Teamwork in Software Organizations

G P Sudhakar

MCA, M.Tech, EMBA, PMP, MIMA, ADM, (PhD), Faculty Member, ICFAI School of Information Technology (ISIT), Plot# 63, Nagarjuna Hills, Punjagutta, Hyderabad, India. Email: purna24@hotmail.com

Indian IT Industry has crossed US$ 60 billion mark. There are few Indian IT organizations whose revenues are more than US $5 billion. The industry has seen an average double digit growth rate for more than a decade. Indian IT industry has got significant importance in Indian economy and in employment generation. The Indian IT job market is picking up and young engineers are getting offers from reputed IT firms. The outside world might be wondering about the success of Indian IT industry and its delivery and business models. The hidden strength behind this success is the Indian software development teams. It is the team orientation, delivery approach, processes, customer focus which is giving the repeat customers to the Indian IT organizations. Thus this article is about Indian software teams.

1. Introduction

Basically, team orientation in organizations has come into existence since the studies of Fredric Taylor's scientific management. However, this has been picked up aggressively in multinational organizations since 1970s. Currently more than 2/3^{rds} of the Fortune 500 organizations are delivering their products and services to the customers using teams. Industries such as Hardware, Software, Pharmaceutical, Construction, Healthcare, Manufacturing and Telecom industries are extensively using teams not only in product development but also in other business functions such as marketing, HR, and finance.

There exist different types of teams in organizations. They are *project teams, work teams, parallel teams*, and *management teams*. Usually one can find *project teams* in software, hardware and telecom companies. These teams have specific objective to achieve in specified time limit with the given budget and acceptable quality to the customer. One can find *work teams* in manufacturing industries and where assembly line work goes on. *Parallel teams* can be found in research areas such as drug discovery and bio-technology areas, and also in some IT organizations. Top *management team* consists of the C-level executives such as CEO, COO, CMO, CTO, and CIO. They work as a team in most of the multinational organizations.

2. Characteristics of Teams

Team is a collection of people working together with complementary skills and for common purpose and objective. Every team in the organization has got an objective to achieve. For example, project teams work towards the project end product, result or service.

A *Team* may consists of individuals with varied experience levels, different genders, age, different skill set, different educational and organizational backgrounds, different race, religion, and different ethnic backgrounds.

All team members work towards the team objective under the leadership of the team leader. Mutual trust, cooperation, cohesion, respect for others, cultural sensitivity, maturity, and support for others, safety for team participation, having team vision, task orientation, and support for productive environment and having team norms and ground rules are some of the characteristics of teams in organizations.

The members in high performance teams have certain special characteristics. They are collective accountability, collective ownership, mutual trust, support for other team members' development and welfare, superior customer orientation, task orientation, having great team vision, situational group leadership, group decision making, and respect for others' culture, language, region and religion.

3. Teams in Software Organizations

One can find many types of teams in software organizations. They are development teams, support teams, testing teams, maintenance teams, quality teams and disaster recovery teams.

As known very well, *Development teams* develop the product or solution based on customer given requirements or any standard specifications. These development projects have team members and project manager to work on the project. They have fixed time limit to deliver the project product. These teams are given fixed budget and time and required quality limits. It is very rare to find a project team with unlimited

time and money allotted to it. These project development teams do requirements gathering, analysis, designing the solution, and coding.

Support teams in software organizations respond to the customer calls and queries. Technical support can be provided at different levels such as Level 1, 2, and 3. Level 1, 2, and 3 support teams have specified time limits to respond to customer queries. If the support team is not able to solve the customer technical problem, it escalates the issue and sends it to the development team. Or some of the customer problems may result into defects or bugs or new features of the product.

Testing Teams in software organizations usually take care of system testing and integration testing of the project product. Usually test teams are lead by test lead or Test Manager. Writing test cases, executing test cases, reporting defects and tracking defects are the main activities of test teams. Once product build happens, development team hands over the pre-tested product to the test team. Test team tests the product and gives the necessary test summary reports and test statistics.

Maintenance teams in software organizations mainly does fixing of bugs and in some cases developing new features to the product. In some organizations, development team itself handles the product maintenance activities. Maintenance teams may involve in releasing fix packs or patches to the product.

Quality teams in software organizations take care of process related quality assurance activities. They ensure that the intermediate project deliverables are reviewed and meet the organizational quality standards. They help in conducting reviews of deliverables such as design documents and source code and they conduct quarterly and periodic quality audits. Quality team does all the internal process related activities to ensure the delivery of quality product to the customer.

In current days, there are other types of teams in software organizations such as design teams, requirements gathering teams, reengineering teams, product innovation teams, R & D teams and disaster recovery teams. Disaster recovery teams in software organizations handle the cases such as data loss, hard disk failure and network failure, etc.

All these teams do not work in isolated environment. They work in collaboration and cooperation. Coordination between these teams should be there in meeting customer requirements. In some cases, the output of one team becomes the input to other team. For example, development team's output, the product build, is the input for test team.

4. Managing Software Teams

According to management philosophy, knowledge worker is self-managing and needs little supervision. Same thing applies to software engineers. However based on the complexity of work, software teams needs to be motivated and brought into track if there are any disturbances in the team. Because there is possibility for conflicts between team members, that is, intra group conflicts, and inter group conflicts in software organizations. The reasons for these conflicts can be any shared resources between the teams, profit sharing, costs, administrative issues, project priorities and project dependencies across multiple teams. The program manager has to resolve all these conflicts between the project teams.

