Comparing the Competencies of Indian Software Professionals across Generations

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Abstract

Indian software industry has been very dynamic and has undergone a shift in its focus from mere technical skills to balance of technical and soft skills. This paper reports the skills and competencies required by Indian software professionals to be effective in their jobs and career. Review of literature helped in identifying some of the generic competencies required for software professionals. Subsequently, semi-structured interviews were conducted on 40 software professionals across various generations, to find out the competencies required to work and excel in IT industry. Content analysis of the interview transcripts was done to arrive at 4 broad competency clusters namely, Personal Traits, Professional Skills, Business Knowledge and Technical Competencies. In a follow up study, the respondents are asked to rate the importance of each of the competencies identified and thus the final list of competencies for the study is confirmed. The next objective of the study is to quantitatively validate the competencies identified through interviews and to find out if there are any differences in the competence level of the software professionals with respect to generations. The respondents will be asked to rate the importance and the perceived competence level for each of the competencies identified. The proposed sample size for the next phase is about 150. The paper outlines some research questions to be answered in future research and discusses the proposed plan for future research.

Introduction

India has emerged as a major exporter of software services in the international economy in the past two decades (Arora and Gambardella, 2006). India has seen exponential growth rates in software industry since 1980 (McManus and Floyd, 2004). According to Nasscom, the total IT revenue for Indian Technology companies is estimated to increase by nearly 17% to around $70 billion this financial year (Arora, Arunachalam, Asundi and Fernandes, 2001). One estimate suggest that India has 16% of the global market in customized software and more than 100 of Fortune 500 has outsourced India (Dataquest, 31 July). The industry has grown at over 50% per year the last five years or six years and if current trend persists, software exports may account for a full quarter of Indian exports in the next five years. The software industry relies highly on technology as a complementary factor other than workforce (Dormann and Zijlstra, 2003). As a matter of fact, the success of the Indian software industry can be attributed to the availability of trained and low cost software professionals (Arora, Arunachalam, Asundi and Fernandes, 2001) and hence its sustainability definitely depends on healthy skilled workforce (Wickramasinghe and Kumara, 2009). Also, the export strategy of India could be threatened by the migration of trained software professionals to other countries like USA, Germany, Japan, Singapore and UK all offering similar attractions. At the outset, there is a strong demand of workforce with specialised skills to sustain the growth achieved so far. IT organizations are trying to achieve competitive

advantage by investing in the human capital by grooming the skills and capabilities of the skilled workforce. To have a supply of well-trained and competent professionals, an in depth understanding of the skills and competencies required for the IT industry is mandatory.

Only a few other professions have seen a rapid change in the past as that of Information Technology (Lee, Trauth and Farwell, 1995). The dynamic nature of this profession requires IT professionals to be updated with the technological advances in order to have a grip in the industry. IT professionals need to keep honing their skills and capabilities and stay abreast of technology as demanded by the new millennium. Unlike the past, where much emphasis was given to technical skills, the focus of the industry has shifted in striking a balance between soft skills and technical skills (Havelka and Merhout, 2009). On top of that, IT professionals are also expected to have sound understanding of business to be successful business enablers. The role of IT has changed as a mean to improve the organisational performance rather as an end in itself. IT professionals are expected to be business problem solvers (Bashein and Markus, 1997) by integrating business development with IT capabilities (Bassellier and Banbasat, 2004) to meet the business objectives.

Research Problem, Objectives and Plan

The study started with the objective of identifying the skills and competencies required for Indian IT professionals. It is evident from the literature that IT sector is given much attention with regards to competency studies and a lot of researches have identified competencies required for various roles in the IT industry. Most of the studies considered one specific role and framed a competency model for that role. Not many studies have identified generic competencies required for software professionals. This observation has motivated us to explore the various generic competencies that will be essential for software professionals.

During the process of identifying the competencies, we understood a few challenges that the industry is currently facing. One such challenge is handling professionals belonging to different generations and meeting their expectations. The current workforce in software industry is a mix of people from different generations and whose competency profiles are not expected to be the same. To manage the workforce and to tap the fullest potential of the employees, it becomes essential to take care of the variations in competencies and their levels across the generations. The curiosity to know if there exists any difference in the competency profile and competence levels of employees belonging to different generations has been the motivation for the second phase of this study.

The objectives of the study are:

- To identify various competencies that are required Information Technology Professionals to be successful and effective at their jobs
- To develop a generic competency model for Information Technology Professionals
- To study the effect of generations on competencies possessed by IT Professionals and to examine if there are any differences in competency levels across generations.

Literature Review

Competency modelling is an area that has been given a lot of attention in management literature. Review of literature helped in understanding the concepts related to competency and identify a few research gaps that need to be addressed.

