

Dissertation Report
On
Competencies of Software Engineers

Submitted by:

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Certificate

I hereby declare that the work which is being presented in this project work entitled “**Competencies of Software Engineers**” at Delhi School of Management, Delhi Technological University, New Delhi is an authentic record of my own work carried out during the period of January 2013 to April 2013 under the supervision of **Dr. Shikha N. Khera**

Dr. Shikha N. Khera
(Project Mentor)

Vishant Rana

Date:

Declaration

I, Vishant Rana, 2K11/MBA/57, student of Delhi School of Management hereby declare that I have pursued a research study on the topic “**Competencies of Software Engineers**” under the guidance of Dr. Shikha N. Khera, Assistant Professor, Delhi School of Management. I also declare that this work has not been submitted in part or full to this or any other organization/ institute as part of any project work by me.

Acknowledgement

It is indeed a matter of great pleasure to present this project report on the topic “**Competencies of Software Engineers**” to The Head of the Department, Delhi School of Management. I gratefully acknowledge my profound indebtedness towards my esteemed guide **Dr. Shikha N. Khera, Assistant Professor, Delhi School of Management** for her invaluable guidance, excellent supervision and constant encouragement during the entire the project work.

Last but not the least; I would like to express my heartfelt gratitude towards my parents for their constant encouragement & support.

Vishant Rana

Delhi School of Management

Executive Summary

The knowledge and skills of software engineers are probably the most important factors in determining the success of software development. Through this study, we seek to identify the most important competencies that determine workplace success in the IT sector across India. These competencies were identified by industry professionals themselves based on the competencies displayed by them on a daily basis.

A list of 12 competencies were to be ranked from 1 (Most important) to 12 (Least important). Based on the survey responses, analysis was carried out to analyze the importance of competencies as perceived by the respondents.

The competency patterns that arise are then analyzed geographically and based on gender. The differences that emerged were identified and this can help in the development of competencies in software engineers.

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CHAPTER-1

INTRODUCTION

The current era of globalization necessitates innovative approaches in managing the workforce. One of the most commonly used HR practices is 'Competency Mapping'. Identifying and developing of competencies enable better performance management, which lead to successful career and succession planning.

Competencies include the collection of success factors necessary for achieving important results in a specific job or work role in a particular organization. Success factors are combinations of knowledge, skills, and attributes (more historically called "KSA's") that are described in terms of specific behaviours, and are demonstrated by superior performers in those jobs or work roles. Attributes include: personal characteristics, traits, motives, values or ways of thinking that impact an individual's behaviour. (T.K, 2011)

1.1 Purpose of the study

The purpose of this study was to prioritize/rank 12 existing software engineer competencies and to find the pattern correlation among these competencies. According to Barry Boehm, who is known for his many contributions to the field of software engineering, there exists a 25:1 ratio between the most productive and least productive software developers and a 10:1 difference in their error rates. He also found personnel and team capability to be twice as important as technical competence. (Turley)

Our aim is to determine the attributes that are necessary for exceptional performance, so that performance of all software engineers can be improved. The study of competencies can improve job descriptions, employee selection, staff development, performance evaluation and promotion. This study aims to identify those competencies that are beyond the core technical competencies which are anyway required by software engineers, such as knowledge of software tools, coding and technology.

1.1.1 Competency Model

A study by Booneka and Kiattikomol (2008) (Kiattikomol, 2008) formulated a model of competencies for software engineers which identify the following 12 competencies:

1. Expertise

Involves knowledge, skill, knowledge application, continuous learning, follow-up technology trends, standards for software development, transfer knowledge, understanding of client's requirements and understanding of the business process

2. Teamwork

Cooperating and coordinating with people along with individual learning and providing constructive feedback, despite any personal conflict between individuals; all done to achieve a defined goal

3. Relationship and Communication

Communication with your team members and other co-workers, maintaining a cordial relationship with them and treating them with respect

4. Service Mind

Appreciation and understanding of client's needs. It can be summarised as follows:

S= Smile

E= Enthusiasm

R= Rapidness

V= Value

I= Impression

C= Courtesy

E= Endurance

M= Make Believe

I= Insist

N= Necessitate

D= Devote

5. Achievement

Involves motivation, enthusiasm, diligence, patience, circumspection, responsibility and time management.

