CHAPTER 4

RESEARCH METHODOLOGY

This chapter presents a detailed review of research methods used in the study. This chapter is about how the study is carried out in order to meet the aim and objectives of the study. This chapter includes sections on the conceptual framework and research model. Subsequently it states the rationale for choosing competency groups in the study. Then the chapter outlines the research design and procedures employed in the study. This chapter also describes the methods used for collecting and analyzing the data. Then the description of the profile of respondents and organizations is presented. In the end, a brief overview of statistical tools used in this study and data analysis procedures is outlined.

4.1 Discussion and Rationale for Choice of Approach

It has often been observed very correctly that the key to achieve the aimed level of performance is to adopt new approaches to performance and performance measurement [Kaplan and Norton (1992)]. Researchers and HR professionals demand new innovative research attempts to get through the barriers and expedite the employment of new business-aligned competency-based initiatives. The necessity of suggesting new schemes concerning competency management is evident [Grzeda (2005)]. The aim of the research is to develop an empirically substantiated HR competency model. The studies carried out in particular by the World Federation of Personnel Management Associations (WFPMA) [Brewster et al. (2000)], the University of Michigan [Brockbank and Ulrich (2003)], Ulrich et al. (2008), and Rothwell et al. (1999) strongly inspired the ardent interest in carrying out the current study.

However, the approach undertaken is slightly different as compared to the above given studies. This study attempts to develop an empirically validated HR competency model by measuring the two competence levels: first, the required competence level (RCL) which is the standard or desired level of competencies for the job; and second, the existing competence level (ECL) which is the jobholder’s demonstrated or actual level of competencies. The proposed model is then tested with information collected from the survey.
While personnel may be currently competent, they do not necessarily retain a satisfactory level of competence over time. The level and nature of the competence of personnel in an organization may be continually changing. Thus, it is in order for organizations to re-evaluate the current competencies of individuals in light of competencies required for optimal performance.

Competency mapping refers to the process of identifying the key competencies needed for the job. On these identified competencies, the desired/expected level of competence for the job, i.e., the *required competence level (RCL)* is measured. Further, against this *required competence level (RCL)* the jobholder’s actual/current/demonstrated level of expertise is measured, which is the *existing competence level (ECL)*. The desired and the actual levels of competence are compared and analyzed to arrive at the gaps. Competency mapping establishes a relationship between what the organization needs and what the employee can perform and eventually detect a gap. The identified innovation requirements and wide interests concerning HR competency models/frameworks justify the efforts in this research.

### 4.2 Research Process

Prior to embarking on the details of the research methodology, it seems appropriate to present a brief overview of the research process used in the study. Research process consists of a series of actions or steps necessary to effectively carry out research and the desired sequence of these steps. Figure 4.1 illustrates the research process used in this study. The research process consists of several closely related activities, as shown in figure 4.1 through I to X. But such activities overlap continually rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken.

*Figure 4.1* depicts the research procedure of the study. The study commenced with a review of the extensive literature on the individual competency, skill shortage, training needs and performance of HR professionals to identify the key issues pertaining to the proposed area of research (step I). This review of extensive literature brought an understanding on the central and background theories (step II), which are relevant to the study as proved by other researchers. However, there were only a limited number of relevant researches conducted in developing country like India against a number of works on developed countries. Therefore,
this study had to review these researches carried in abroad, especially the ones in developed countries with a view to apply such literature in the Indian context.

Figure 4.1: Research Schema

The next stage (step III) is on the research gaps identified through the review of the literature. The next stage (step IV) formulates the research hypotheses, total seven hypotheses were formulated. The next stage (step V) describes the research design, including the sample design. Next stage (step VI) describes the draft of measurement instrument, i.e., survey questionnaire. A suitable and applicable survey questionnaire was prepared to get responses from HR professionals. Subsequently, a pilot-test (step VII) was carried out. Next stage (step VIII) describes the data collection method. Next stage (step IX) discusses the analysis of the
data. The hypotheses proposed in step IV are tested. Last stage (step X) discusses about the interpretation of the results, preparation of the report and formal write-up of conclusions reached.

Next section elaborates on the theory base and derives the hypotheses.

4.3 Theoretical Background

The studies carried out by the University of Michigan [Brockbank and Ulrich (2003)] over several years founded a model representing five competency domains. The competency domains set up were: strategic contribution, personal credibility, business knowledge, HR delivery, and HR technology. The competency domains encompass various competency factors. Six competency domains established in the study carried out by Ulrich et al. (2008) are: credible activist, business ally, operational executor, talent manager/organization designer, culture and change steward, and strategy architect. This research was primarily based on the grounded competency models established by Brockbank and Ulrich (2003). The aim of the study carried out by Brewster et al. (2000) was to develop a worldwide definition of who an “HR professional” is and does in terms of a global set of core competencies; how do different countries define the use of standards for what constitutes an HR professional; and what are the competencies they will need to be able to apply at various levels of their professional activities from the operational to the most strategic levels. Studies that were conducted before those carried out by Brewster et al. (2000), Brockbank and Ulrich (2003), Ulrich et al. (2008), and Rothwell et al. (1999) on the HR competency models were mostly related to the conceptual constructs of descriptive, analytical, and normative models.

4.4 Conceptual Framework of the Study

Extensive survey of the competency mapping literature provided a theoretical basis for classifying competency groups with their corresponding competency factors. While there was a clear intention to learn from previous models, the overall approach used was to integrate the best elements of other models based on leading HR competencies world-wide. These competencies are categorized into six competency groups/domains (Table 4.1).
After a thorough and meticulous analysis of earlier prominent studies, six groups/domains of HR competencies are proposed: Leadership, Interpersonal, Business, Technical, Analytical, and Technological.

The six competency groups/domains and their corresponding competency factors were derived mainly from ASTD (2004), IPMA (2005), and NAPA (1996) competency models.

