector's strong performance was more diversified geographic market exposure and continued expansion of the service portfolio, leading steady growth in scale by Indian-origin service providers as well as Multinational Corporations (MNCs) having operations in India. While many of the challenges faced by the sector persist, and are likely to remain over the foreseeable future, Indian IT-BPO's demonstrated ability to overcome them and continue on its strong growth trajectory reinforces the conviction in its fundamentally strong and sustainable value proposition. India continues to be the 'nerve-centre' for global sourcing with over 2/3rd of the Fortune 500 and a majority of the Global 2000 firms leveraging global service delivery – now sourcing from India. Positive market indicators and a strong track record strongly support the optimism of the industry in achieving its aspired target of USD 60 billion in software and services exports and USD 73-75 billion in overall software and services revenues, by FY2010.

Yet, the size and scope of the opportunity for Indian IT-BPO, and the strategic advantages in realizing its full potential – are significantly larger. Though India is uniquely advantaged to best address these opportunities, they are not lost to others. Timely, coherent and continued action is needed to ensure that India makes the most of these opportunities and maintains its lead.

3.1.1 Global Sourcing Trends in 2007

Worldwide technology products and related services sector spends are estimated to have grown at 7.3 per cent to nearly reach USD 1.7 trillion in 2007 – overcoming concerns of budgetary cutbacks due to an economic slowdown in the US and its spill-over effects on other key markets.

IT-BPO services, growing at an above-sector-average rate of nearly 8 per cent, remain the largest category, accounting for an increasing share of the worldwide technology sector revenue aggregate.

3.1.2 STRATEGIC REVIEW 2008

Outsourcing continues to be the primary growth driver, albeit sustained by gradual shifts in regional spending patterns – with increasing traction in Europe and Asia Pacific offsetting a marginal decline in share of the Americas. Underlying this steady growth in services spends is the increasing adoption and continued evolution of the global sourcing supply-chain. Global sourcing of technology related services is estimated to have grown by about 30 per cent to reach USD 70-76 billion in 2007. Increasing emphasis on innovation-led growth added to the secular trend in technology related spending, with IT-enablement and global delivery now being recognized as complementary means of effectively increasing productivity, reducing time-to-market and thereby increasing the returns on innovation investment. Consequently, players with demonstrated global delivery capabilities continue to close-in on the market shares of the incumbents (US Big-Six and European Big-Five), with India-heritage players reporting the sharpest gains in their share of the total value of large outsourcing contracts awarded in the year 2007. While the portfolio of sourcing destinations continues to evolve, India remains the nerve-centre for any major global sourcing strategy. Sustained growth amongst indigenous

players is being complemented by a continued flow of MNC investments – reinforcing India's growing role in the new world technology order.

3.2 MICRO ANALYSIS

FY 2006-07 witnessed a revalidation of the Indian Information Technology – Business Process Outsourcing (IT-BPO) growth story, driven by a maturing appreciation of India's role and growing importance in global services trade. Industry performance was marked by sustained double-digit revenue growth, steady expansion into newer service-lines and increased geographic penetration, and an unprecedented rise in investments by Multi-national Corporations (MNCs) – in spite of lingering concerns about gaps in talent and infrastructure impacting India's cost competitiveness. The sector looks set to close the year at record levels, with the revenue aggregate growing by nearly ten times over the past ten years.

Positive market indicators including large unaddressed white-spaces and the unbundling of IT-BPO mega-deals with increasing shares of global delivery, strongly support the optimism of the industry in achieving its aspired target of USD 60 billion in exports by 2010.

While India is uniquely advantaged to best address these opportunities, they are not lost to others. Timely, coherent and continued action is needed to ensure that India makes the most of these opportunities and maintains its lead.

3.2.1 Key Highlights of the IT-ITES sector performance

Table 3.1 IT Industry-Sector-wise break-up

USD billion	**FY 2004**	**FY 2005**	**FY 2006**	**FY 2007E**
IT Services	**10.4**	**13.5**	**17.8**	**23.7**
-Exports	7.3	10.0	13.3	18.1
-Domestic	3.1	3.5	4.5	5.6
ITES-BPO	**3.4**	**5.2**	**7.2**	**9.5**
-Exports	3.1	4.6	6.3	8.3
-Domestic	0.3	0.6	0.9	1.2
Engineering Services and R&D, Software Products	**2.9**	**3.9**	**5.3**	**6.5**
-Exports	2.5	3.1	4.0	4.9
-Domestic	0.4	0.8	1.3	1.6
Total Software and Services Revenues	**16.7**	**22.6**	**30.3**	**39.7**
Of which, exports are	**12.9**	**17.7**	**23.6**	**31.3**
Hardware	**5.0**	**5.9**	**7.0**	**8.2**
Total IT Industry (including Hardware)	**21.6**	**28.4**	**37.4**	**47.8**

Total may not match due to rounding off

- *Historical values for a few segments have changed due to availability of updated information*

➢ **Growth in Revenues:** The Indian IT-ITES sector (including the domestic and exports segments) is expected to exceed USD 47.8 billion in annual revenue in FY07. an increase of nearly 28 percent in the current fiscal

- Contribution to GDP estimated to be 5.4% up from 4.8% last year.
- Service and software exports remain the mainstay of the sector contributing USD 31.3 billion and beating forecast to register a 32.6% growth
- Increasing traction in offshore product development and engineering services is supplementing India's efforts in IP creation. This segment is growing at 22-23 percent and is expected to report USD 4.9 billion in exports, in FY 2006-07.

- MNC investments reach an unprecedented scale; over USD 10 billion announced in FY 2006-07, to be invested over the next few years.

- **Service-line expansion:** Aiding service providers to take on larger and more complex deals, and is driving up the average size of contracts awarded to Indian firms. Indian Service Providers have grown their share of contracts of values in excess of USD 50 million dollars from 1% in 2002 to 7% in 2006.
  - High offshore component of delivery and superior execution in multi-location delivery continue to be key differentiators
  - Broad-based industry structure - IT led by large Indian firms, BPO by a mix of Indian and MNC third-party providers and captives, reflects the depth of the supply-base. Even though larger players continue to lead growth, gradually increasing their share in the industry aggregate; several high-performing SMEs also stand out
- **Employment Trends & NASSCOM Initiatives:** Total IT Software and services employment to reach 1.6 million in FY07. The industry in collaboration with the government and other stakeholders has initiated several initiatives to further enhance the availability and access to suitable talent for IT-ITES in India.

Table 3.2 Employment figures - Software and Services sector

Sector	**FY 2004**	**FY 2005**	**FY 2006**	**FY 2007E**
IT Services	215000	297000	398000	562000
ITES-BPO	216000	316000	415000	545000
Engineering Services and R&D and Software Products	81000	93000	115000	144000
Domestic Market (including user organizations)	318000	352000	365000	378000
TOTAL*	**830000**	**1058000**	**1293000**	**1630000**

**Figures do not include employees in the hardware sector*

- **Domestic Market Matures:** Complements the continued growth in IT-ITES exports and for the first time ever in FY 2006 showed signs of breaking out of the hardware led growth and the trend of software and services gaining share is expected to continue
  - The total size of the domestic market is expected to cross USD 15.9 billion in FY 2006-07, a growth of 21 percent over FY 2005-06
  - Traditionally, this segment has been led by MNCs. However, Indian firms are gradually gaining ground. Overtime this segment could become a larger SME play, as the mid-sized firms increase their levels of IT adoption

- **Global Markets:** While US and UK remain the dominant markets for IT-ITES exports, revenues from newer markets are growing rapidly

- **Growth Verticals:** BFSI, Telecom and Hi-Tech continue to account for approximately 60% of the pie. Other verticals such manufacturing, retail, transportation, healthcare and utilities are also growing rapidly.

Table 3.3 Table representing the global market

Countries	FY03	FY04	FY05	FY06
Americas	69.10%	69.40%	68.30%	67.18%
Europe	22.20%	22.60%	23.10%	25.13%
Rest of the World	8.70%	8.00%	8.60%	7.69%

- **Emerging Locations** - As global delivery matures, newer locations are emerging; however India is expected to remain the undisputed leader.

- **Going forward:** For India to fully capitalize on the opportunity and sustain a disproportionate lead in the global IT-ITES space, stakeholders need to continue working towards timely and coherent execution of initiatives to address supply-side concerns across the following areas
    - Augmenting Talent Supply
    - Creating world-class infrastructure
    - Strengthening information security
    - Enhancing operational excellence
    - Providing regulatory support
    - Catalyzing domestic market development
    - Fostering an ecosystem for innovation

3.2.2 ABOUT COGNIZANT

Cognizant is a leading provider of information technology, consulting, infrastructure and business process outsourcing services for Global 2000 Companies located in North America, Europe and Asia. Its Major service offering are Technology strategy consulting, Complex Systems Development Project-based application services, Business and technology consulting, Complex systems integration, Application outsourcing, Business process outsourcing, IT infrastructure outsourcing, Testing solutions, Analytics, ERP, CRM, BI/DW and SCM which also serve as the core competency of the concern. The company does 87% its sales from customers in North America.

Growth Record ('06 to '07)

Employees: +43%; Revenues: +50%; Net income: +64% (GAAP)

Customer Satisfaction Record

93% of clients rate overall Cognizant Customer Experience as

"Much Better, Better or About the Same as Competition" (2006)

Customers

- 500 active clients, 46 of Fortune 100
- 20 of world's top 20 pharmaceutical companies

- 7 of top 10 U.S. healthcare plans
- 4 of top 10 global telecom service providers & equipment vendors
- 10 of top 30 global retailers
- 6 of top 10 U.S. banks, 7 of largest European banks
- 13 of top 30 life, property & casualty insurers
- 3 of top 10 manufacturing & logistics companies
- 4 of top 10 information services companies worldwide
- 4 of top 10 global media companies
- 4 of top 7 online companies

No customer accounted for revenues in excess of 10% of total revenues in 2006 and 2005. One customer, JP Morgan Chase, accounted for 13.7% of revenues in 2004.