6. Flexibility

Intellectual flexibility, being receptive to change and creatively adjusting your style of working or method of approach to meet the needs of a situation or emergency

7. Leadership and Influence

Leading a group of people to achieve an objective and being able to influence them to perform the desired actions and display required behaviour

8. Emotion and Ethic

Emotional intelligence, sympathy, empathy, kindness, playfulness, calmness, consideration, willingness to help and honesty

9. Logical thinking

Ability to design algorithms using a rational, systematic series of steps based on sound mathematical procedures

10. Systems Thinking

Being able to design the whole system and understanding how things influence one another as a whole

11. Future thinking

Planning and forecasting the future and taking actions in accordance to that

12. Creative Thinking

Looking at problems from a fresh perspective that suggests unorthodox solutions

CHAPTER-2
LITERATURE REVIEW

Title of Research Paper (1)	Middle Level Managers: Competency and Effectiveness (R., 2011)
Research Methodology	<p>a) Each of the twenty Middle Level Managers are rated by three of his/her subordinates on the survey. The competencies and role are asked to be ranked by the managers in their order of importance they assume for that particular role.</p> <p>b) The instrument for assessing the effectiveness was a six point item scale in continuum where 1 denotes "Participant does not play that role" and 6 denotes "Participant plays that role extra-ordinarily well".</p> <p>c) The managers' ratings were then tabulated using SPSS 13 software and the ratings of a particular manager was averaged to derive the managers' score on an assigned role or competency.</p> <p>d) The hypothesis was tested using a one sample t-test at 95 percentage confidence level. A correlation analysis was then carried out to prove the relationship between role effectiveness and managerial competencies.</p>
Sample Size	20
Hypothesis	<ol style="list-style-type: none"> 1. There exists a significant difference in the competency level of leaders. 2. There is a specific and positive correlation between competency traits of leaders and performance of the organization.
Remarks	<ol style="list-style-type: none"> 1. The results of the co-relational analysis show, role effectiveness and managerial competencies are highly correlated. 2. The managers used for this study had more expertise at discharging their leadership roles and operations-related roles than their strategic roles. The higher the average rank, lower was the efficiency. 3. The Managers studied have a slight edge on their leadership competencies and contextual sensitivity competencies, which indicate that they are pretty aware of the responsibilities of the position they uphold
Title of Research Paper (2)	Functional competencies and their effects on performance of manufacturing companies in Vietnam (NGUYEN, 2008)

Research Methodology	a) Questionnaires were sent. b) Functional Competencies were marked on a 5 point scale c) ANOVA, Single Regression, Multiple Regression and Factor Analysis were used for analysis
Sample Size	110 (725 companies were randomly chosen to send the questionnaires. A total of 110 properly filled questionnaires were received, achieving respondent rate of 15.17 %.)
Hypothesis	Hypothesis 1: There is a positive relationship between the manufacturing competency and profitability performance. Hypothesis 2: There is a positive relationship between the marketing competency and profitability performance. Hypothesis 3: There is a positive relationship between the research & development and profitability performance. Hypothesis 4: There is a positive relationship between the human resource management and profitability performance. Hypothesis 5: There is a positive relationship between the manufacturing competency and market performance. Hypothesis 6: There is a positive relationship between the marketing competency and market performance. Hypothesis 7: There is a positive relationship between the research & development and market performance. Hypothesis 8: There is a positive relationship between the human resource management and market performance.
Remarks	<u>ABOUT THE RESPONDENTS:</u> a) The majority (51.82%): directors or vice directors. b) 13.64% of them were head of either marketing or business department. c) 34.55% held other positions in their companies such as head of manufacturing, financing or human resource departments. <u>RESULTS:</u> H1, H2, H3, H4, H6, H7, H8 -Supported H5:Not Supported <u>LIMITATIONS:</u> First , studies on samples are seldom conducted without any intention to

	<p>generalize the results to the whole population to which the samples belong.</p> <p>Second, perceptual performance was used in the study instead of objective measure.</p> <p>Third, the validity of the findings regarding the relationship between four functional competencies and firm performance may be hampered by the fact that data on functional practices and organizational performance were collected at the same point in time</p> <p>Lastly, firm performance may be affected by various other extraneous variables not accounted for in this study</p>
Title of Research Paper (3)	Competency mapping of the employees in 2 software companies (T.K, 2011)
Research Methodology	<p>a) Researcher had identified 147 competencies which was relating to 20 broad categories. The related dimensions that were identified were Drive for results, Process management, Functional expertise, Personal effectiveness & ability to influence, Innovation, Team effectiveness, Customer service, Self development orientation, Analytical thinking, Physical ability, Knowledge, Aptitude, Motivation, Communication, Leadership, Managerial ability, Negotiations, Personal values, Social skills, Technical competence.</p> <p>b) Simple random method was used to collect the data from the respondents.</p> <p>c) Tools like "Z" test were used to identify the present competency levels and the competency gap.</p> <p>d) Competency levels were found among the different levels of competency of respondents in each one of the 20 dimensions.</p> <p>e) Competency Gaps were found among the respondents in each one of the 20 dimensions.</p> <p>f) All statements listed in each one of the twenty dimensions were assessed using a five point Likert Scale.</p>
Sample Size	295 (145 - Cognizant; 150 - HCL)
Hypothesis	H0: The competency level in each one of the 20 dimensions is same among IT Professionals with two different software companies.