Table 4.1 shows six competency groups/domains with their corresponding competency factors. Prior empirical studies conducted in similar vein by the University of Michigan [Brockbank and Ulrich (2003)], Ulrich et al. (2008), Chen et al. (2005), Rothwell et al. (1999), and Abdullah et al. (2011) offered the framework for this study’s vital inquiry.

The conceptual framework of the study is given in table 4.1. The list of competency factors (which are the measured variables) from each of the competency groups/domains are broad and cover a wide spectrum of knowledge, skills, and attributes. In total, 33 competencies (knowledge, skills, or behaviours) in six competency groups/domains were identified.

For business competency groups, the business activities or functions which are central to business operations were identified. Items for business competency group were adapted from the ASTD competency model [Bernthal et al. (2004)] and Abdullah et al. (2011). Items for interpersonal competency group were adapted from Bernthal et al. (2004), Chen et al. (2005), and Abdullah et al. (2011). Items for technical competency groups were adapted from Abdullah et al. (2011), Brockbank and Ulrich (2003) and Bernthal et al. (2004). Items for the technological competency groups were adapted from Bernthal et al. (2004), and Suen and Yang (2012b). Leadership competency group was measured by the items adapted from Bernthal et al. (2004), Chen et al. (2005) and Brockbank and Ulrich (2003). Items to measure analytical competency groups were adapted from Bernthal et al. (2004), Chen et al. (2005), and, Brockbank and Ulrich (2003).

A competency domain refers to a broad group to which homogenous and/or similar competencies belong. Each competency domain comprises of competencies (competency factors). A competency factor is a variable that makes up the competency domain [Brockbank and Ulrich (2003)]. In this research, a competency factor is a variable that makes up the competency domain and this is the smallest unit of competencies.
Table 4.1: Conceptual Framework of the Study

<table>
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<tr>
<th>Competency Groups/Domains</th>
<th>Competency Factors</th>
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| Leadership competencies (LC) | • Decision making  
|                            | • Knowledge of company’s vision and mission  
|                            | • Inspiring and motivating others  
|                            | • Assembling strong teams  
|                            | • Process management  
|                            | • Conflict management  
|                            | • Consensus and negotiation skills  
|                            | • Empowering and training people  
| Interpersonal competencies (IC) | • Pride at work  
|                            | • Personal credibility  
|                            | • Relationship building  
|                            | • Building trust  
|                            | • Networking and partnering  
|                            | • Strong initiative  
|                            | • Communication  
|                            | • Leveraging diversity  
| Business competencies (BC) | • Analyzing needs and proposing solutions  
|                            | • Driving results  
|                            | • Applying business acumen  
|                            | • Strategic and customer orientation  
| Technical competencies (TC) | • Career and succession planning  
|                            | • Organizational development  
|                            | • Human performance improvement  
|                            | • Compensation and benefits  
|                            | • Performance management  
|                            | • Resourcing and talent management  
|                            | • Change management  
| Analytical competencies (AC) | • Analytic thinking  
|                            | • Problem-solving inquisitiveness  
|                            | • Creativity and innovation  
|                            | • Flexibility  
| Technological competencies (TGC) | • Technological literacy  
|                            | • Knowledge of IT and adapting IT to HR management  

The outcomes of the study are: performance improvement and effectiveness. As for the constructs of performance improvement, which is the extent to which possession of competencies improves the performance of an individual, items were modified from Human Resource Competency Study (HRSC) [Brockbank and Ulrich (2003)], Brewster et al. (2000), and Ulrich et al. (2008). Items for effectiveness, which is the extent to which possession of competencies leads to achievement of objectives, were drawn up with reference to the measuring items of Human Resource Competency Study (HRSC) [Brockbank and Ulrich (2003)], Brewster et al. (2000), and Ulrich et al. (2008), further modified according to the present topic. Altogether six competency groups and 39 items were analyzed.
4.4.1 Relevant Literature Support for the Proposed Competency Groups/Domains

This section contains a brief elaboration and the rationale for the identified competency groups.

(a) Leadership Competencies

Leadership has been described as the process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task. A definition more inclusive of followers is that “Leadership is ultimately about creating a way for people to contribute to making something extraordinary happen”. Leadership is a matter of intelligence, trustworthiness, humane, courage, and discipline. When one has all five virtues together, each appropriate to its function, then one can be a leader.

By using a competency-based approach to leadership, organizations can better identify and develop their next generation of leaders. Essential leadership competencies and global competencies have been defined by researchers. However, future business trends and strategy should drive the development of new leadership competencies.

In the past, some researchers have argued that the actual influence of leaders on organizational outcomes is overrated and romanticized as a result of biased attributions about leaders [Meindl and Ehrlich (1987)]. Another body of literature criticizes competence-based approaches from a ‘practice perspective’. Carroll et al. (2008) provides the notion of practice in its consideration to ‘leadership’ as discourse, identity and modus operandi, as far more aligned and attuned to what researchers, developers and professionals will require. Carroll’s argument that the presence of competency in the present mainstream dialogue, operates more as a restraint to leadership thinking and development, than a facilitator of further leadership richness, contributes to the debate around competencies.

The image of leadership conveyed in many competency frameworks could almost lead us to believe that leaders might exist in splendid isolation, with no need for a meaningful relationship with others, let alone require their belief, commitment or acquiescence. Such an approach neglects both more recent theorizing on more inclusive ‘post-heroic’ forms of leadership [e.g., Binney et al. (2005); Drath (2001); Mintzberg (1999); Raelin (2003)] and
accounts that question, the extent to which individualistic models of leadership are associated with improved performance [Gronn (1995)].

Despite these assertions, however, it is largely recognized and accepted by professionals and researchers that leadership is important, and research supports the notion that leaders do contribute to key organizational outcomes [Kaiser, Hogan, and Craig (2008)]. In order to facilitate successful performance, it is important to understand and accurately measure leadership performance.