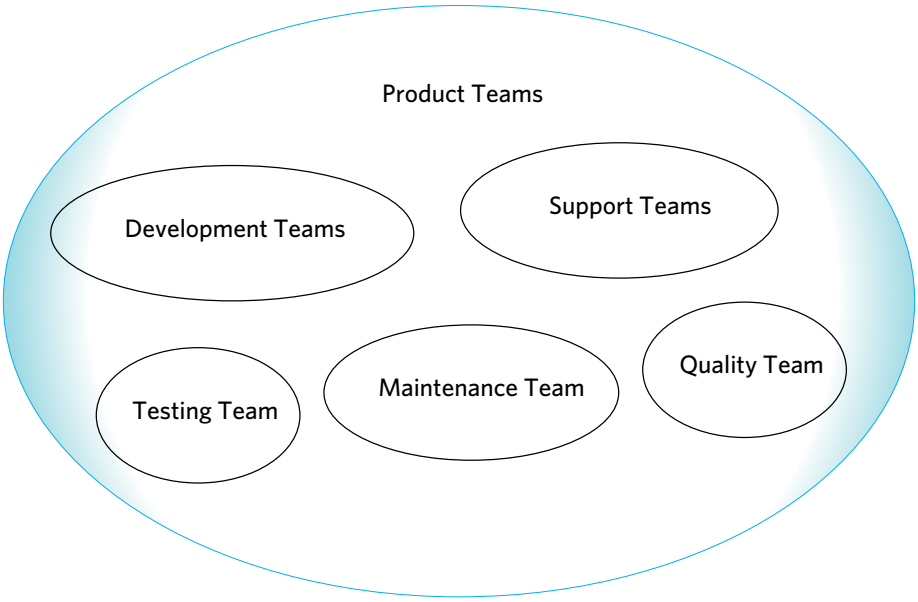

Fig 1: Product Teams in Software Organizations

To motivate the software teams in the organization, there should be proper reward and recognition system in place, training needs of the teams are to be identified, hardware, software resources need to be provided, and right environment is to be provided to the teams to make them productive. The senior management has to set the objectives to each project team and monitor the progress. They have to communicate and handle the dependencies between the project teams.

5. How to evaluate performance of Software Teams?

In current days, the software organizations are too much worried about how to improve individual as well as team productivity, how to compare one team with another team to take decision of whether to continue the team in the organization or to dissolve the team. Many researchers found different ways of measuring software development team productivity. Those measures include KLOCs, Function Points, Object Points or Use Case points implemented per man hour. Among all these Function Points (FP) measure is the prominent one because it is programming language independent. A team implemented 20 FPs in one man month is more productive than a team implemented 15 FPs in one man month. However this kind of comparison in KLOCs can not be done between teams if the programming language is different. *Productivity* is the number of units produced per unit of input time.

Similarly test teams' productivity can be compared by number of test cases executed per unit of time. Similarly support teams' productivity can be compared by number of customer requests or calls attended during a specified time by the competing teams. These are basically the *quantitative* measures. However, *qualitative* measures such as customer satisfaction, project product or service quality, stakeholder satisfaction, or top management satisfaction levels can be used for evaluating performance of different teams in software organizations. Sometimes, audits (both internal and external) and reviews are also used as performance measure instruments for software teams.

Based on this team's performance appraisal, top management should take corrective actions. There are many factors affecting the productivity and performance of software teams in Indian kind of scenario. Those factors include selection of hardware, software tools, customer behavior, project manager behavior, selection of

programming language, socio, economic, political and legal environment, lack of specific technical skills, experience and competency of engineers, top management commitment and support, organizational culture, organizational climate, team climate and organizational politics.

6. Conclusion

As one famous saying said unless you measure, you can not improve on it. Thus, one can definitely evaluate the productivity of software teams in the organization and can compare and take necessary actions on the teams based on the organizational needs, strategy and vision.

Using these measures organizations can strive for continuous improvement and make the teams more productive in Indian IT industry, which is very much needed for the economy and well being of the great *Indian Programmer*.

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ABOUT THE AUTHOR

G P Sudhakar, PMP with over a decade of experience in IT industry is currently working as Faculty Member at ICFAI School of Information Technology (ISIT), Hyderabad, India. He worked in USA, UK, Ireland, Finland and India. He has **B.Sc., MCA, M.Tech. and Executive MBA**. He is Project Management Institute, USA certified Project Management Professional (**PMP®**). He is currently pursuing his **PhD** in Business Administration from Aligarh Muslim University. He is member of All India Management Association (AIMA). He is adjunct faculty at ICFAI School of HRD, Hyderabad. He worked as employee or Consultant to companies such as IBM, Siemens, Interwoven, Wipro Technologies, Citicorp, Nokia, Salomon Smith Barney, SIAC, DSET Corporation, IONA Technologies, Birla-Horizons International, and PCL Mindware. He has more than **50 published articles**. His articles were published in The Hindu, Indian Management, Businessgyan, Business & Management, PMresearch, SmartTechie, The Global Educator, Express Computer, Projects and Profits, www.pmhub.net, Computers Today and *CSI Communications*. He authored *Business Essentials for Software Professionals* and *Project Management: Training Manual* and **edited 10 other books**.