	<p>H1: The competency level in each one of the 20 dimensions is not the same among IT Professionals with two different software companies.</p> <p>Hg0: The competency Gap in each one of the 20 dimensions is same among IT Professionals with two different software companies.</p> <p>Hg1: The competency Gap in each one of the 20 dimensions is not the same among IT Professionals with two different software companies.</p>
Remarks	<p>The present study has been attempted to identify gaps in the competency levels of IT professionals working in two IT firms in Chennai. A total of 20 dimensions have been used to assess the performance level and identify the gaps. It is found that the performance levels of CTS employees are higher when compared to the employees of HCL. The gaps are found to be high among the employees of HCL in most of the dimensions. These could be developed by giving training and personality development classes for the employees.</p> <p>H0 and Hg0 were accepted hypothesis</p>
Title of Research Paper (4)	<p>Ranking Competencies for Software Developers in Thailand (Kiattikomol, 2008)</p>
Research Methodology	<p>a) The survey was designed by the authors of this paper specifically for the study. It consisted of one page and two parts.</p> <p>b) The first part focused on demographic information such as gender, age, position and years of experience.</p> <p>c) The second part listed the 12 competencies and invited respondents to rank all competencies from lowest to highest with the number 12 being the highest.</p> <p>d) Demographic data was analysed by descriptive statistics (sum, mean, and standard deviation)</p> <p>e) To determine the rankings, they totalled the numbers from 1-12 assigned by all participants for each competency</p> <p>f) Factor analysis was used to find the correlation among the competencies</p>
Sample Size	282
Hypothesis	No Hypothesis

Remarks	<ol style="list-style-type: none">1. The results indicate that software developers' competencies should be professional worker, who has experience, can work in team, show logical and systematic thinking and be able to communicate and create relations within a team and with other people.2. Spencer and Spencer conducted a similar study.3. In terms of similarities between the results of Spencer and Spencer's study and the present paper, ranking of Conceptual Thinking (3) Analytical Thinking (4) was similar to present paper's ranking - Logical Thinking (3) and System Thinking (4).4. Ranking for other competencies differed across both papers.
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CHAPTER-3

**SCOPE AND
LIMITATIONS**

3.1 Scope

This research paper has tried to detect the competencies of software engineers in India working across three regions i.e. North, West and South. The study has tried to focus on junior and middle level software engineers in some of the top Indian and Foreign MNCs like Infosys, Tech Mahindra, Accenture, Fiserv, HCL, Dell, IBM, etc.

3.2 Limitations

- Our study only covers one country, India. A study by Spencer and Spencer has shown that the results may have been different if other countries would have been involved as well.
- North region being the hub for IT companies, the number of responses were more as compared to the other regions.
- For the similar reason, less response was received from Eastern India; which might have impacted the analysis.
- The Female to Male response ratio was skewed more towards the males, because there are more male employees than female employees in the industry.
- The data collection was limited to junior or middle level executives.

CHAPTER-4

RESEARCH

METHODOLOGY

4.1 Participants

The target group was engineers which included software engineers, mechanical engineers, chemical engineers and others who do not hold B.E. or B.Tech degree but are working as Engineers with some organisations.

Further, there is special focus on software engineers which included system analysts, senior system analysts, software engineers, senior software engineers, associate software engineers, engineers who are now pursuing higher education and others who have been a part of the IT sector.

We first invited the employees to participate in the survey via emails. The email included the link to the survey along with a brief about the purpose of the survey.

4.2 Instrument

The survey was designed exclusively for the study. It consisted of two parts, one that focused on collecting demographic information like name, age, gender, designation, organisation, location etc and other focussed on ranking of 12 competencies from 1 to 12, 1 being the highest and 12 considered to be the lowest. (Kiattikomol, 2008) The survey also had a column for additional comments. We estimated the completion time for the survey to be 10-15 minutes approximately.

The survey link and snapshot is attached as Annexure I with the report.

CHAPTER-5

DATA ANALYSIS AND INTERPRETATION

The survey was launched on 29th July 2012 and was kept active for 12 days. The total number of responses received was 151. Out of these responses 140 were quality responses. A response was considered as a quality response if it was completely filled in all respects and ranking of competencies was done as per the guidelines given in the survey.

Hence, the quality completion rate was 92.7%.

5.1 Gender wise analysis

The number of responses received gender wise was:

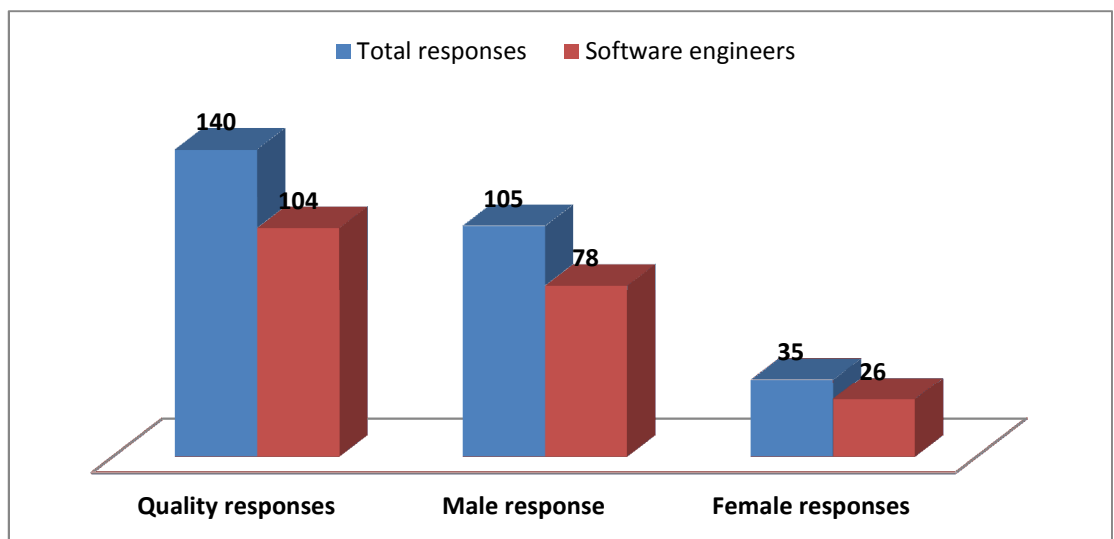


Figure 1: Response Analysis

5.2 Region wise analysis

For region wise analysis we have divided India into 4 geographic regions: Northern India, Southern India, Western India and Eastern India. North India being the hub for software companies, maximum response was received from North i.e. 63 and least was received from East India i.e. 2. West and South received 30 and 31 responses respectively.

(Note: Few people surveyed didn't disclose their location so we included them in the overall analysis only.)Number of software engineers' response received from North, South and West was 44, 26 and 23 respectively.

5.3 Survey Analysis

The survey was analysed in two parts:

1. **Competency Preference list:** By calculating the sum, mean and standard deviation for each competency and ranking them accordingly. The list obtained reflected the respondents' preferences for each competency.
2. **Top ranked competency:** By calculating the number of times a competency is ranked 1st by respondents and then ranking the competencies wrt to this total. The competency ranked 1st maximum number of times was ranked as the most important competency.

The analysis was done for engineers and further for software engineers. Region wise and gender wise analysis was also done.

For representation purposes tables and pie-charts were used.

5.3.1 Competency Preference list

The competencies were ranked keeping in mind, that the competency ranked 1 was the highest ranked competency and the competency ranked 12th was the lowest rank competency. The findings are summarised after calculating their 'Mean' and 'Standard Deviations'.

Preference list:

Table 1: Overall Competency Ranking

Competencies	For All Engineers	
	Total	Mean
Expertise	545	3.609272
Teamwork	668	4.423841
Logical thinking	669	4.430464
Creative thinking	735	4.86755
Relation and Communication	806	5.337748
Service mind	851	5.635762
Leadership and influence	855	5.662252
Achievement	883	5.847682
System thinking	952	6.304636
Flexibility	972	6.437086
Future thinking	1018	6.741722
Emotion and ethic	1196	7.92053

The calculations show that “**Expertise**”, “**Teamwork**” and “**Logical Thinking**” are the top rated competencies among the 12 competencies for an engineer. The least preferred competencies being “**Future Thinking**” and “**Emotion and Ethic**”.

Software engineers:

For software engineers the results were as follows:

Table 2: Ranking for Software Engineers

Competencies	For Software Engineers	
	Total	Mean
Expertise	383	3.389381
Teamwork	486	4.300885
System thinking	491	4.345133
Emotion and ethic	547	4.840708
Logical thinking	604	5.345133
Creative thinking	635	5.619469
Leadership and influence	638	5.646018
Relation and communication	655	5.79646
Flexibility	710	6.283186
Service mind	711	6.292035
Future thinking	774	6.849558
Achievement	885	7.831858

While analysing for software engineers it was found that “**Expertise**”, “**Teamwork**” and “**System Thinking**” was ranked top competencies and “**Future Thinking**” and “**Achievement**” were the least rated competencies.

5.3.2 Top ranked competency

If data was analysed by calculating the number of times a particular competency was ranked 1st we found the below mentioned pattern:

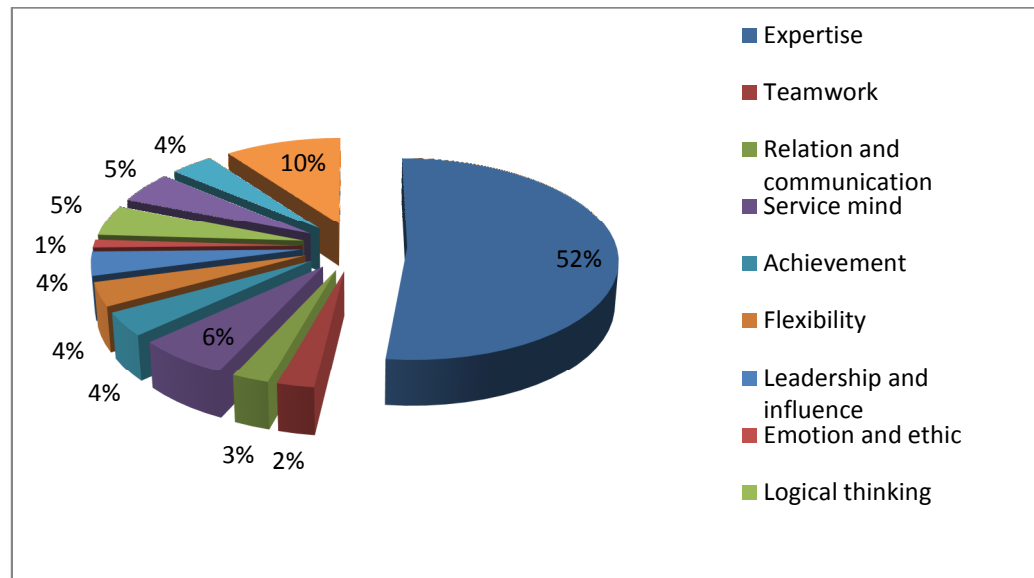


Figure 2: Top rated Competency Analysis

5.4 Gender wise Analysis

5.4.1 Competency Preference list

The same analysis was done for female and male respondents separately. And top 3 competencies for both genders were found to be “**Expertise**”, “**Logical Thinking**” and “**Teamwork**”.

The detailed calculations are represented in the table below.

Table 3: Gender wise Analysis

Competencies	Gender Based Analysis			
	Female Software Engineers		Male Software Engineers	
	TOTAL	MEAN	TOTAL	MEAN
Expertise	77	1.71	276	2.94
Logical thinking	110	2.44	337	3.59
Teamwork	114	2.53	345	3.67
Creative thinking	116	2.58	398	4.23
Service mind	134	2.98	416	4.43
Relation and communication	152	3.38	440	4.68
Leadership and influence	153	3.40	447	4.76
Achievement	163	3.62	468	4.98
System thinking	164	3.64	506	5.38
Flexibility	175	3.89	506	5.38
Future thinking	209	4.64	523	5.56
Emotion and ethic	213	4.73	636	6.77

5.4.2 Top rated competency

If calculations were done to find out which competency was ranked 1 by maximum respondents we found again “**Expertise**” to be rated as top competency by maximum respondents.

And the competency rated 1st the least number of times was “**Emotion & Ethics**” irrespective of the gender.

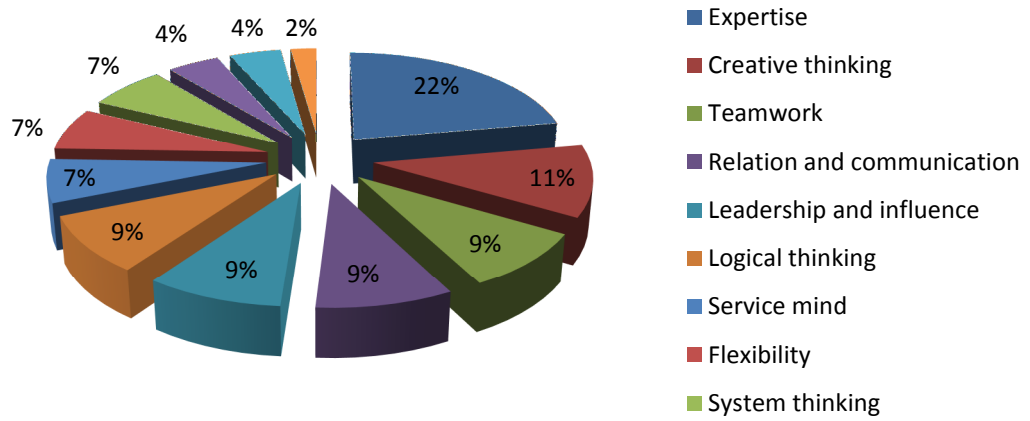


Figure 3: Rated top by maximum (Female)

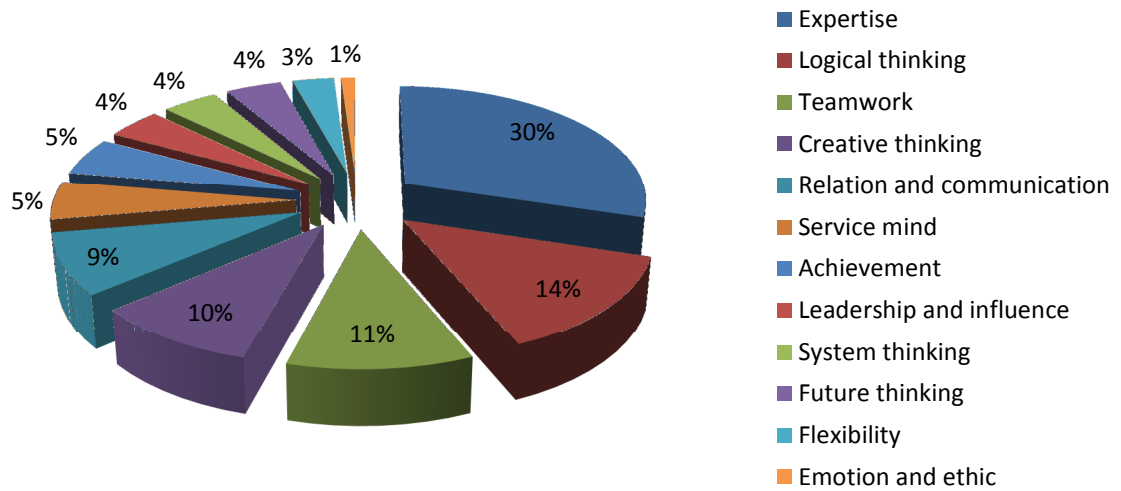


Figure 4: Rated top by maximum (Male)

5.5 Region wise Analysis

Similar calculation was done region wise i.e. respondents were categorised according to their place of work.