(b) Interpersonal Competencies

Interpersonal competencies can be defined by a collection of interpersonal skills such as an ability to (i) initiate relationships (ii) assert oneself (iii) disclose personal information (iv) provide emotional support and (v) manage conflict [Buhrmester, Furman, Wittenberg, and Reis (1988)].

An ability to engage in interpersonal relationships in various social situations is known to be important for healthy adjustment in society and psychological well-being for various age groups and evidence supporting this is well documented [e.g., Blakemore and Frith (2004); Larson, Whitton, and Hauser (2007); Rubin, Bukowski, and Parker (1998)].

Interpersonal relationships, in particular, have been emphasized as an important area of competence in employment. Boyatzis (1982) identified 6 work related competence groups for evaluating a manager’s performance and found that 4 out of 6 groups were highly connected to interpersonal competencies. Several empirical studies have confirmed the importance of interpersonal competencies related to work outcomes. Wayne et al. (1997) found interpersonal effectiveness predicted job performance in assessing potential employees in a variety of managerial, professional, and technical jobs. They also found that supervisor’s perceptions of interpersonal skills were positively related to an employee’s salary progression. These and other similar empirical studies also found that individual characteristics related to the ability to engage in interpersonal relationships was essential for managerial effectiveness [Kilduff and Day (1994)], and career success [Luthans, Hodgetts, and Resenkrantz (1988)]. Zaccaro et al. (1991) found that social intelligence is directly related to leadership effectiveness and that it is necessary to effectively develop and implement a vision for an organization. Thus, greater attention needs to be given to interpersonal competency as it is an important concept in
organization studies, playing a vital role in leadership, organization development, and human resource development [Ferris, Perrewe, and Douglas (2002)].

(c) Business Competencies

According to Becker and Huselid (1998), business related competencies refer to the business skills and experiences that employees possess outside their functional specialism. Business competencies also have a strong influence on corporate financial performance. Rothwell et al. (1999) defined business competencies as “those that are associated with the understanding of organizations as systems and of the process, decision making criteria, and issues that businesses face”. McDaniel (1998) defined business competency as “a competency that applies to many different positions in a company”. Unfortunately, common problems nowadays is that HR professionals do not possess an adequate working knowledge of what business is all about, or of the strategic goals of the organizations.

To become key players in an organization, HR professionals must understand the business or industry of the company they serve. The labour factor, representing institutional constraints such as labour legislation, is the third factor that constitutes the domain of business knowledge [Boselie and Paauwe (2005)]. HR professionals must understand how their business or agency operates. Therefore, HR professionals should develop their knowledge of such areas as finance, marketing, operations, and general management. Expertise in these areas helps HR professionals create value by enabling them to link their actions more effectively to the organization’s strategy [Heisler (2003)]. As one of the main barriers for the ability of HR professionals to play a more strategic role in an organization is their lack of competencies [Aitchison (2007)]; the impact of business competencies on performance must be assessed.

(d) Technical Competencies

Technical competency refers to that competency which is unique or specific to HR roles or functions. McDaniel (1998) defined technical competency as “a competency that is unique or specific to a role or function”. Palan (2003) defined technical/functional competencies as “the work tasks and outputs, i.e., knowledge and skills that are needed to perform a job at a specific job level”. Huselid, Jackson, and Schuler (1997) suggested that technical HR practices are more focused on traditional personnel management practices (e.g., recruitment, selection, and training).
HR professionals deliver both traditional and operational HR activities to their businesses in four major categories [Boselie and Paauwe (2005)]:

1. Designing developmental programs and challenging work experiences, which are accomplished by offering career planning services and facilitating internal communication processes. These efforts include both individual development and organization-wide development.
2. Structuring and HR measurement—restructuring the organization, measuring the impact of HR practices, and managing global implications of HR practices.
3. Attracting, promoting, retaining, and out-placing appropriate people.
4. Performance management in terms of designing performance-based measurements and reward systems and providing competitive benefit packages.

(e) Analytical Competencies

Analytical competency is the ability to visualize, articulate, and solve both complex and uncomplicated problems and concepts and make decisions that are sensible and based on available information. Such skills include demonstration of the ability to apply logical thinking to gathering and analyzing information, designing and testing solutions to problems, and formulating plans. It is the ability to comprehend a situation by breaking it down into its components and identifying key or underlying complex issues. It implies the ability to systematically organize and compare the various aspects of a problem or situation, and determine cause-and-effect relationships to resolve problems in a sound, decisive manner.

(f) Technological Competencies

To contribute to management team discussions about technology, HR professionals need a knowledge base about the current technological possibilities and a general vision about the future role that technology might play in their firms [Ulrich and Brockbank (2005)]. The impact of technology on HR’s work cannot be underestimated. The three most important catalysts for change include (i) employee self-service through web-based portals, (ii) increasingly sophisticated call centers and (iii) aggressive new entrants into the outsourcing market [SHRM (2002)].

In the context of IT, technology enables HR professionals to provide faster processes, cost reduction, and a less administrative burden [Ngai and Wat (2006); Ruël et al. (2004)], and therefore, to deliver technical effectiveness of HR functions [Haines and Lafleur (2008)].
Thus, the HR competencies of systems and processes can be leveraged by technological competencies.

Technological competencies are positively associated with the performance of HR professionals [Suen and Yang (2012a, b)]. IT also acts as a catalyst that enables HR professionals to spend more time on transformational and IT-supported activities (Gardner et al. (2003)), identifying and managing talent, managing projects [Ulrich and Brockbank (2006)], and collecting data and transforming it into strategically valuable information [Bell et al. (2006)]. Smart use of IT should allow HR professionals to be strategists and achieve results instead of being bogged down with “administrivia”, and greater use of IT-supported HR applications will be associated with greater HR involvement in the strategic roles of business partners and change agents [Haines and Lafleur (2008)], which can leverage the HR competencies of organization capabilities.