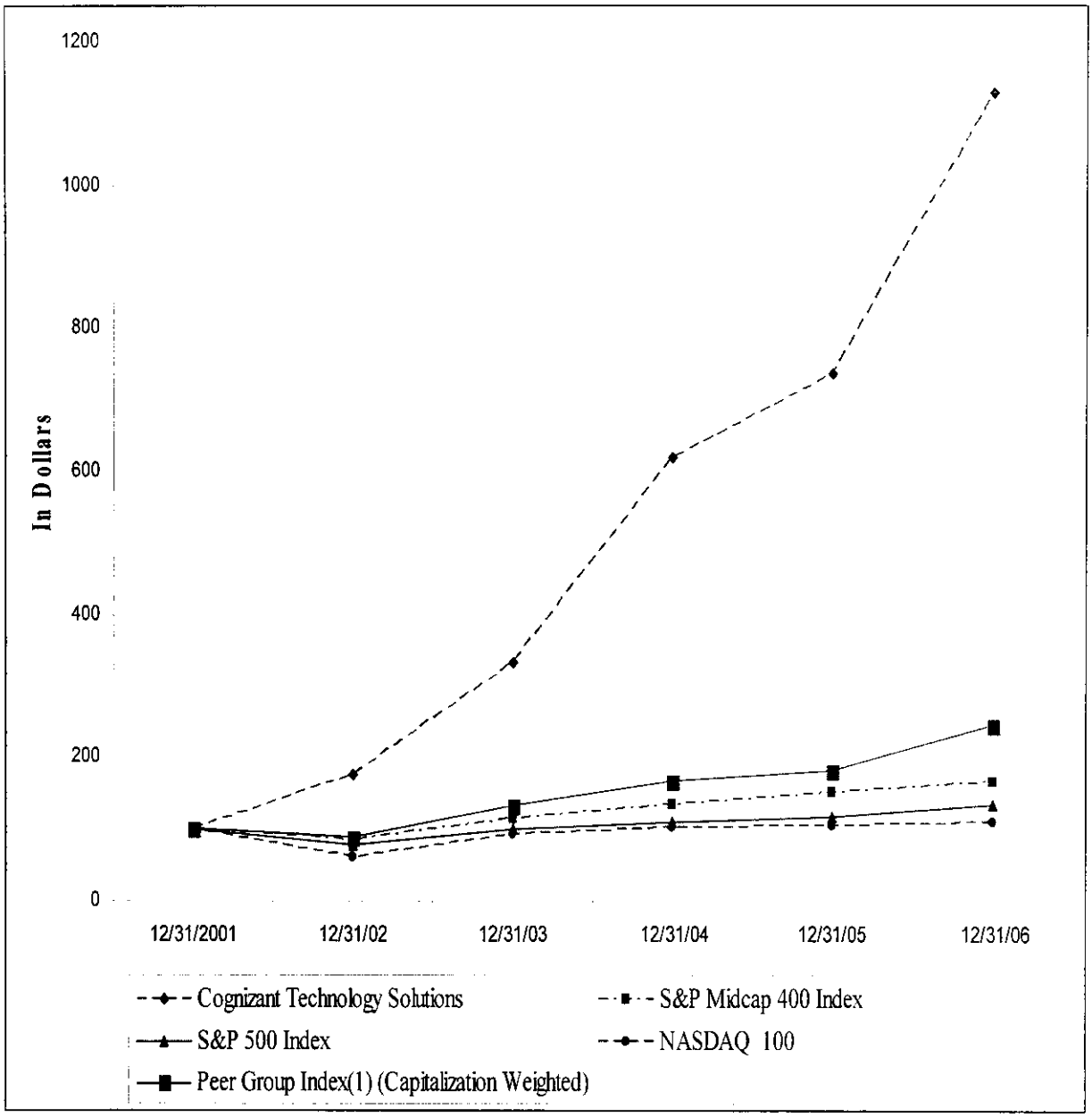
Comparison of Cumulative Total Return

Comparison of Five Year Cumulative Return Among Cognizant, the NASDAQ 100 Index, the S&P MidCap 400 Index, the S&P 500 Index and a Peer Group Index(1) (Capitalization Weighted)

Table 3.4 Comparison of Cumulative Total Return

Company/Index	12/31/2001	12/31/02	12/31/03	12/31/2004	12/31/2005	12/31/06
Cognizant Technology Solutions	100	176.26	334.11	619.77	736.02	1129.72
S&P Midcap 400 Index	100	85.49	115.94	135.05	152	167.69
S&P 500 Index	100	77.9	100.25	111.15	116.61	135.03
NASDAQ 100	100	62.42	93.08	102.79	104.32	111.4
Peer Group Index(1) (Capitalization Weighted)	100	87.33	132.19	166.67	182.11	243.71

CHART 3.1 Performance chart of Comparison of Cumulative Total Return



Geographic Area Information

Revenue by geographic area, are as follows:

Table 3.5Revenue by geographic area

Revenues/Countries	North America	Europe	Asia	Total
2006 Revenues	$1,227,641	$ 183,868	$ 12,758	$1,424,267
2005 Revenues	$ 772,775	$ 103,707	$ 9,348	$ 885,830
2004 Revenues	$ 508,432	$ 73,707	$ 4,534	$ 586,673

NOTE: Includes revenue from operations in United Kingdom of $134,926, $80,834 and $61,223 in 2006, 2005 and 2004, respectively.

RECENT NEWS

Cognizant Sets Up New Delivery Centre in Argentina to Bolster Value to Customers. The new Argentina delivery centre represents Cognizant's 35th global delivery centre and will service global and South American clients on March 11 2008. Cognizant Signs an Agreement with AstraZeneca to Support the Delivery of Clinical Data Management Services on March 10 2008.Cognizant Sets Up First Systems Integration Alliance to Globally Serve Corporate on Europe march 05 2008.

CHAPTER-4

DATA ANALYSIS AND INTERPRETATION

PERCENTAGE ANALYSIS

A tabular summary of data showing the percentage of items in each of several non-overlapping classes is known as percentage analysis. It is also said as, the ratio of a current value to a base value with the result multiplied by 100. It is further said as an index number measures how much a variable changes over time. We calculate an index number by finding the ratio of the current value to a base value. Then we multiply the resulting number by 100 to express the index as a percentage. Note that the index number for base point in time is always 100. In our analysis, the base value is taken as 554 when analysis is made for overall 7 months. For monthly analysis the total number of issues handled in corresponding month value is taken as the base value.

$$\text{Percentage} = \frac{\text{Number of Issues}}{\text{Total Number of Issues Handled}} \times 100$$

The data collected for analysis is from 30th of May 2007 to 9th of January 2008. The Column and Pie charts are used for the analysis of given data.

SECTION A: THE ANALYSIS BASED ON NUMBER OF ISSUES IN GIVEN DATA.

Table 4.1 Number of issues handled on monthly and weekly basis:

Month	Week					Monthly Total of Issues
	1	2	3	4	5	
May	0	0	0	0	10	10
June	2	23	14	23	51	113
July	29	27	28	31	8	123
Aug	10	14	16	11	28	79
Sep	22	13	8	21	0	64
Oct	8	11	6	14	0	39
Nov	3	8	10	14	14	49
Dec	12	9	15	12	2	50
Jan	12	15	0	0	0	27
Weekly Total	98	120	97	126	113	554

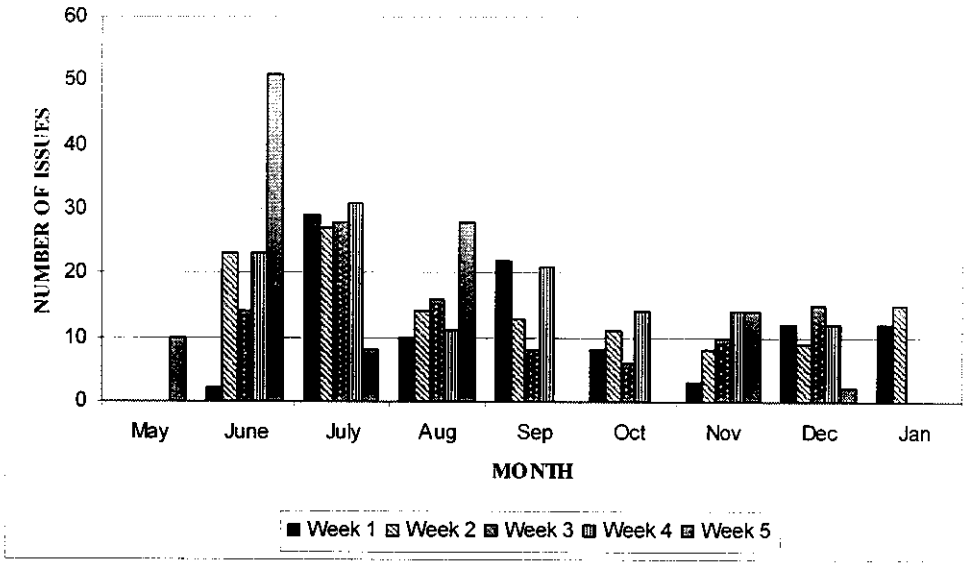


Figure 4.1 Number of issues handled on monthly and weekly basis

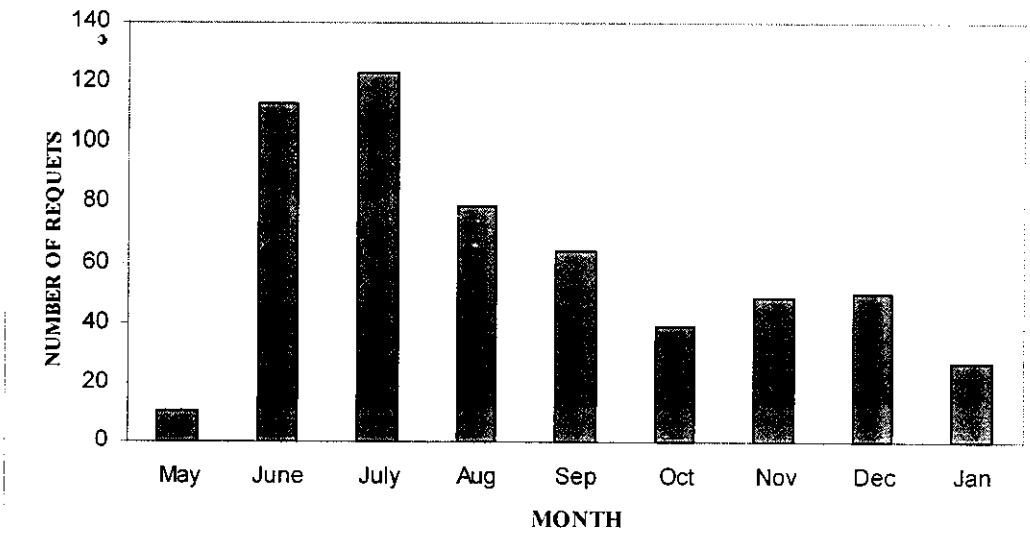


Figure 4.1.1 Number of issues handled on monthly basis

Table 4.1.1 Issues reports on day basis:

DAY'S	NUMBER OF ISSUES
Monday's	84
Tuesday's	106
Wednesday's	118
Thursday's	122
Friday's	121
Saturday's	3
Total	554

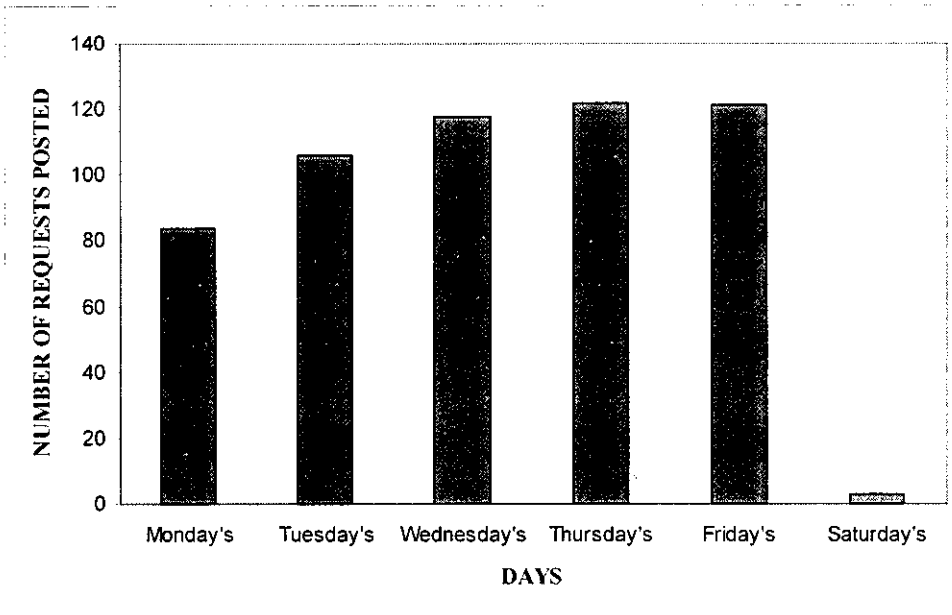


Figure 4.1.2 Issues on day basis

Note: In the given data, on only one Saturday alone the issues have been handled. Hence for the analysis we shall ignore it.