5.5.1 Northern region

The analysis was done again by using both the ways:

5.5.1.1 Competency Preference list

Table 4: Northern region(A)

COMPETENCIES	TOTAL	MEAN
Expertise	139	2.438596
Logical thinking	197	3.45614
Teamwork	203	3.561404
Creative thinking	209	3.666667
Leadership and influence	222	3.894737
Service mind	238	4.175439
Relation and communication	242	4.245614
System thinking	242	4.245614
Achievement	263	4.614035
Future thinking	273	4.789474
Flexibility	293	5.140351
Emotion and ethic	328	5.754386

By calculating the sum total “**Expertise**” was found to be the highest ranked competency and “**Flexibility**” was the least ranked competency.

5.5.1.2 Top rated competency

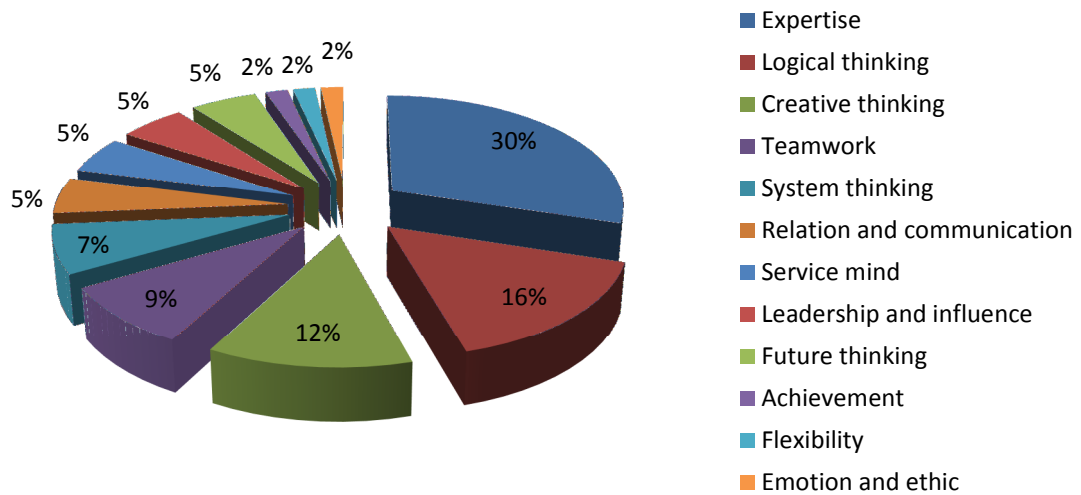


Figure 5: Northern region (B)

“**Expertise**” was again ranked 1st by maximum number of respondents, whereas “**Relation and communication**”, “**Emotion and ethic**” and “**Flexibility**” were ranked as most important the least number of times.

5.5.2 Western Region

The analysis of the Western Region was calculated as follows:

5.5.2.1 Competency Preference List

Table 5: Western region (A)

COMPETENCIES	TOTAL	MEAN
Expertise	64	2.206896552
Achievement	87	3
Logical thinking	106	3.655172414
Teamwork	124	4.275862069
Emotion and ethic	131	4.517241379
Creative thinking	135	4.655172414
Relation and communication	136	4.689655172
Leadership and influence	148	5.103448276
Service mind	158	5.448275862
Future thinking	158	5.448275862
Flexibility	186	6.413793103
System thinking	219	7.551724138