In the context of IT usage in HR functions, HR professionals generally act as end users; whereas the end user’s IT competencies influence how well they can apply IT knowledge, applications, and information systems to their tasks in an organizational computing environment [Yoon (2009)]. In essence, the technological competencies are antecedents to improved performance [Marcolin et al. (2000)].

4.5 Research Model and Hypotheses Development

This study describes a model for investigating six competency groups: business, technical, leadership, analytical, interpersonal, and technological, and it offers an empirical evaluation of how these competencies influence the outcomes of this study: performance improvement and effectiveness of HR professionals.

A hypothesis attempts to answer questions by putting forth a conceivable explanation that has yet to be rigorously tested. For setting up of the hypotheses in the research, this section focuses on the relevant literature review.

4.5.1 Relevant Literature Support for the Proposed Hypotheses

In 1978, Gilbert’s influential “Human competence: Engineering worthy performance” appeared, one of the first contributions in which the concept of competence was linked to performance. Gilbert defined ‘competence’ as a function of worthy performance (W), which
is a function of the ratio of valuable accomplishments (A) to costly behaviour (B). He expressed this in the formula $W = \frac{A}{B}$. He thereby established that the value of performance was a function of accomplishments (that which is achieved, for example, goals accomplished) and the costs of behaviour (for example, wage costs, time or energy). The value of performance rises as results achieved increase and the cost of the behaviour necessary to achieve these results decrease. Woodruffe (1991) perceived a ‘competency’ as a dimension of behaviour or a soft skill underlying competent performance. Thus a competency serves as an important predictor of job performance, particularly contextual performance. In general, the definition of performance in any given context requires: combination of criteria (not a single measurement), level of analysis (such as end-users, employees, etc.), certain focus (perspective), time frame (short or long range), and a measurement system (quantitative versus qualitative, objective versus subjective) [Szilagyi (1988)].

Competency is an ‘underlying characteristic’ causally related to superior job performance [McClelland (1971); Boyatzis (1982)]. This approach is also known as the input approach to management competency [Tate (1995); Hoffmann (1999)], as it was used to define the inputs needed to demonstrate a competent performance and to find out what makes managers competent. Boyatzis’ model investigates which characteristics of managers are related to effective performance and it can be considered as an adaptation of the classical psychological model of behaviour [McClelland (1971)]. Marrelli (1998, 2001) has argued that it is useful to define these personal characteristics as ‘enabling behaviours’. These include work habits, ways of interacting with others, or manners of conducting oneself that contribute to effective work performance. Examples of enabling behaviours are managing work priorities and assignments to meet schedule commitments, developing rapport with others, and treating others with respect [Marrelli (1998, 2001)].

Competencies can articulate both the expected outcomes from an individual’s effort and the manner in which these activities are carried out [Rankin (2002)]. Competencies by themselves are insufficient for performance unless defined in behavioural terms. The competency, as a measurement tool, identifies behavioural dimensions of an individual’s effective performance at work. Some authors suggest that competencies are the work-related personal attributes: knowledge, skills, and values that individuals draw upon to do their work well [Selmer and Chiu (2004)]. These elements, at the same time, are the factors that enable assessment, feedback, development, and reward for individuals to take place [Kochanski (1996)].
Competencies are often intended to distinguish exceptional performers from average performers [e.g., Parry (1996); Olesen, White, and Lemmer (2007)]. There is ample evidence that competencies form the base for effective and superior performance. Performance is the achievement of set goals or objectives of an individual. Competencies are a set of abilities and personality traits required for superior performance, and hence, are known as the key to superior performance. A superior job performance is characterized as exhibiting more frequently in several job situations and yielding better results.

Spencer and Spencer (1993) emphasize the point that competencies must be related to performance in the workplace and not what would be desirable to have. The simplest example, they provide of relating competencies to performance is the studies they conducted with salespersons where they were able to relate competencies to sales performance. Unfortunately, most jobs do not allow for such accessible criterion measures.

Since the pioneering work of Stogdill (1948), Katz (1955), and Mann (1965) on competencies, a burgeoning literature in the 1980s and 1990s has gone on to identify an array of competencies linked to managerial success and effective performance [e.g., Boyatzis (1982); du Gay, Salaman, and Rees (1996); Lawler (1994); Mansfield (1996); McCall and Lombardo (1983); McLagan (1996); Mirabile (1997); Posner and Kouzes (1988); Spencer and Spencer (1993)].

However, even if competency-driven applications have been applauded by many organizations, some authors have complained about the unbalanced relationship between the abundance of competency models used in organizational settings and the paucity of empirical studies that have been conducted to support them [Laber and O’Connor (2000); Maurer et al. (2003); Rogelberg (2000)].

Related literature also shows that various studies have been conducted on the dynamics affecting the competency and performance of HR professionals in isolation and separation. Integrated studies on the key dynamics and their effectiveness on performance and competency are very few and inconclusive.

Further, critics have argued that competence is formulated in terms that are too general, which means they do not have any discriminative power in assessments, and the link between competence and performance is also not direct. Various competencies can influence certain performance, and certain competencies can influence various fields of performance.
When measuring dimensions of competence, it must be noted that they are not directly observable, but are manifested in performance in a specific situation [Spencer and Spencer (1993)]. It is argued that the key to achieve the aimed level of performance is to adopt new approaches to performance and performance measurement [Kaplan and Norton (1992)].

According to Spencer and Spencer (1993), HRM adds value when it assists individuals and organizations to perform better than their present level of performance. Ulrich et al. (2008) asserted that HR professionals who possess the right HR competencies will be able to support their organizations to achieve the desired organizational goals and objectives.


Gilbert (1978) puts the ‘competence’ concept in a wider framework of performance improvement, at societal, organizational and individual levels. The measure of competence used by Gilbert is the performance improvement potential. This states that actual behaviour is inversely proportional to the potential for improving performance (PIP). The PIP is the ratio of exemplary performance to typical performance. He adds that the ratio must be established for an identifiable result, so that no general quality of competence is created.