INTERPRETATION:

- From the monthly analysis of number of issues it is inferred that, the number of issues handled on July month is higher than other months, which shows that the support team had served a lot to the client's requests in order to uncover the errors in those projects.

- From the weekly analysis of issues at the 5^{th} week of June month the issues were handled highly and in general of total 7 months at 4^{th} week only the issues were high, as tabulated.

- On day basis of analysis, the number of issues handled on Monday's & Tuesday's are less and the number of issues handled on Wednesday's, Thursday's and Friday's are higher. Since the number of issues posted to the company was less at the beginning of every week, the efforts in the issues handling has reduced.

SECTION B: ANALYSIS ON APPLICATION BASIS.

Table 4.2a Number of issues handled on applications basis in all the seven months:

Presumption: The applications with more than 20 issues alone are furnished in the table and further analyses are made only to them.

S.NO	NAME OF APPLICATION	NUMBER OF ISSUES	PERCENTAGE
1	TIMIT	23	4
2	MAST	242	44
3	MYSPACE	74	13
4	REPORT	26	5
5	Canteen bills	36	6
6	CBE Certification	26	5
7	OTHERS	136	25

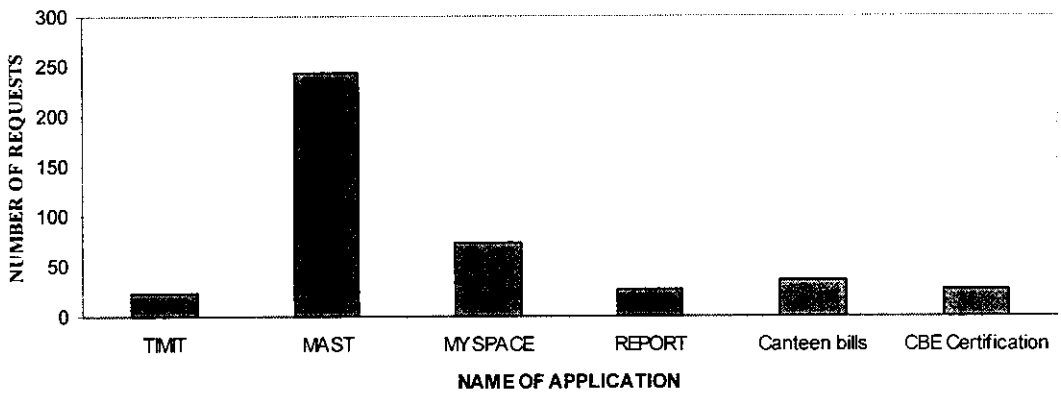


Figure 4.2a Number of issues handled on applications basis in all the seven months

INTERPRETATION:

From the above fig it is inferred that the issues handled on MAST application is higher, when compared to the other applications. Among 554 issues for the given period, MAST alone comprises of 44% of issues, MySpace comprises 13%, Canteen Bills comprises 6%, CBE Certification & Report applications comprises 5% and finally the Timit application comprises of 4%. These are the applications which had many number of issues among the all other applications of the given data.

Table 4.2b Number of issues on applications with less than 20 issues in all the seven months:

S.NO	NAME OF APPLICATION	TOTAL
1	ODE	6
2	320 degree feedback	5
3	PMO	9
4	PMO	9
5	Complaint circle	8
6	POLL	1
7	All tools(need access)	1
8	VISA	2
9	CANTEEN	2
10	Ready Reckoner	10
11	New projects	3
12	Connection tester	1
13	MTM	3
14	Quality	12
15	MVC Certification	1
16	IBIZ Report	5
17	ODE,MAST,MYSPACE	1
18	Quality Complaint circle	2
19	Dats	1
20	Birthdaymail	2
21	Peoplesoft	1
22	Enterpriseportals	1
23	Others	10
24	CBE Canteen	8
25	CBE Finance report	2
26	CBE Firewarden	2
27	CBE Fleet	2
28	Travel MVC	6
29	CBE PMO	7
30	CBE Complaint circle	1
31	CBE Polling	2
32	MVC PMO	1
33	CBE Quality	2
34	IBIZ	1
35	CBE ORION	1

Table 4.2.1 Number of issues handled on applications basis at every month

Presumption: The applications which are handled for three and more times in a month alone are furnished in the table and hence the sum of the percentages are not equal to hundred.

S. NO	MONTH	JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER		JANUARY	
	NAME OF APPLICATION	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage	No. of Issues	Percentage
1	MAST	59	47.9	52	42.2	28	35.4	32	50	15	38.5	22	44.8	23	46	11	40.7
2	MY SPACE	17	13.8	23	18.6	7	8.86	7	10.9	8	20.5	6	12.2	0	0	3	22.2
3	REPORT	7	5.6	6	4.8	6	7.5	0	0	0	0	0	0	0	0	0	0
4	PMO	5	4.1	4	3.2	0	0	0	0	0	0	0	0	0	0	0	0
5	QUALITY	8	6.5	4	3.2	0	0	0	0	0	0	0	0	0	0	0	0
6	CANTEEN BILL	7	5.6	6	4.8	10	12.6	0	0	0	0	3	6.1	7	14	0	0
7	COMPLAINTS CIRCLE	3	2.4	0	0	3	3.7	0	0	0	0	0	0	0	0	0	0
8	TIMIT	0	0	10	8.1	5	6.3	0	0	0	0	0	0	0	0	0	0
9	ODE	0	0	3	2.4	0	0	0	0	0	0	0	0	0	0	0	0
10	CBE CERTIFICATION	0	0	0	0	6	7.5	4	6.25	0	0	3	6.1	5	10	6	11.1
11	CBE PMO	0	0	0	0	0	0	4	6.25	0	0	0	0	0	0	0	0
12	READY RECKONER	0	0	0	0	0	0	0	0	0	0	0	0	4	8	0	0