Competency

Definition (Spencer and Spencer, 1993)

A competency is an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation. Underlying characteristic means the competency is a fairly deep and enduring part of a person's personality and can predict behaviour in a wide variety of situations and job tasks. Causally related means a competency causes or predicts behaviour and performance. Criterion-referenced means that the competency actually predicts who does something well or poor as a measured on a specific criterion or standard.

The need for Competency management has grown since David Mc Clelland wrote his seminal paper in the year 1973: "Testing for Competence Rather than Intelligence", which created a stir in the field of industrial psychology (Vazirani, 2010). His research indicated that although traditional academic aptitude and knowledge content tests were good predictors of academic performance, they seldom predicted outstanding on the job performance. Also he included that the best predictors of on the job performance were underlying, enduring personal characteristics that he called "competencies". Hence competencies are seen as possible characteristics of an individual and the requirement that a job demands (Khalek, 2007).

Competency as an element of HR Practices

From the literature it can be noted a lot of research have been done by integration competencies with various HR functions. By using any element of the human resource functions, the focus of definition of the term competencies may shift (Hoffmann, 1999). Designing the Human Resource functions based on the competencies is a key to enduring performance and making HR more effective (Kochanski and Ruse, 1998). Assessing the competencies and identifying the skills gaps pave way for organisations to implement cost-effective and meaningful training and development practices, determine changes in individual and team performance and select better candidates (Homer, 2001). Aligning the organisational core competencies with the individual core competencies paves way for continuous improvement in performance (Lahti, 1999). Henceforth it is vital for organisations to hone their employees' competencies in accordance with their strategy, which is a one among the greatest challenges that organisations face today.

Competencies studies done in IT sector

IT sector has been given much focus with regard to competency modelling. Competency models have been framed for most of the roles in the IT industry. The study done by Turley and Bieman in 1995 identifies the professional competencies for exceptional software performers. Lee and Han (2008) identified the skill requirements for analyst/programmer type of role in the industry by collecting and analysing the job ads given in the Fortune 500 corporate websites. Investigations are done on human factors affecting the success of IT project management by exploring necessary competencies (Stevenson and Starkweather, 2009). Team Problem solving competency has been identified as essential for the success of Information Systems development projects (Li et al., 2010). Ho and Frampton (2010) formulated a competency model for IT architects by interviewing professional architects and identifying the competencies after content analysis. The core competencies needed for IT professionals in business services in Taiwan was identified in the study done by Lu, Lo and Lin (2011). Nevertheless, not many studies have focused on generic

competencies that are not very specific to any role in this sector. The business competence required for IT professionals and its contribution in the enhancement of the partnership between IT professionals and the business clients is studied in the research done by Bassellier and Benbasat (2004). Havelka and Merhout (2009) formulated the generic competency model that can be applied to any role in the IT sector at the entry level. The current study is similar to the work done by Havelka and Merhout (2009), by identifying generic competencies required for IT professionals rather than focusing on one particular role.

Generation as a construct in competency

Researchers and social scientists, who study the effects of population on society, use the term ‘‘generation’’ to refer to people born in the same general time span who share key historical or social life experiences (Kupperschmidt, 2000; Smola and Sutton, 2002). The effects of those key life experiences tend to be relatively stable over the course of their lives (Smola and Sutton, 2002). Due to these distinct key life experiences, each generation develops a unique personality that determines its feelings toward authority and organization (Smola and Sutton, 2002). From the literature it can be seen that the generations are classified as the following (Smola and Sutton, 2002).

Baby Boomers (1943–60): These people were born during or after World War II and raised in an era of extreme optimism, opportunity and progress. They predominantly occupy the senior positions in the organisations and they have great influences in the organisations (Jorgensen, 2003).

Generation X (1961–80): They were born after the Boomers into a rapidly changing social climate and economic recession. An interesting fact about them is that they have very low job tenure, about one year (Jorgensen, 2003).

Millennials (1981–2000): They were born of Boomer parents and early X-ers into the current high-tech, neooptimistic times. Although the youngest workers, they represent the most technologically adept (Jorgensen, 2003).

The merging of the three generational cohorts namely Baby boomers, Gen X and Gen Y happening at the workplace today makes it essential to understand and respect the differences among these generations to nurture their talents. Also, it is important to know their expectations, attitudes, behaviours so that they can be managed effectively (Elmore, 2010). A lot of researches have been done in generational differences pertaining to work ethics, attitudes, personality and motivational drivers in workplace (Real, Mitnik and Malony, 2010; Wong, et al. 2008). But, there is lack of empirical evidence on competencies and skills at workplace and their variations with respect to generations.