Since the emergence of theoretical approaches in the field of work, the question of how employee performance can be improved has intrigued both academics and professionals for many years. Some researchers like Romiszowski (1981, 1986) and Dubois (1993) developed a strategic systems model based on the competencies for improving performance in organizations, providing various answers to this question.

Individual performance depends on many internal and external factors. The competency mapping, as a measurement tool, identifies those internal factors (competencies), which are responsible for improving the performance of employees. The performance improvement process becomes stronger when employees are appraised on both objectives (what) and behavioural performance (how), referred to as the “mixed model”. This “mixed model” provides a shared understanding of what will be monitored and measured, and ensures an understanding of how the work gets done in addition to what gets done [Ozcelik and Ferman (2006): 77]. The study group [Leman et al. (1994): 2-3] also concluded that it should be quite
easy to examine improvements in individual performance, irrespective of the use of the standards. The possible benefits ranged from perceived improvements in personal effectiveness and motivation to the acquisition of specific managerial skills leading to demonstrable improvements in performance [Winterton et al. (1999)]. In other words, the possession of competencies is assumed to lead to performance improvement. This suggests the first set of hypothesis linking all six competency groups with performance improvement:

**H1a:** Perceived possession of leadership competencies will have a positive effect on perceived performance improvement.

**H2a:** Perceived possession of interpersonal competencies will have a positive effect on perceived performance improvement.

**H3a:** Perceived possession of business competencies will have a positive effect on perceived performance improvement.

**H4a:** Perceived possession of technical competencies will have a positive effect on perceived performance improvement.

**H5a:** Perceived possession of analytical competencies will have a positive effect on perceived performance improvement.

**H6a:** Perceived possession of technological competencies will have a positive effect on perceived performance improvement.

A competency provides a “means” and an “end” in the form of knowledge, skills and abilities required to be an effective employee functioning and performing at expected standards [Youn, Stepich, and Cox (2006)]. Competency is a combination of tacit and explicit knowledge, behaviour and skills that give someone the potential for effectiveness in task performance. The question posed by Effectiveness is, “How much do competencies affect the capacity and actions of employees”? Boyatzis (1982) defines the effective performance of a job as “the attainment of specific results (outcomes) required by the job through specific actions while being consistent with policies, procedures, and conditions of the organizational environment”. Boyatzis’s model for effective performance includes three elements: individual’s competencies; functions and demands of the job; and organizational environment. McClelland (1973) advocated the use of criterion referenced assessment (CRA) for analyzing key aspects of behaviour that distinguish between effective and less effective performance.
The second approach identifies the outcome expected from a job when it is performed adequately. It suggests not only skills and knowledge, but also the range of qualities of personal *effectiveness* required to get a job done [Ashworth and Saxton (1990); Silver (1991); Boam and Sparrow (1992); Burgoyne (1989)].

According to Huselid (1995), high performance work system (HPWS) worker’s efforts are expected to be higher and more effective than for those working in a control-oriented organization. In the organizations that we work with, there are almost always a few HR professionals who effectively demonstrate how competence connects to strategic success, and are known for improving the performance. Ulrich et al. (2008) asserts that HR professionals who possess the right HR competencies will be able to support their organizations to achieve the desired organizational goals and objectives, i.e., they will be perceived as more effective.

Thus, previous studies have implied that competency models not only help in providing a “blue print” for the entire gamut of competencies that produce excellent performance, but can also provide an important and useful tool to bring effectiveness. Research also indicates that closer the *required level of competence (RCL)* to the *existing level of competence (ECL)* of the employees, brings a better chance of bringing *effectiveness* in their jobs.

Summarizing the above arguments, this study proposes a second set of hypothesis linking all six competency groups with effectiveness:

**H1b:** Perceived possession of leadership competencies will have a positive effect on perceived effectiveness.

**H2b:** Perceived possession of interpersonal competencies will have a positive effect on perceived effectiveness.

**H3b:** Perceived possession of business competencies will have a positive effect on perceived effectiveness.

**H4b:** Perceived possession of technical competencies will have a positive effect on perceived effectiveness.

**H5b:** Perceived possession of analytical competencies will have a positive effect on perceived effectiveness.

**H6b:** Perceived possession of technological competencies will have a positive effect on perceived effectiveness.
However, the question also arises whether those who have been perceived as effective can be further developed and whether this in turn leads to performance improvement. Within the research model it is assumed that there is a positive correlation between performance improvement and effectiveness, as effectiveness may have a positive impact on the performance improvement of HR professionals. Accordingly, we hypothesize that:

**H7**: Effectiveness will be positively related to performance improvement.

### 4.5.2 Research Model

Anchored in the necessity of HR professionals to provide value to their organizations, HR professionals who demonstrate competence will be perceived as more effective [Ulrich et al. (1995)]. The classic rationale for competency models is the belief that formalized and tested competencies are the most effective way of predicting performance [Delamare Le Deist and Winterton (2005)].

Workforce performance is assessed with respect to job competency constraints in addition to the objectives [Draganidis and Mentzas (2006): 56]. However, today performance is not only seen as “what” (objectives) an employee achieves, but also viewed as “how” (competencies demonstrated) the results are derived. One of the ‘recurring features’ in the notion of competencies is that the competencies can be described in terms of observable specific behaviours [Hirsh and Strebler (1994): 83]. In practice, nonetheless, organizations increasingly adopt hybrid systems that include behavioural as well as functional competences [Winterton and Winterton (2002); Alderson (1993)]. The objective here is to assess individual’s strengths and weaknesses so that future development can be planned. **Figure 4.2** depicts the proposed research model of the study.