5.5.2.2 Top rated competency

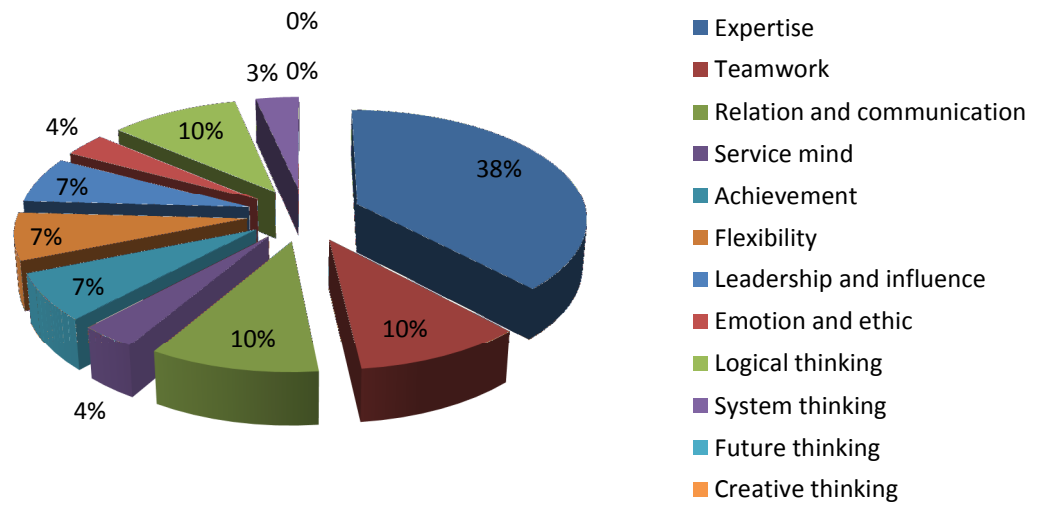


Figure 6: Western Region

“**Expertise**” was rated the most important competency by 38% of the participants, whereas, “**Future thinking**” and “**Creativity**” were not rated the most important competency by even a single respondent.

5.5.3 Southern Region

The analysis of Southern India revealed the following statistics:

5.5.3.1 Competency Preference List

Table 6: Southern Region (A)

COMPETENCIES	TOTAL	MEAN
Expertise	113	3.896552
Logical thinking	115	3.965517
Emotion and ethic	115	3.965517
Achievement	119	4.103448
Leadership and influence	129	4.448276
Teamwork	153	5.275862
Creative thinking	158	5.448276
Service mind	159	5.482759
Relation and communication	168	5.793103
Future thinking	199	6.862069
Flexibility	199	6.862069
System thinking	208	7.172414

“**Expertise**” and “**Logical Thinking**” are the most highly rated competencies, whereas “**Flexibility**” and “**System thinking**” were ranked less important.

5.5.3.2 Top Ranked Competencies

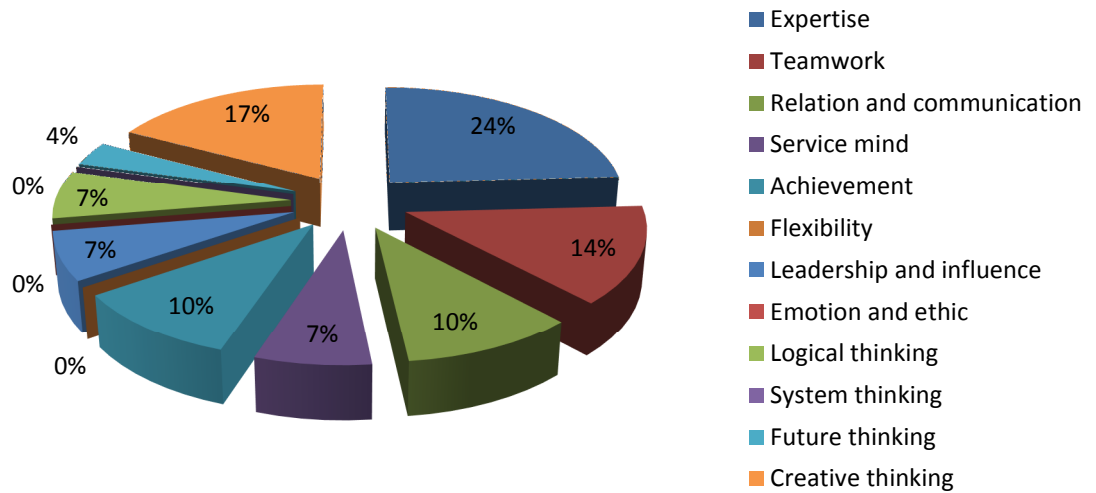


Figure 7: Western Region (B)

“**Expertise**” and “**Teamwork**” were ranked number 1 the most number of times and “**Flexibility**”, “**Emotion and Ethic**” and “**System thinking**” were not ranked highest by anyone.

CHAPTER-6

FINDINGS AND DISCUSSION

6.1 Findings

- Irrespective of gender or region, “Expertise” was ranked as the most important competency among the 12 competencies. Secondly, “Expertise” was ranked 1st by maximum number of respondents. Hence, being an expert in respective field/domain governs the success of a software engineer.
- Irrespective of gender “Expertise”, “Logical Thinking” and “Teamwork” were the top 3 competencies. (When sum total of ranking was considered). An engineer who focuses on gaining expertise in his/her field, applying logics while doing daily operations and believes in team work has high chances of succeeding in his/her engineering career.
- “Emotion and Ethics” and “Flexibility” were least ranked competencies irrespective of the gender. In professional life, ethics and flexibility is not given much importance by software engineers.
- For “Logical Thinking” competency, it was found that even though it was not rated as the most important competency by females but when sum total of ranks were calculated it was 2nd preferred competency by the same group (i.e. female respondents). This shows that logical thinking, even though not a top rated competency, it is still considered important by software engineers.