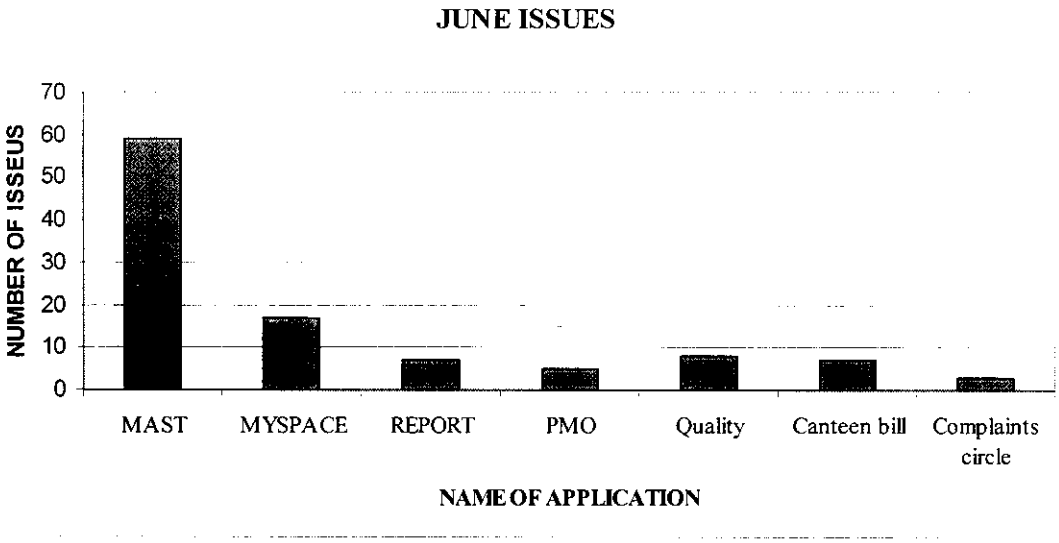


Figure 4.2.1 Number of issues handled on applications basis at June month

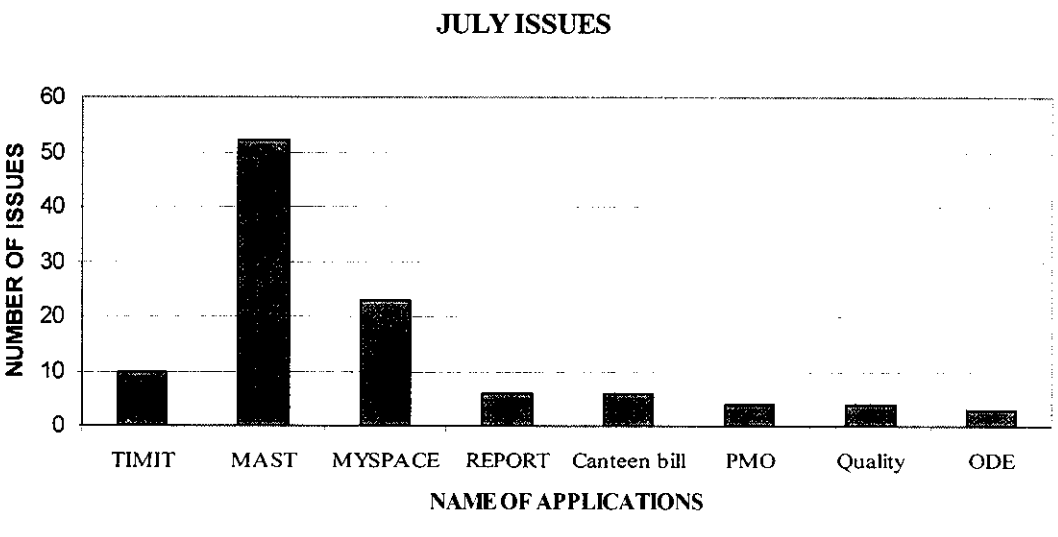


Figure 4.2.2 Number of issues handled on applications basis at July month

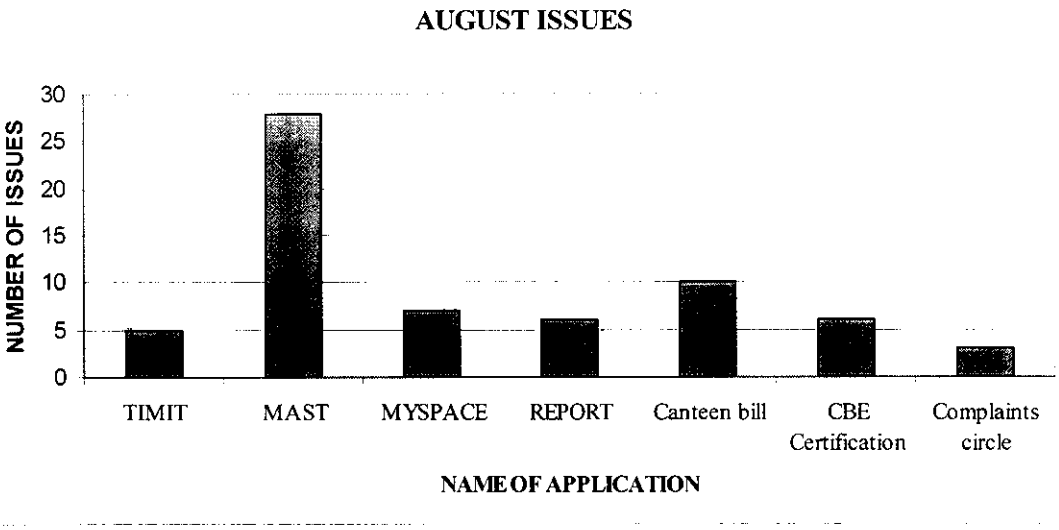


Figure 4.2.3 Number of issues handled on applications basis at august month

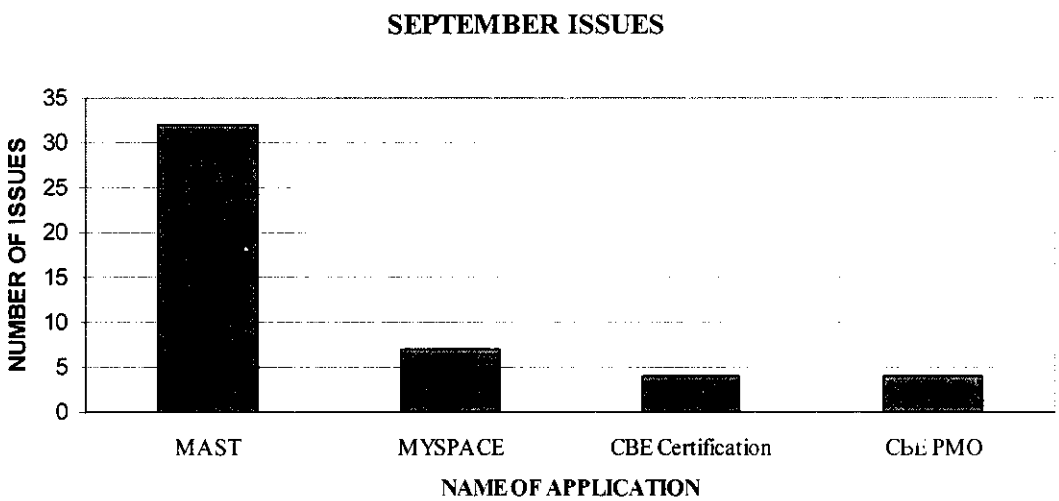


Figure 4.2.4 Number of issues handled on applications basis at September month

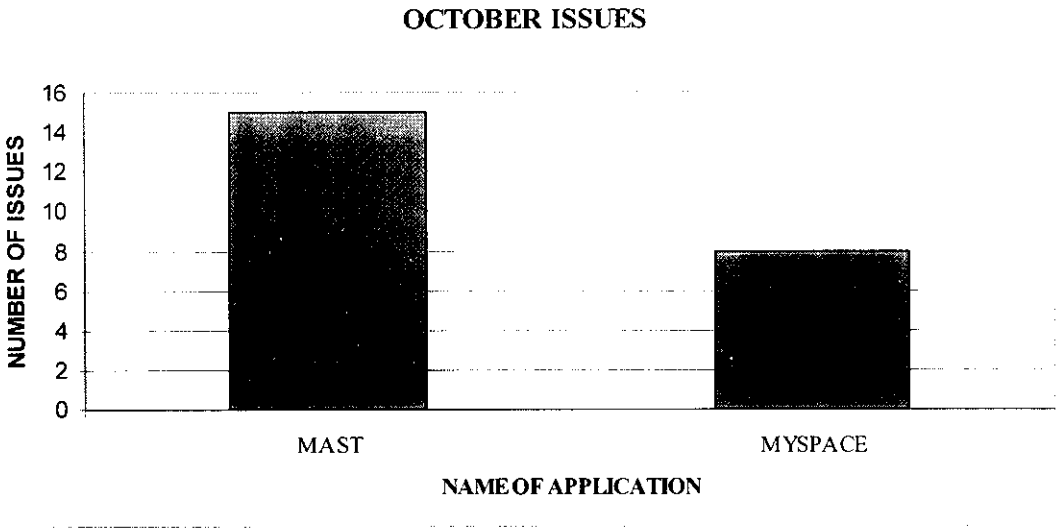


Figure 4.2.5 Number of issues handled on applications basis at October month

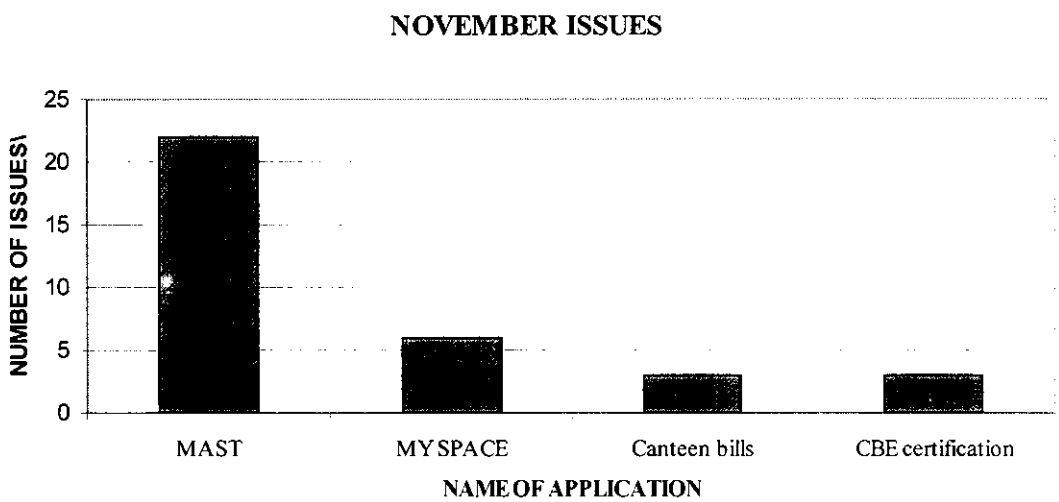


Figure 4.2.6 Number of issues handled on applications basis at November month

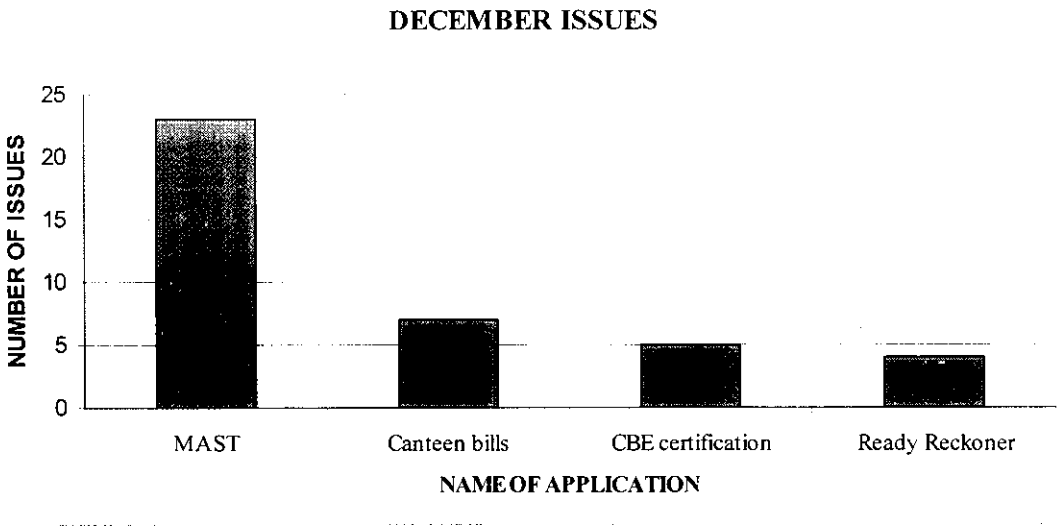


Figure 4.2.7 Number of issues handled on applications basis at December month

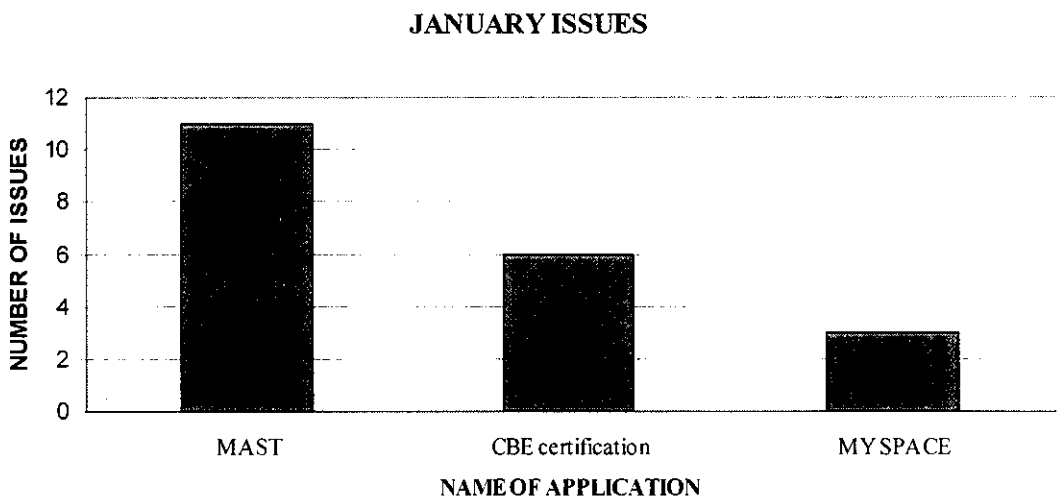


Figure 4.2.8 Number of issues handled on applications basis at January month

INTERPRETATION:

From the above charts the following are inferred,

- The monthly analysis of the various issues handled on the applications say that the issues handling processes that are undergone is to resolve the quality problems of software, that are propagated from the process framework activity.
- Out of 123 issues in June month the application MAST and MYSPACE are handled for 48% and 14% by support teams.
- Among 123 issues in July month the applications MAST and MYSPACE are handled for nearly 42% and 35% for the issues raised by clients.
- On August month, among 79 issues the applications MAST and Canteen bills were alone handled for nearly 35% and 13%.
- In September month among 64 issues handled the applications MAST and MYSPACE were handled for nearly 50% and 11%.
- At the month of October among 39 issues handled the applications MAST and MYSPACE were handled for nearly 39% and 20% by the support teams.
- In November month among 49 issues handled the applications MAST and MySpace were handled for nearly 45% and 22%.
- Out of 50 issues handled in December month the applications MAST and Canteen bills have been handled highly, which are nearly 46% and 14%.
- In the month of January among its 27 issues the applications MAST, MySpace and Cbe Certification were handled high in number, for nearly 41%, 22% and 11% by the Support teams.

Thus, the various issues handled on many applications including enhancements have improved their software engineering activities that we called analysis, design, and coding which avoided the problems in execution of projects and there by satisfying the User`s requirements.

TABLES OF APPLICATION'S Vs SUPPORT TEAM & TYPES OF REQUEST

Table 4.2.2 Issues of TIMIT Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBER OF ISSUES
1	T1	1
2	T3	13
3	T5	1
4	T8	1
5	T10	1
6	T11	1
7	T12	1
8	T19	1
9	BLANK	3
TOTAL NUMBER OF ISSUES		23

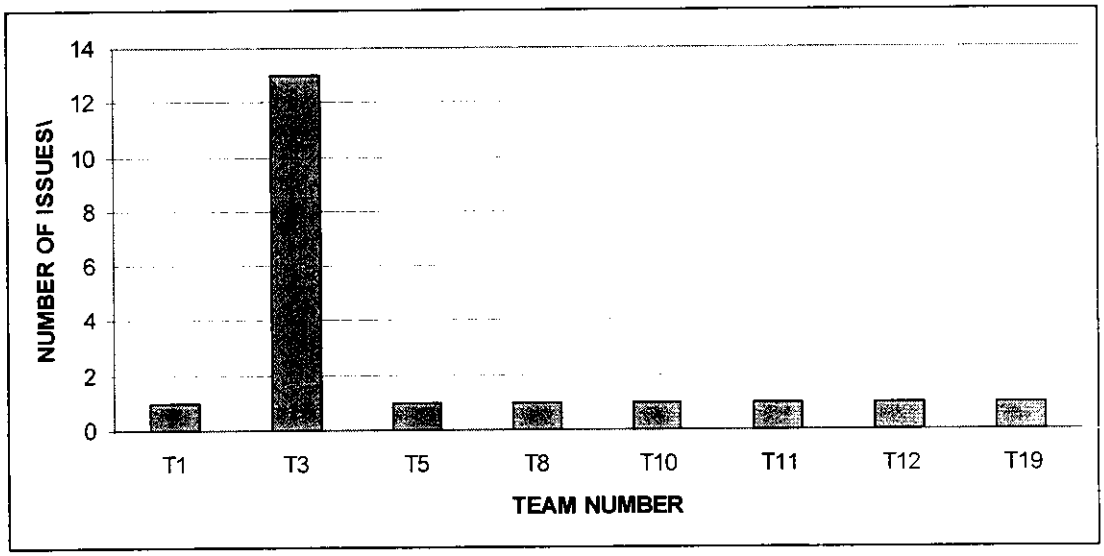


Figure 4.2.9 Issues of TIMIT Application Vs Support Team

INTERPRETATION:

From the figure it is inferred that particularly the Support team T3 has put most of their efforts in ending up those issues raised by TIMIT application. The other teams such as T1, T5, T8, T10, T11, T12 and T19 have also worked in the issues handling process of TIMIT application in the given period of data.