All the six competency groups are directly and indirectly related to performance improvement, with the indirect path occurring through effectiveness. The six competency groups lead to the effectiveness of HR professionals as perceived by HR professionals themselves. This linkage, in turn, affects the outcome variable of the study “performance improvement”.

Based on prior studies, items for the performance improvement outcome were identified as: effectiveness, efficiency, productivity, and better quality of work. The items were adapted to
reflect an improvement in HR professional’s performance through the set of competencies. Items for effectiveness were identified as: achieving objectives, and decrease in errors.

**Figure 4.2: The Research Model**

The study seeks to examine HR professionals’ overall perceptions and evaluations of the required competence level (RCL) and existing competence level (ECL) on the competencies identified and their linkages to the performance improvement for the most part. The requirement is to find out the manner in which evaluations of effectiveness are interconnected and the extent to which competency models are predictive of performance. The rationale for this approach was that HR professionals’ evaluations of performance and effectiveness matter because they are in a unique position to judge how competency models work in practice [Rynes et al. (2002); Caldwell (2010)]. Hence the respondents for this study and the units of analysis are HR professionals.
The research model proposed here shifts the focus to HR professional’s overall perceptions and evaluations of effectiveness. While this shift in focus does not offer a direct exploration of empirical measures of effectiveness it does allow for an analysis of the perceived effectiveness of HR professionals [Rynes et al. (2002)].

**Figure 4.3** shows the research model with hypothesis indications.

![Figure 4.3: The Research Model with Hypothesis Indications](image_url)

### 4.6 Research Design

The research methodology for the current study involved multiple methods, such as exploratory, descriptive, analytical, survey and empirical. The details are as follows:

**Exploratory**: The proposed study is exploratory. An exploratory study is a means to look out what is happening, to search for new insights, to ask questions and to assess phenomena in a new light [Robson (2002)].
Descriptive: The proposed study is descriptive in nature. Descriptive research includes fact finding inquiries of different kinds. After reviewing the literature and identifying the past and the current competency mapping practices; the facts and figures relating to employee competency mapping strategies, its implementation and the consequences in terms of individual and organizational performance are narrated. The study is designed to gather descriptive information on individual competency, skill shortage, training need, performance and challenges for HR professionals.

Analytical: The study quantified the qualitative phenomena concerning employee competency mapping strategies and their implementation for organizational success by using scaling techniques. Further, competency mapping in the sample organizations is analyzed, interpreted and appropriate conclusions are drawn.

Survey: By identifying independent and dependent variables for the study, the questionnaire was constructed for the respondents. Subsequently, data have been mustered, analyzed, interpreted and appropriate logical conclusions are arrayed.

Thus, the insights gained from exploratory research are quantified by conclusive research. Survey (conclusive research) has been done to verify the hypothesis and to quantify the facts gathered in survey. The objective of conclusive research is to test specific hypothesis and examine specific relationships.

Empirical: The research has employed quantitative methods for data analysis. Data collected and examined was primary type. Primary data for the study was collected by conducting a survey, for which survey instrument was scientifically developed.

4.7 Data Collection Techniques and Procedures

4.7.1 Sampling Design

The proposed research targets subjects who are working as HR professionals in Indian IT organizations. The survey was conducted in 11 leading IT companies in India, namely: Wipro Technologies, Infosys Ltd., Tata Consultancy Services Ltd., HCL Technologies Ltd., Hawlett-Packard India Software Operation Pvt. Ltd., Larsen and Toubro Infotech, Oracle India Pvt. Ltd., Zenith Software Ltd., 3i Infotech Ltd., Cognizant Technology Solutions Corporation, and Impetus Software Ltd.
The target population for this study was limited only to the HR professionals who are working in the IT sector in India. The survey was conducted in ten IT companies in Bangalore, Karnataka as most of the IT companies in India are located here and it is also known as the IT hub of India. The survey was also conducted in one IT company located at Indore, Madhya Pradesh.

The sample size is 120. For selecting the respondents, the convenience sampling technique is used, as convenience sampling attempts to obtain a sample of convenient elements. Often, respondents are selected based on the ease of the access and because they happen to be in the right place at the right time. In this type of sampling the researcher judges the nature of the sample and the sampling area.

Conducting the HR survey in IT companies was a very challenging task, as it was extremely difficult to get consent from organizations on participating in the survey and also many respondents were not willing to share their view perceptions with regards to their competency. Therefore, this study was limited to eleven IT organizations.

The study carried out was limited to the development of the HR professional competency model for the management level of HR professionals. Management level employees refer to those who are supervisors, administrative officers, executives, managers, senior managers, general managers, directors, etc. and those higher in the position. Due to this, the HR professionals at the management level were targeted for the survey.

Several issues or problems that could possibly have affected the nonparticipation in this survey, include the following:

- The unwillingness of HR professionals to fill up the survey questionnaire,
- Respondents’ unknown fear of the response given falling into the wrong hands and may jeopardize the position of individuals in the organizations,
- Busy schedule,
- Lack of understanding of the purpose of the research, and
- Lack of awareness of the importance of the survey.
4.7.2 Method of Collecting the Data

There is no collected data source from previous research conducted on the same content and context as that of the study. Primary data is therefore imperative for the study. All the information and data were primarily collected through a survey questionnaire. Admittedly, the method is time consuming and costly. However, it can secure validity and reliability of the data. To collect primary data for this study, a survey questionnaire was designed and distributed to the respondents at their workplace.

4.7.3 Questionnaire Design

The aim of the research is to develop an empirically substantiated HR competency model. The study aims at exploring the contribution of six competency groups to performance improvement and effectiveness of HR professionals, in terms of their existing competence level and required competence level. Hence, in designing the questionnaire it was ensured that the items of the questionnaire covered the respondent’s perceptions on possession of competencies, and their impact on effectiveness and performance improvement.

As a first step, an extensive literature search on previously used validated questionnaires was done and we captured variables that are of interest according to the study hypothesis.