While gender wise analysis, it was found that at one side where male respondents found “Logical Thinking” as top rated competency, on the other side the female respondents didn’t rate it in top 5 competencies.(when considering analysis done on top ranked competency) This could reflect upon the importance male engineers give to logical thinking in their profession and also shows that the same doesn’t hold for female engineers.

- In analysis for Southern India, Creative thinking was not voted 1st by any respondents reflecting that it is considered less important when compared to other competencies. Whereas the same was not the case when analysis was done for Northern or Western region.

6.2 Discussion

The results indicate that software developers' competencies should be professional worker, who has experience, can work in team, show logical and creative thinking and be able to communicate and create relations within a team and with other people. This ranking reflects the perceptions of those working in the software development industry in India. Spencer and Spencer (1993) conducted a similar study in which they ranked competencies of software developers, engineers, applied research scientists, and technicians in a bank department in 24 countries. A comparison of ranked competencies between our results and Spencer and Spencer's is as follows:

Table 7: Spencer & Spencer (Comparison)

Spencer and Spencer	(1993)	(2012)	Our Study
Competency	Rank	Rank	Competency
Achievement Orientation	1	8	Achievement
Impact and Influence	2	7	Leadership and Influence
Conceptual Thinking	3	3	Logical Thinking
Analytical Thinking	4	9	System Thinking
Initiative	5	11	Future Thinking
Self-Confident	6	4	Creative Thinking
Interpersonal Understanding	7	5	Relationship and Communication
Concern for order	8	6	Service Mind
Information Seeking	9	10	Flexibility
Team work and cooperation	10	2	Team Work
Expertise	11	1	Expertise
Customer Service Orientation	12	12	Emotion and Ethic

Spencer and Spencer's study was similar to ours in that we were both working with a similar set of 12 competencies. In terms of similarities between the results of their study and ours, we note for example that they ranked Conceptual Thinking (# 3), Customer Service Orientation (# 12) similarly to ours Logical thinking (# 3) and Emotion & Ethic (# 12). The other similarities in the results can be depicted by the nearness in rankings in Relationship & Communication, Service Mind and Creative Thinking across the two studies.

The similarities however are limited to those competencies. In fact, we observed more differences than similarities between their results and ours. We observed for example, that whereas our respondents ranked expertise at the top (# 1), in Spencer and Spencer's study, it was ranked almost at the bottom (# 11). Likewise, Teamwork and Cooperation ranked at the bottom (# 10) for Spencer and Spencer, yet it was ranked at the top (# 2) in our study. We note as a limitation in our study that expertise and teamwork were listed as items 1 and 2 respectively in the survey. It is possible, therefore, that our respondents were influenced by the position of the items in the survey.

The differences in the ranking of competencies between the two studies point to the fact that competencies may change over time and that they are subject to larger social, cultural or economic trends is to be expected.

CHAPTER-7
CONCLUSION AND
IMPLICATIONS

The purpose of this study was to prioritize 12 existing software engineers' competencies and to find pattern emerging from it. A survey was designed for the same and was shared with engineers. The response received was 151 in total out of which 11 entries were considered as error entries.

The 12 competencies were previously identified in a study of competencies for software developers in Thailand.

The overall ranking found was as follows: Expertise, Teamwork, Logical Thinking, Creative Thinking, Relation and communication, Service mind, Leadership and influence, Achievement, System thinking, Flexibility, Future thinking, Emotion and ethic.

In terms of implications for organisations, these competencies can be part of human resource development which may include selection, training and development, performance appraisal, and succession planning. The focus of a software engineer should remain on increasing expertise in specific domain.

Annexure I: Survey

Competencies of an engineer

We are doing a research study on top competencies required for an engineer or a position equivalent to it. The same will be used only for academic/research purpose. Please fill the following survey for the same.

Name:

Organisation:

Location:

Age:

Gender:

Designation:

Specialisation:

Please rank the below competencies in the order of importance that you'll give wrt your job and profile . (1 being the highest and 12 being the lowest rank)

Expertise (involves knowledge, skill, knowledge application, continuous learning)	<input type="text"/>
Teamwork (involves individual work as well as team work; cooperation, collaboration)	<input type="text"/>
Relation and communication (Communication with others, in teams, good relationship)	<input type="text"/>
Service mind (involves appreciation and understanding of client's/user's needs)	<input type="text"/>
Achievement (involves motivation, enthusiasm, diligence, patience, circumspection)	<input type="text"/>
Flexibility (involves compromise and flexibility)	<input type="text"/>
Leadership and influence (involve leadership, influence of others, and control of situations)	<input type="text"/>
Emotion and ethic(involves emotional intelligence, sympathy, empathy, kindness, playfulness)	<input type="text"/>
Logical thinking (involves an ability to design algorithms.)	<input type="text"/>
System thinking(involves being able to design for the whole system.)	<input type="text"/>
Future thinking (involves planning for the future.)	<input type="text"/>
Creative thinking (involves an ability to solve problems in different ways.)	<input type="text"/>

Any comments:

Submit

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