Table 4.2.3 Issues of TIMIT Application Vs Types of Request

Note: The request Enhancement was not posted for TIMIT application during the given period of data.

MONTH	TYPES OF REQUEST		
	BUG FIX	CLARIFICATION	SERVICE REQUEST
JUNE	2	0	2
JULY	1	2	7
AUGUST	1	0	4
SEPTEMBER	0	0	2
OCTOBER	0	1	1
NOVEMBER	0	0	0
DECEMBER	0	0	0
JANUARY	0	0	2
TOTAL	2	3	18

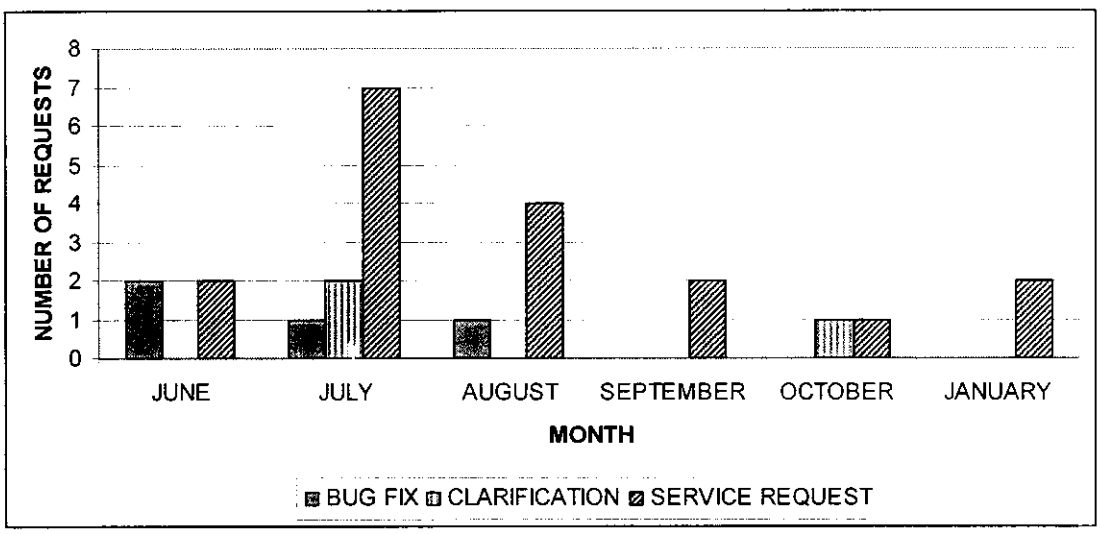


Figure 4.2.10 Issues of TIMIT Application Vs Types of Request

INTERPRETATION:

For the TIMIT application Service request was the type of request posted in large number than Clarification and Bug fix requests. It is to note that the various teams involved in development of TIMIT project have to work on better to avoid issues raise up. Since the number of Bugs in TIMIT is less, it shows the developers effort in generation of it.

Table 4.2.4 Issues of MAST Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBER OF ISSUES
1	T1	1
2	T2	92
3	T4	105
4	T6	1
5	T7	1
6	T9	1
7	T10	7
8	T11	3
9	T15	8
10	T16	3
11	T17	6
12	T20	1
13	T21	1
14	T22	2
TOTAL		242

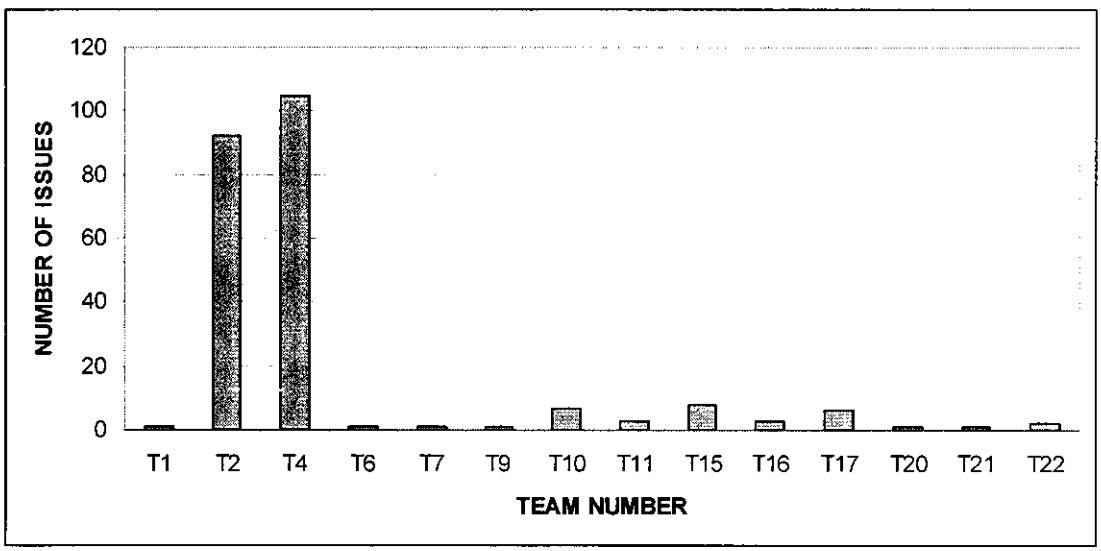


Figure 4.2.11 Issues of MAST Application Vs Support Team

INTERPRETATION:

From the figure it is noted that the teams T4 and T2 were much focused to MAST application over the given period, in resolving various kinds of issues raised by it. Also to a very less number the other contributors were T10, T15, T11, T16, T1, T6, T7, and T9.

Table 4.2.5 Issues of MAST Application Vs Types of Request

Note: The request Enhancement was not posted for MAST application during the given period of data.

MONTH	TYPES OF REQUEST		
	BUG FIX	CLARIFICATION	SERVICE REQUEST
JUNE	18	22	19
JULY	4	26	22
AUGUST	4	12	12
SEPTEMBER	1	20	9
OCTOBER	0	6	9
NOVEMBER	0	13	9
DECEMBER	1	13	9
JANUARY	0	8	3
TOTAL	27	120	92

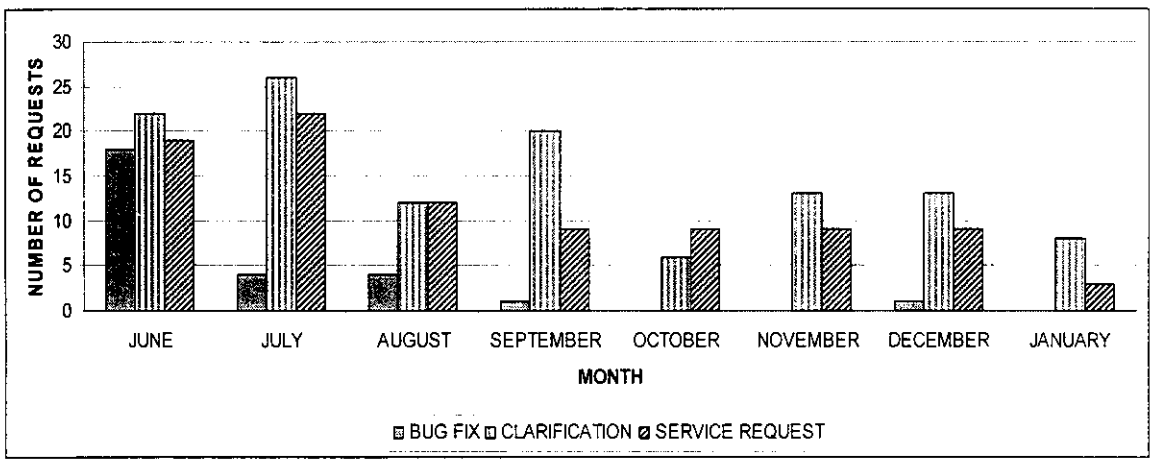


Figure 4.2.12 Issues of MAST Application Vs Types of Request

INTERPRETATION:

From the figure we ought to know that from the application MAST, Service request and Clarification were the two kinds of requests posted in large number than the Bug fix request. As the number of bugs are less in number, which shows that the developers have performed well in the design process itself. But yet the members who have worked on MAST could have still worked to reduce the other kinds of issues raised, by which the *defect amplification* and *cost impacts* can be lessened.

Table 4.2.6 Issues of MySpace Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBEROF ISSUES
1	T1	4
2	T3	10
3	T4	40
4	T6	1
5	T7	1
6	T8	2
7	T9	5
8	T11	11
9	T12	6
10	T23	2
TOTAL		73

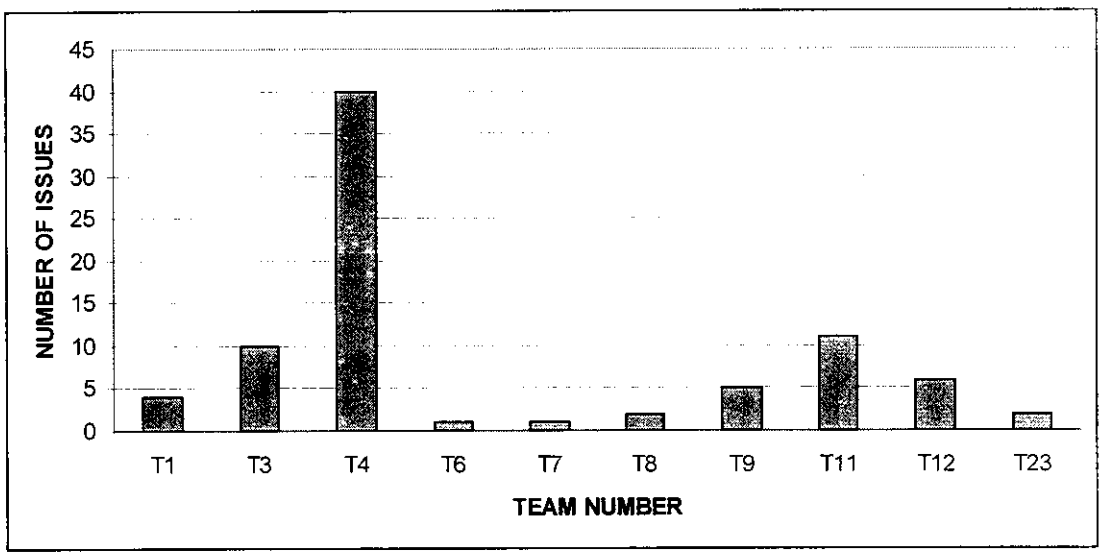


Figure 4.2.13 Issues of MySpace Application Vs Support Team

INTERPRETATION:

From the figure it is inferred that the Support team T4 have handled 40 issues among total 73 issues of MySpace application. Also the other teams such as T11, T3, T12, T9, T1 and T23 have handled the issues in MySpace application to further make that application up to User's requirement.