To ensure content validity of the scales, items for the constructs were mainly adapted from prior studies, as discussed in preceding sections.

Part of the questionnaire or complete questionnaire can be adapted from previous studies. For example, the SERVQUAL questionnaire developed by Zeithaml et al. (1990) to measure quality in the service sector “appears to remain the most complete attempt to conceptualize and measure service quality” [Nyeck, Morales, Ladhari, and Pons (2002)]. The SERVQUAL measuring tool has been used by several researchers to examine numerous service industries such as healthcare, banking, financial services, and education [Nyeck, Morales, Ladhari, and Pons (2002)].

Questionnaire development is a collaborative and iterative process. Therefore the questionnaire was designed after careful deliberation of the structure of the questionnaire. A survey questionnaire was designed and distributed to the respondents to collect primary data for the study. The study made use of a mixed-method approach comprising both open and
closed-ended questions in the questionnaire. In setting up the questionnaire, continuous questions (where the respondent is presented with a continuous scale) were framed. The Likert scale is employed, which is a rating scale that requires the respondents to indicate a degree of agreement or disagreements with each of a series of statements about the stimulus object, typically, each scale item has the five response categories, ranging from “strongly disagree” to “strongly agree” [Likert (1932)]. All 39 items were measured on a five-point Likert-type scale, ranging from ‘‘strongly disagree’’ (1) to ‘‘strongly agree’’ (5).

The survey questionnaire was designed through the following key steps:

- Study of the existing literature on HR competency models to find out the competencies that were integrated into the six competency groups: leadership, interpersonal, business, technical, analytical, and technological.

- Development of research hypothesis linking competencies with individual performance.

- Development of survey questions in the form of statements linking competencies with the performance of HR professionals.

- The survey questionnaire was designed, pretested and pilot-tested.

4.7.3.1 Pretesting

After designing the survey questionnaire, five HR professionals working in Hewitt Associates India, Gurgaon were approached to pretest it. We asked them to complete the survey and time taken to complete each questionnaire was measured. We observed them completing the survey, and the places where they hesitated or made mistakes. This was an indication where survey questions and layout were not clear enough and needed to be improved.

Subsequently we analyzed the information provided to clarify directions, question wording, appropriateness of the content, level of sophistication of language, or response categories where necessary. Questions that were not providing useful data are discarded, and the necessary revisions of the questionnaire were made.
4.7.3.2 Pilot Testing

The questionnaire is pilot tested and validated in order to evaluate if it is measuring what it supposed to measure and is it doing it reliably. A **pilot test** was used to validate the measurement instrument. Pilot testing was done using a group of 25 HR professionals from Gas Authority of India Ltd., National Fertilizers Ltd., Tata Consultancy Services, and Accenture.

A pilot test was required to gauge the reliability and validity of the competency factors. Cooper and Schindler (2003) stated that a pilot test is conducted to discover weaknesses in design and instrumentation. The size of a pilot group may range from 25 to 100 subjects [Cooper and Schindler (2003)]. The questionnaires were personally handed to the HR professionals. Data was collected and thereafter analyzed using Statistical Package for Social Sciences (SPSS) Windows version 21.00. The results of the **pilot test** are summarized below.

The Cronbach’s alpha levels for leadership competency group, interpersonal competency group, business competency group, technical competency group, analytical competency group, and technological competency group were 0.727, 0.938, 0.862, 0.902, 0.751 and 0.786 respectively. All the Cronbach’s alpha levels were acceptable as the values were more than 0.7 [Nunnally (1978)]. Cronbach’s alpha reliability coefficient measures how well a set of items measure a single unidimensional construct. It explains the internal consistency of the items in the scales. Therefore, the scales of the instrument were reliable and the instrument was fit. Due to the acceptable levels of Cronbach’s alpha, no item was dropped from the survey questionnaire. Items loaded in the correct factors in confirmatory factor analysis (with loadings of 0.60 or more). Consequently, these results confirmed that each of the eight constructs was unidimensional and factorially distinct and that all items used to operationalize a particular construct, loaded onto a single factor.

Therefore, the measurement instrument demonstrated satisfactory **reliability, convergent validity, and discriminant validity** in the pilot testing.

The questionnaire is divided into three sections. This is given in **Appendix 2**. The first section is on the background information and respondent’s profile, which consisted of general questions about the respondent’s personal information, like age, gender, and the organization he/she is working for. The second section of the questionnaire consists of measurement of the
required competence level (RCL). The third section of the questionnaire consists of measurement of the existing competence level (ECL).

The questionnaire should be simple to administer and should be able to produce meaningful information to the study [Sekaran (2008)]. The items included in the questionnaires should require respondents to use their experience. The respondents’ understanding of the questions, the type of the questions, and the wordings of the questionnaires should be appropriate [Sekaran (2008)]. The researcher also took into consideration the fact that a respondent should not spend more than 20 minutes of their valuable time in completing the questionnaire.

4.7.4 Procedure

Before administering the questionnaire, participants were informed about the objectives of the research and told that their participation is voluntary and that the identity of each employee would not be revealed. Following their consent, the questionnaire was completed individually. Respondents took around fifteen to twenty minutes to complete the questionnaire.

Unlike the procedure carried out by Brockbank and Ulrich (2003), and Ulrich et al. (2008), in this study the competency groups/domains were not revealed directly to the respondents in the survey questionnaire.

The survey questionnaire was designed through the following key steps:

- Study of the existing literature on HR competency models to find out the competencies that were integrated into the six competency groups: leadership, interpersonal, business, technical, analytical, and technological.
- Developing statements linking competencies with the performance and effectiveness of HR professionals.
- The survey questionnaire was designed and pilot-tested with 25 HR professionals.
- The survey questionnaire was accompanied by a cover letter introducing the study. The unit of analysis was the person himself/herself. A sample of the survey questionnaire together with the cover letter is given in Appendixes 1 and 2.
4.7.5 Measurement and Scaling Procedures

Measurement scale in the research study is the *Interval-Scale*. The basic characteristic of interval-scale is that difference among objects can be compared, and the zero point is arbitrary.