Developing a research model

Review of literature helped in identifying the generic competencies that play a crucial role in the success of IT professionals. The framework of competencies proposed by Havelka and Merhout (2009) is taken as a base for the study. Essential competencies required for IT professionals identified by various studies are collected and used as a reference for the study (Li et al., 2010; Bailey and Mitchell, 2007; Bassellier and Benbasat, 2004; Ho and Frampton, 2010; Lee and Han, 2008; Lu, Lo and Lin, 2011; Spencer and Spencer, 1993; Stevenson and Starkweather, 2009; Turley and Bieman, 1995).

Data for this survey is collected from the software companies located in and around Chennai. The sample consisted of respondent belonging to three different generations namely Baby boomers, Gen X and Gen Y. Convenient sampling was used to collect the samples.

The study is divided in two phases. The first phase aims at identifying the competencies required for Indian software professions and the second phase is to validate the competencies identified during the first phase and to check for the generational differences in the competencies. To identify the competencies for Indian IT industry, we conducted semi-structured interviews with about 40 IT professionals who were currently working at different roles in Indian IT organisations. The interviewees had minimum of 1year experience to a maximum of 18 years experience in the field. The interviews lasted from 30 minutes to 45 minutes and were audio-recordered with the consent of the interviewees. The interviews helped in identifying certain competencies that are very specific to Indian IT industry. Also, the competencies that are identified in the literature also evolved during the interview. Content analysis of the interviews was done and the transcripts were coded. After coding, the classification of the codes in the respective clusters was verified by another researcher. After several iterations, the codes were then grouped into sub-competency clusters and which in turn were grouped as competency clusters. The clustering was verified by another researcher to check the aptness in placing a competency in a particular cluster. Disagreements were discussed until a consensus had developed in clustering the codes.

The competencies were broadly classified as Personal Traits, Professional Skills, Business Knowledge and Technical Competencies. Each of the competency clusters were further sub-divided into sub-clusters which in turn had the individual competencies.

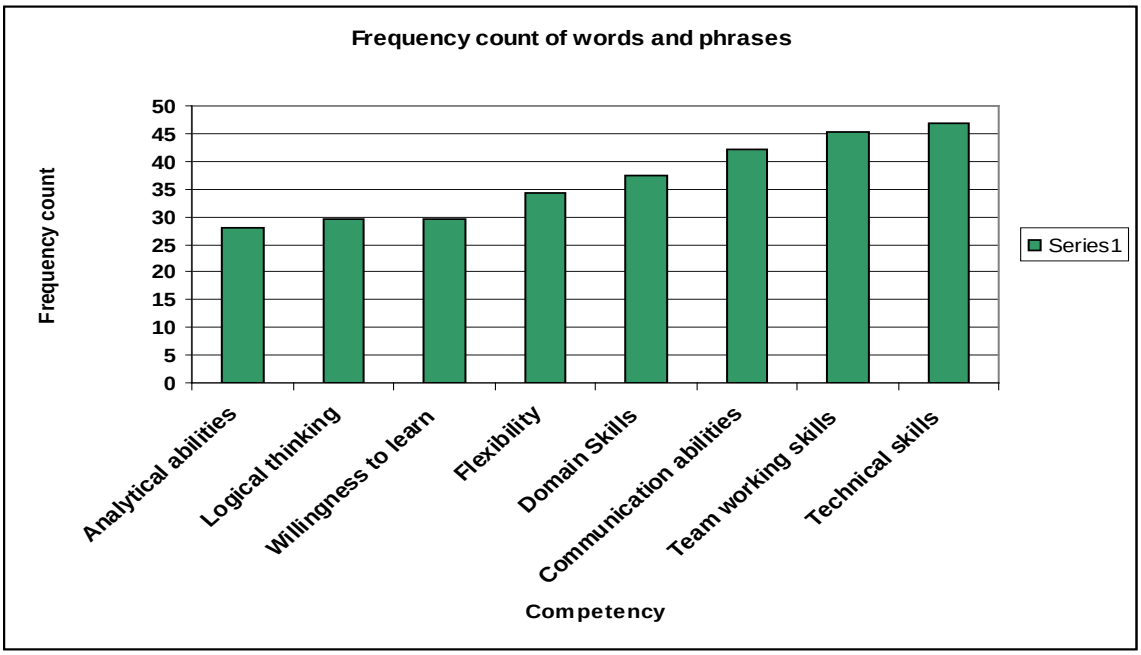
Table 1: Classification of IT professionals' competency into clusters and sub-clusters

Competency cluster	**Sub competency cluster**
Personal Traits	Passion Experience Conscientiousness (Open-mindedness) Attitude Character Flexibility
Professional Skills	Cognitive Skills Organizational Skills Leadership Ability Analytical Skills Team-Oriented Communication Skills Interpersonal Skills Problem-Solving Skills Client Focus Knowledge-Sharing Competencies
Business Knowledge	Organisational Knowledge Domain Knowledge
Technical Knowledge Competencies	Development Methods Application Software Project Management Production Data Management Architecture Infrastructure Specialty Area Programming & Code Development