Table 4.2.7 Issues of MySpace Application Vs Types of Request

Note: The request Enhancement was not posted for MySpace application during the given period of data.

MONTH	TYPES OF REQUEST		
	BUG FIX	CLARIFICATION	SERVICE REQUEST
JUNE	3	9	5
JULY	4	7	12
AUGUST	0	3	5
SEPTEMBER	2	4	1
OCTOBER	2	1	5
NOVEMBER	3	1	2
DECEMBER	0	0	2
JANUARY	0	0	3
TOTAL	14	25	35

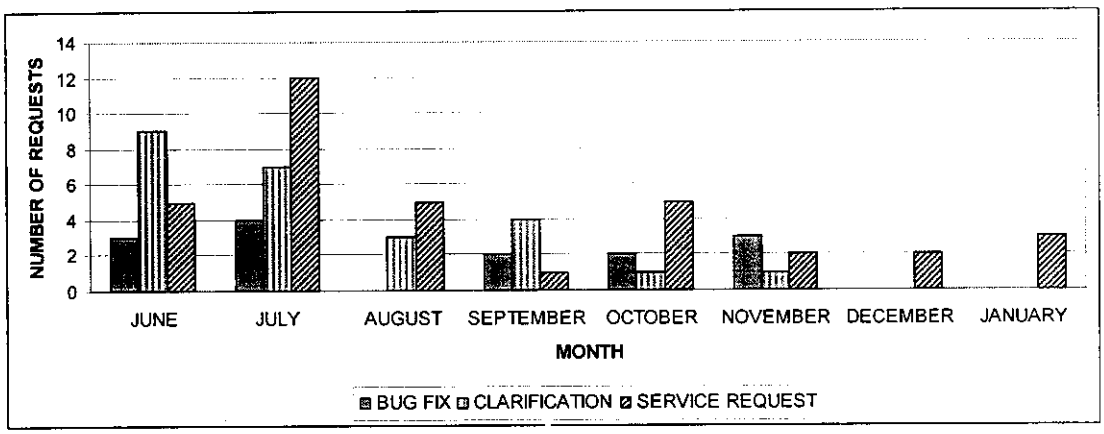


Figure 4.2.14 Issues of MySpace Application Vs Types of Request

INTERPRETATION:

From the figure it is known well that for MySpace application Service request was the request posted in more number. Also the request Clarification was the second highly posted request and the third one was the bug fix request. Bugs in MySpace is shown higher which shows that the software engineering process of MySpace has some deviations which are resolved further in issues handling process. Hence the developers can work on well to reduce the number of issues raised in later part of project processes.

Table 4.2.8 Issues of REPORT Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBER OF ISSUES
1	T1	12
2	T2	1
3	T3	10
4	T6	2
5	T7	1
TOTAL		26

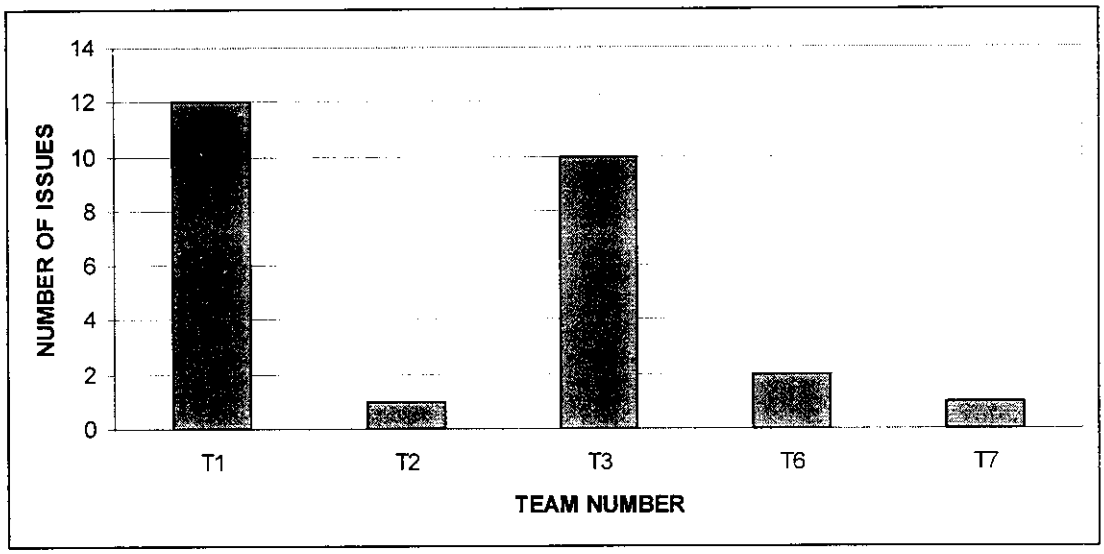


Figure 4.2.15 Issues of REPORT Application Vs Support Team

INTERPRETATION:

From the figure it is inferred that in resolving the issues raised by REPORT application the teams T1 and T3 have contributed to a greater number. The other support teams which performed for REPORT application are T6, T2 and T7. Thus the support teams are performing well to make sure the quality assurance standpoint of applications.

Table 4.2.9 Issues of REPORT Application Vs Types of Request

Note: The request of type Bug Fix was not posted for REPORT application during the given period of data.

MONTH	TYPES OF REQUEST		
	CLARIFICATION	ENHANCEMENT	SERVICE REQUEST
JUNE	0	2	5
JULY	1	0	5
AUGUST	2	0	4
SEPTEMBER	0	0	2
OCTOBER	1	0	1
NOVEMBER	1	0	1
DECEMBER	1	0	1
JANUARY	0	0	0
TOTAL	6	2	19

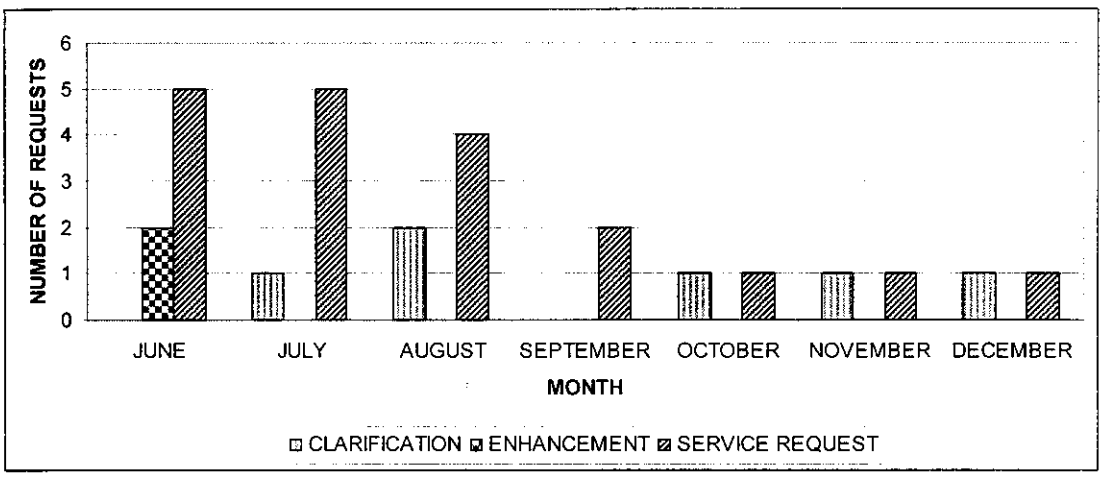


Figure 4.2.16 Issues of REPORT Application Vs Types of Request

INTERPRETATION:

From the above chart it is inferred that for REPORT application at June month the Enhancement request has been posted for task of query. The enhancement handling is quite tough process to undergo with it. The other requests that were posted in large number are Clarification and Service request. Thus the developers of project have to focus much to reduce the issue araisals in future.

Table 4.2.10 Issues of Canteen Bills Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBER OF ISSUES
1	T5	1
2	T6	18
3	T7	3
4	T9	1
5	T12	1
6	T14	8
7	T18	2
8	ISG-Coimbatore	2
TOTAL		36

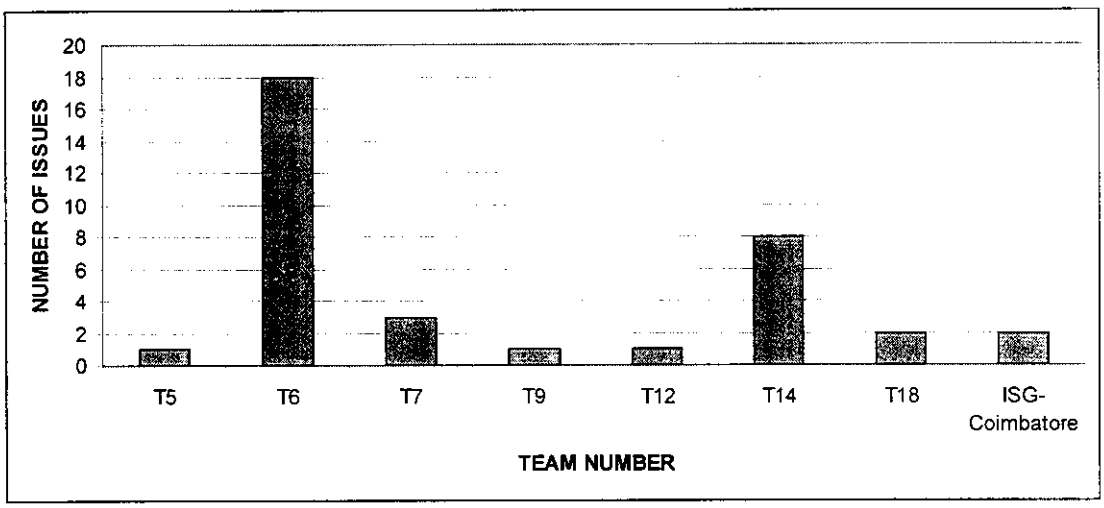


Figure 4.2.17 Issues of Canteen Bills Application Vs Support Team

INTERPRETATION:

From the figure it is inferred that the team T6 is much focused to Canteen bills application in resolving various kinds of issues raised by it. Also the other teams such as T14, T7, T18, T12, T5 and T9 have also handled the issues raised upon various kinds of requests that were posted to Canteen bills application.

Table 4.2.11 Issues of Canteen Bills Application Vs Types of Request

Note: The request Enhancement was not posted for Canteen Bills application during the given period of data.

MONTH	TYPES OF REQUEST		
	BUG FIX	CLARIFICATION	SERVICE REQUEST
JUNE	0	7	0
JULY	0	6	0
AUGUST	1	7	2
SEPTEMBER	0	1	0
OCTOBER	0	0	1
NOVEMBER	0	3	0
DECEMBER	0	6	1
JANUARY	0	1	0
TOTAL	1	31	4

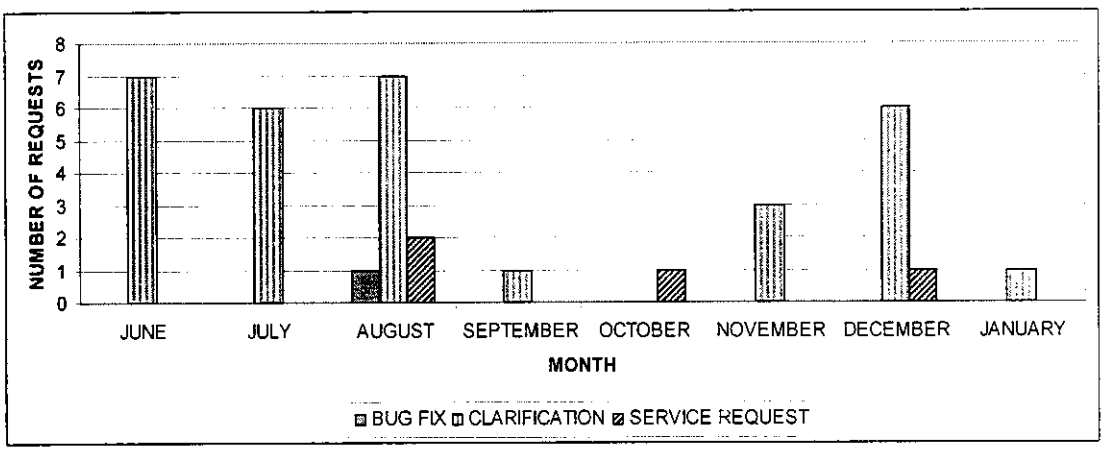


Figure 4.2.18 Issues of Canteen Bills Application Vs Types of Request

INTERPRETATION:

From the above figure it is noted that Clarification was the kind of request posted highly by the user in all the months except October. The other requests such as service request and bug fix were posted less in number by user. At the month of august alone the Bug fix request is posted due to doubts about food recovery. This shows the effective performance of developers in Canteen bills application. Similarly the performance can be increased to reduce the Clarification kind of requests.

Table 4.2.12 Issues of CBE Certification Application Vs Support Team

S.NO	SUPPORT TEAM	NUMBER OF ISSUES
1	T1	1
2	T6	7
3	T7	3
4	T13	10
5	T14	5
TOTAL		26

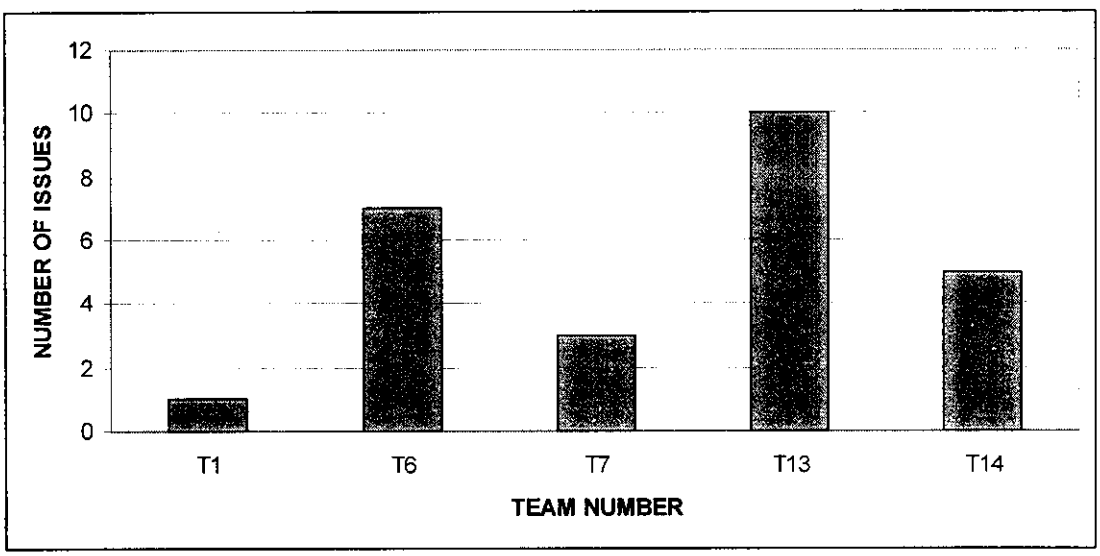


Figure 4.2.19` Issues of CBE Certification Application Vs Support Team

INTERPRETATION:

For CBE Certification application the figure conveys us that the performance of team T13 is especially higher. Also the teams T6, T14, T7 and T1 have performed to resolve the issues raised by the users. So, the supporters were performing their assignments properly to satisfy the users.

Table 4.2.13 Issues of CBE Certification Application Vs Types of Request

Note: The request Enhancement was not posted for CBE Certification application during the given period of data.

MONTH	TYPES OF REQUEST		
	BUG FIX	CLARIFICATION	SERVICE REQUEST
JUNE	0	0	0
JULY	0	0	0
AUGUST	0	1	5
SEPTEMBER	0	1	3
OCTOBER	0	0	2
NOVEMBER	1	1	1
DECEMBER	0	3	2
JANUARY	0	2	4
TOTAL	1	8	17

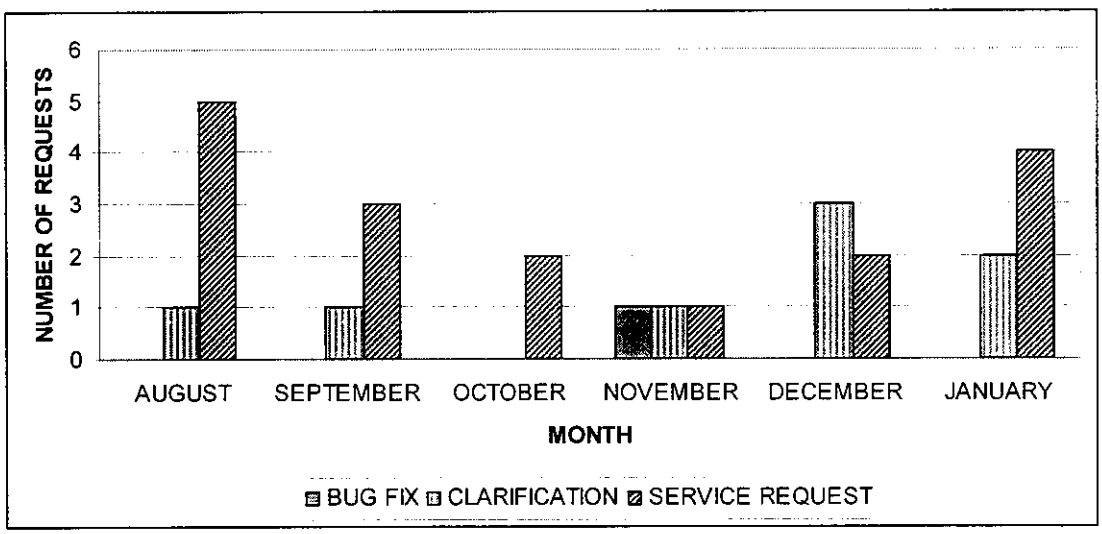


Figure 4.2.20 Issues of CBE Certification Application Vs Types of Request

INTERPRETATION:

From the figure it is inferred that, for CBE Certification application only at the month of November the bug fix request is raised due to Problem faced while *approving certification* details. In other months the Service request and Clarification requests has been dealt in large numbers, which can be reduced by monitoring well in the requirement analysis process of Software development.

SECTION C: THE ANALYSIS BASED ON TYPES OF REQUESTS.

Table 4.3 Types of requests posted to company on Monthly basis:

S.NO	MONTH	TYPES OF REQUEST				TOTAL NUMBER OF REQUESTS
		BUG FIX	CLARIFI-CATION	SERVICE REQUEST	ENHANCE-MENT	
1	JUNE	30	39	48	5	122
2	JULY	16	45	58	1	120
3	AUGUST	8	26	43	1	78
4	SEPTEMBER	4	33	24	1	64
5	OCTOBER	4	12	23	0	39
6	NOVEMBER	5	24	19	1	49
7	DECEMBER	2	27	20	1	50
8	JANUARY	0	13	13	0	26
9	TOTAL	69	219	248	10	548
10	AVERAGE	12	40	45	2	

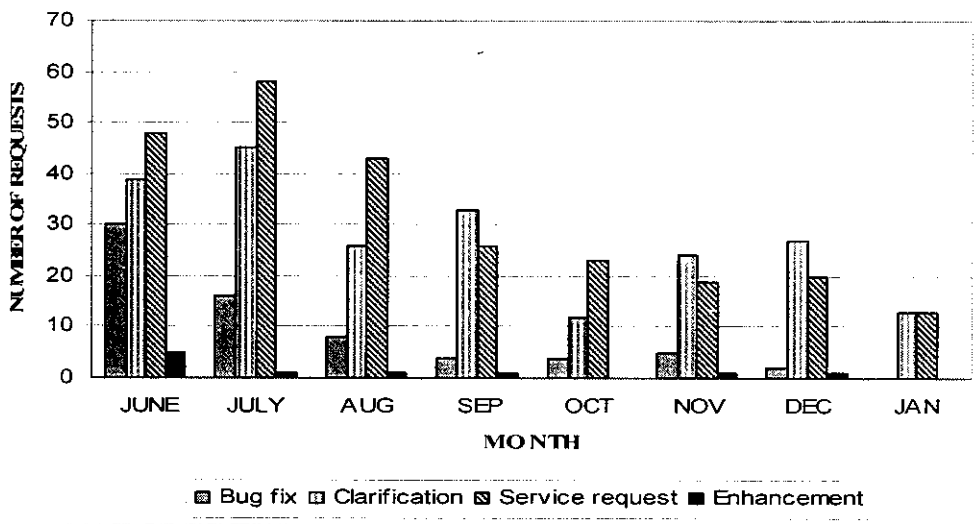


Figure 4.3 Types of requests posted to company on Monthly basis

INTERPRETATION:

From the above table it is inferred that, Service request the kind of request which has been posted more in number of nearly 45%, Clarification is another kind of request which is posted to nearly 40%, Bug fix is request has been posted for about 12% and Enhancement request is posted nearly to 2% only, to the company in the given period.