Data Analysis

Few significant insights that emerged during the interviews are included in this paper to get an idea about the demands of the Indian software industry currently. The requirements for skill sets in software industry are changing drastically, where great emphasis is given to the soft skills as well unlike the previous decades. '*Willingness to Learn'* is the attitude that is most expected from every professional in this field. Since this field is extremely dynamic, people are required to learn, update and keep themselves on pace with the technological changes. '*Ability to work in Teams*' and '*Communication Skills'* are the most important soft skills required. Though 'Technical Competencies' are crucial, foundation skills like '*Analytical Thinking'* and '*Logical Reasoning*' are considered as most demanded by the industry. Sound understanding of *domain concepts* plays a significant role in delivery of quality service to the clients. Apart from these skills, *'Flexibility'*, *'Experience'* and '*Emotional Intelligence'* were also covered in most of the interviews. Figure 1 shows the frequency count of how often the competencies are emphasised in the interviews.

Figure 1: Competencies that were frequently mentioned during the interviews



The list of competencies were finalised in the follow-up study, where the interviewees were asked to rate the importance of each of the competencies identified on a Likert scale of 1-5, where 1 being least important and 5 being most important. This also reassured that the competencies that we identified from the interviews were matching with the opinions of the interviewees.

Statistical Package for Social Sciences (SPSS) was used to analyse the data and find the ranking of each of the competencies identified. Table 2 shows the top 10 individual competencies that were rated high by the respondents. *Positive attitude towards work* was rated high by most of the respondents which was emphasised during the interview also. From

the table it can be seen that soft skills out rated the technical skills in terms of importance which is evident from the trend that IT industry is facing.

Table 2: Top 10 Competencies rated high by the respondents

Competence	Mean	Rank
Positive attitude towards work	4.33	#1
Ability to be self-directed and proactive	4.30	#2
Desire to contribute to the IT industry	4.22	#3
Ability to be self-motivated	4.22	#4
Interest in applying technology to solve business problems	4.19	#5
Ability to understand system development life cycle	4.15	#6
Orientation towards quality	4.11	#7
Openness to learning	4.07	#8
Integrity and honesty	4.07	#9
Focus on customer/user	4.04	#10

Table 3 shows the competency sub-clusters that were rated high by the respondents. This shows the various dimensions where an IT professional is expected to show competent behaviour. None of the technical competency clusters were included in the list which shows that the focus of the industry is on the soft-skills and business related knowledge rather than the technical capabilities. This is very unlikely to the past scenario where software professionals were expected to be stronger technically and not much importance was placed on professional, personal and business related skills. From these results, we can understand that the industry demands professionals, who have the right attitude, exhibit the expected professional behaviour, act as efficient business enablers and posses sound technical knowledge. The right mix of these skills determines the success of a person in the industry.

Table 3: Top 10 Competency sub-clusters rated high by respondents

Competency sub-clusters	Mean	Rank
Client Focus	4.058333	#1
Conscientiousness	3.988889	#2
Flexibility	3.933333	#3
Character	3.933333	#4
Organisational Skills	3.866667	#5
Attitude	3.833333	#6
Analytical Skills	3.786667	#7
Leadership Abilities	3.766667	#8
Knowledge Sharing Competencies	3.726667	#9
Cognitive Skills	3.722222	#10

Discussion and Conclusion

From the first phase, the competencies required for the IT profession were identified and finalised. This main aim of the first phase is to finalize the competencies and dropping those that are consistently rated lower by most of the respondents. The competencies finalised in the first phase will be used for the second phase of the study.

The generational differences will be captured in the second phase where respondents will be asked to rate the importance rating and their competence level for each of the competencies. The proposed sample for the second phase is 200. Data will be analysed using

ANOVA to find the extent to which the perceived importance level and perceived competence level differ with respect to generations.

The study has identified the various dimensions at which a software professional is expected to be proficient to excel in the job. The competencies identified are very generic and can be applicable to any role. The study is in line with the work done by Havelka and Merhout (2009) where various competency clusters that will be required for most of the roles in the IT industry are identified but the proportion and combination of competency clusters required depend on the role being performed. The second phase of the study will help in understanding the generational differences in competency profiles of the employees. This will help in better handling of employees from different generations and streamlines the HR processes depending on the competency profiles.

Limitations and Future Research

The study focuses on the generic competencies those can be applied to any role in IT industry rather than focusing on a specific role. Hence, few competencies might not be applicable to any particular role which is a limitation of the study. The future research can focus on one particular role in IT industry and explore how the competencies are varying across generations. Not many studies have tried to study the diversity of the work force at workplace. Future studies can also focus on other diversity factors like gender, ethnic background, marital status and so on and study their impacts on the competence levels on the job.

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