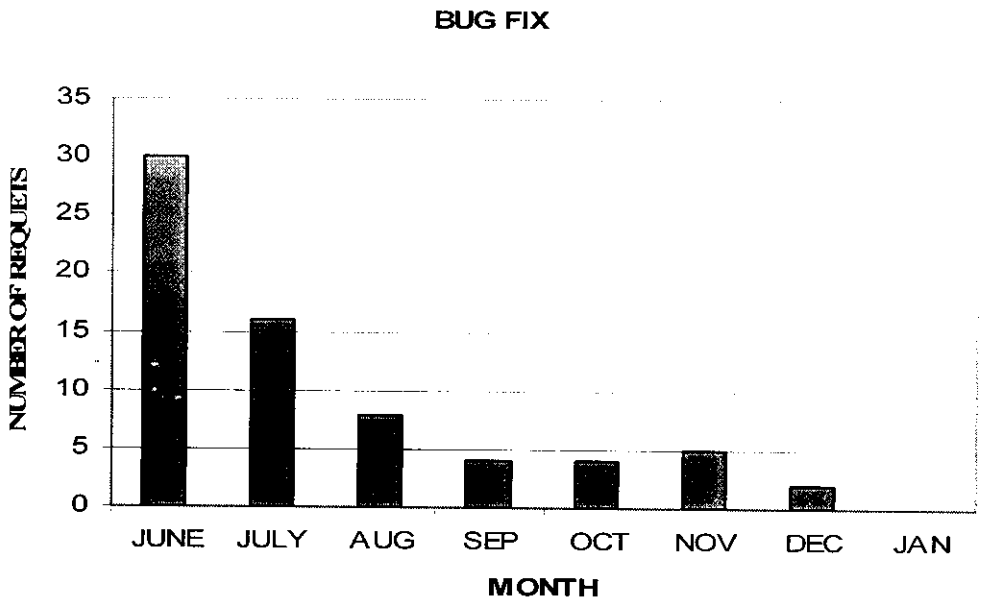


Figure 4.3.1 Bug fix request posted to company on monthly basis

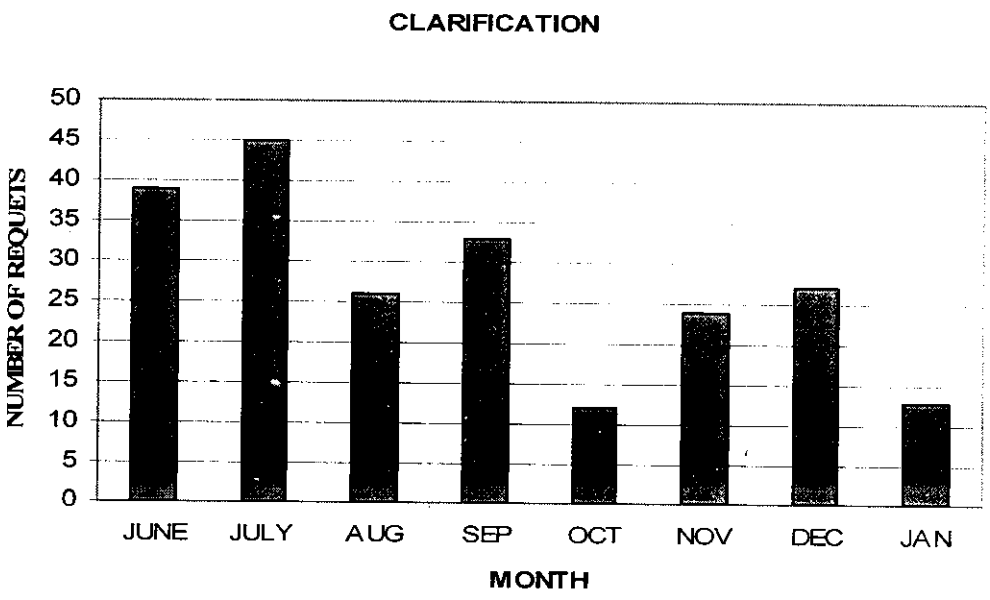


Figure 4.3.2 Clarification request posted to company on monthly basis

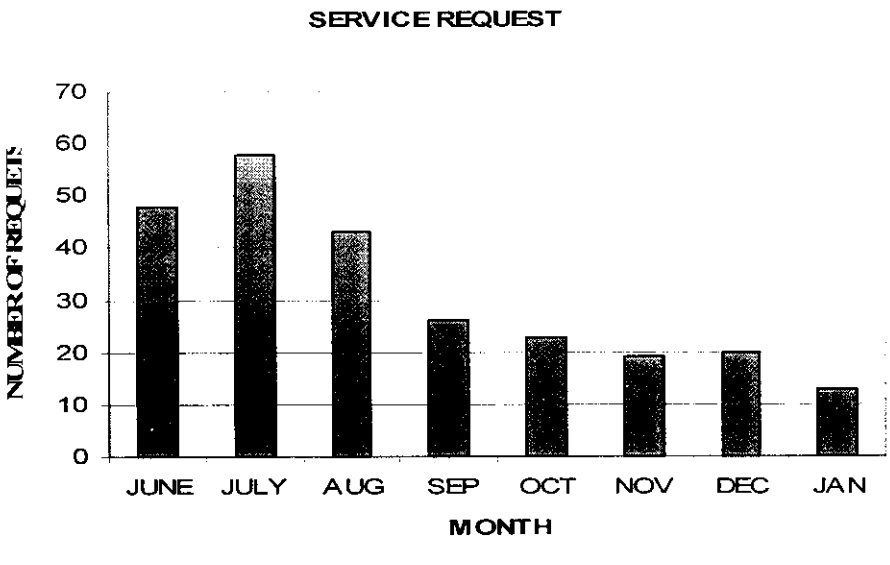


Figure 4.3.3 Service request posted to company on monthly basis

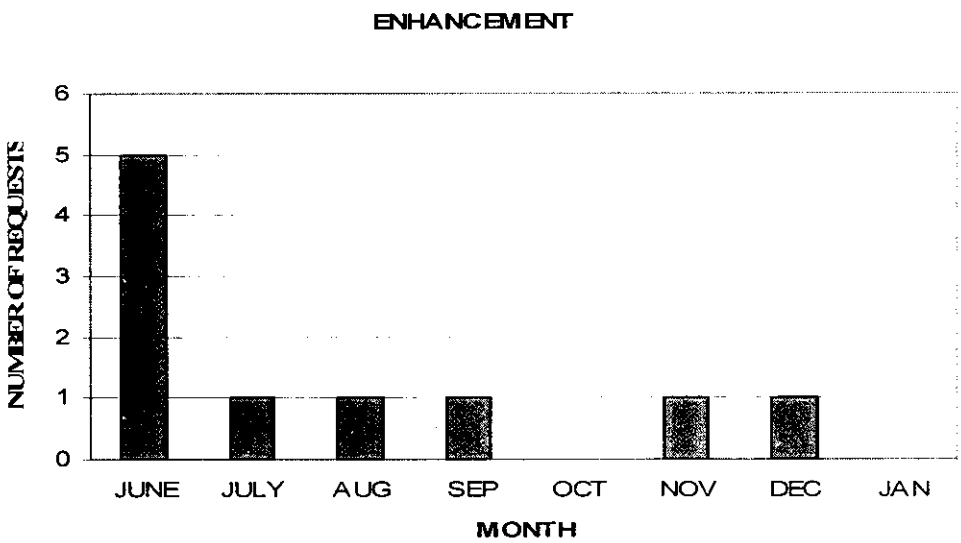


Figure 4.3.4 Enhancement request posted to company on monthly basis

INTERPRETATION:

From the above charts it is suggested that the software developing teams can still work on to reduce the Service request, Clarification kinds of request by providing all the necessary details in more understandable manner to clients and also they can reduce the bugs that are generated in the projects by organizing well the framework activities of projects. Hence by which the company can reduce the *ended cost* and *schedule overruns*.

TABLES OF TYPES OF REQUEST Vs APPLICATION, SUPPORT TEAM.

Table 4.3.1 Issues on Bug Fix Request Vs Applications on monthly basis.

MONTH	NAME OF APPLICATIONS														
	MAST	My Space	TIMIT	Quality	Complaint Circle	Travel MVC	PMO	360 Degree Feedback	ODE	IBIZ Report	Travel desk@ MVC	CBE Certification	CBE Quality	CBE Complaint circle	Total no. of Issues
June	18	3	0	7	2	0	0	0	0	0	0	0	0	0	30
July	4	4	1	2	0	1	2	1	1	0	0	0	0	0	16
August	4	0	1	0	1	0	0	0	0	1	0	0	0	0	8
September	1	2	0	0	1	1	0	0	0	0	0	0	0	0	4
October	0	2	0	0	0	0	0	0	0	0	1	0	0	0	4
November	0	3	0	0	0	0	0	0	0	0	0	1	1	0	5
December	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Total no. of Issues	28	14	2	9	4	2	2	1	1	1	1	1	1	1	69

INTERPRETATION:

The above tabulated applications have a number of Bugs which are requested to resolve by their respective clients and for which the support teams had worked to resolve the bugs. Mainly the application MAST has been handled highly on this Bug Fix request. Hence

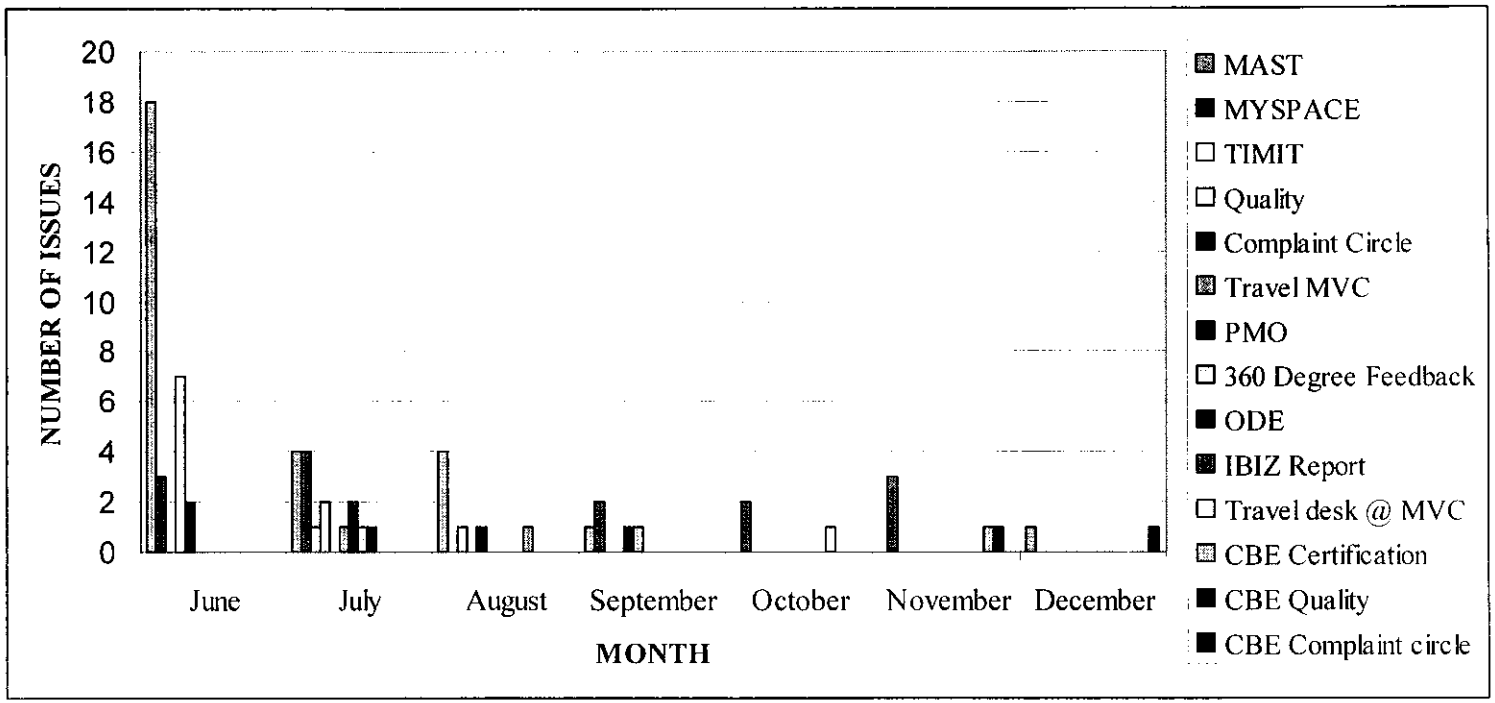


Figure 4.3.5 Issues on Bug Fix Request Vs Applications on monthly basis.

it shows that in the applications listed above the Bugs were generated due to various reasons which can be reduced by concentrating well in work at software development process.

Table 4.3.2 Issues on Bug Fix Request Vs Support Teams on monthly basis.

MONTH	TEAM NUMBER															No. of Issues
	T1	T2	T3	T4	T5	T7	T8	T9	T11	T12	T13	T17	T25	T24	T22	T23	
JUNE	1	1	7	15	1	0	1	1	0	0	0	0	0	0	1	2	30
JULY	2	1	2	4	1	0	2	0	0	0	0	0	1	1	0	0	14
AUGUST	0	3	0	1	3	1	0	0	0	0	0	0	0	0	0	0	8
SEPETMBER	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	4
OCTOBER	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	4
NOVEMBER	2	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	5
DECEMBER	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
JANUARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of Issues	5	5	22	7	7	1	3	1	2	3	1	1	1	1	1	2	69