4.7.6 Scaling Techniques

In *noncomparitive scales*, also referred to as monadic or metric scales, each object is scaled independently of the others in the stimulus set. The resulting data are generally presumed to be interval or ratio scaled. In noncomparative scales, *itemized rating scale* is used (as shown in *figure 4.4*) in which the respondents are provided with a scale that has a number or brief description associated with each category.

![Scaling Techniques Diagram](image-url)

**Figure 4.4:** Scaling Techniques

The categories are ordered in terms of scale position; and the respondents are required to select the specific categories that best describe the object being rated. In Itemized scale *Likert scale* has been used. The Likert scale is a widely used rating scale that requires the
respondents to indicate a degree of agreement or disagreements with each of a series of statements about the stimulus object, typically, each scale item has the five response categories, ranging from “strongly disagree” to “strongly agree” [Likert (1932)].

The respondent’s perceptions were measured through a five-point Likert interval scale. Respondents were required to respond to 39 items, which were measured on a five-point Likert-type scale, ranging from “strongly disagree” (1) to “strongly agree” (5).

The questionnaire was customized on the basis of the requirements of the investigation, but proven standard scales were taken from the literature. The HR professional’s overall perceptions and evaluations of the required competence level (RCL) and existing competence level (ECL) across six competency groups and their linkages to the performance were measured through these scales.

Except for section one (i.e., the respondent profile); all the remaining sections of the questionnaire used the interval scales of measuring the variables where respondents were asked to respond to items that measured a variable through the five-point scale. As the research is an empirical study, nominal scales were used to observe the respondent profile. Though the nominal scale is considered as the least powerful measurement scale, however, it gives some fundamental, categorical, and gross information [Sekaran (2003)].

4.8 Respondent Profiles

For HR professionals, the profile variables included the gender of respondents, age of respondents, education level, current job title/designation and years in the current HR role. These were captured by direct single item using nominal scales.

In terms of the gender, 51.6% were males and 48.4% were females. Approximately 32.5% of the respondents were between the age of 25 to 34 years and 30.8% were between 35 to 44 years. Altogether, 67.5% of the respondents were 35 years and above of age.

It was observed that the majority of the sample possessed a master's degree (62.5%), followed by bachelor degree (28.3%), professional/others (5.0%), and PhD degree (4.2%). Altogether, 71.7% of all the respondents possessed a minimum of a master's degree. From the above, it can be deduced that the above sample in terms of gender, age, and education level produced a moderately homogenous sample pool for this research.
Table 4.2 sets out the summary of profiles of respondents.

Table 4.2: Respondent Profiles

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>62</td>
<td>51.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>58</td>
<td>48.4</td>
</tr>
<tr>
<td>Age</td>
<td>25-34</td>
<td>39</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>37</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>30</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>55-65</td>
<td>14</td>
<td>11.7</td>
</tr>
<tr>
<td>Education Level</td>
<td>Secondary Education</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Diploma Degree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Bachelor Degree</td>
<td>34</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>Master Degree</td>
<td>75</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td>PhD Degree</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>Professional/Others</td>
<td>6</td>
<td>5.0</td>
</tr>
<tr>
<td>Current Job</td>
<td>Executive/Administrator</td>
<td>23</td>
<td>19.2</td>
</tr>
<tr>
<td>Title/Designation</td>
<td>Senior Executive/Administrator</td>
<td>23</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td>Manager</td>
<td>31</td>
<td>25.8</td>
</tr>
<tr>
<td></td>
<td>Senior Manager</td>
<td>26</td>
<td>21.7</td>
</tr>
<tr>
<td></td>
<td>General Manager</td>
<td>10</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td>Director</td>
<td>7</td>
<td>5.8</td>
</tr>
<tr>
<td>Years in Current</td>
<td>1-2 years</td>
<td>35</td>
<td>29.1</td>
</tr>
<tr>
<td>HR Role</td>
<td>3-5 years</td>
<td>32</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>6-9 years</td>
<td>33</td>
<td>27.5</td>
</tr>
<tr>
<td></td>
<td>Over 10 years</td>
<td>20</td>
<td>16.7</td>
</tr>
</tbody>
</table>

The respondents of the questionnaire were the senior executive/administrator, executive/administrator, manager, senior manager, general manager, and HR director of the organization as depicted in figure 4.8.

The profile variables of respondents are depicted by pie-charts as shown in figures from figure 4.5 to 4.9.
Figure 4.5: Gender of Respondents

Figure 4.6: Age Group of Respondents
Figure 4.7: Education Level of Respondents

Figure 4.8: Current Job Title/Designation of Respondents
4.9 Organizational Profiles

Table 4.3 sets out the summary of profiles of organizations.

Table 4.3: Organization Profiles

<table>
<thead>
<tr>
<th>Category</th>
<th>Profile of Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size - Number of Employees</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Frequency</td>
</tr>
<tr>
<td>Less than 1000</td>
<td>3</td>
</tr>
<tr>
<td>1001-2500</td>
<td>3</td>
</tr>
<tr>
<td>2501-5000</td>
<td>2</td>
</tr>
<tr>
<td>Over 5000</td>
<td>3</td>
</tr>
<tr>
<td>Number of HR Staff</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Frequency</td>
</tr>
<tr>
<td>0-50</td>
<td>3</td>
</tr>
<tr>
<td>51-100</td>
<td>3</td>
</tr>
<tr>
<td>Over 100</td>
<td>5</td>
</tr>
</tbody>
</table>

Profiles of the organizations from where questionnaires were filled up by the respondents are depicted in figure 4.10 and 4.11.
Figure 4.10: Size of Respondent Organizations

Figure 4.11: Number of HR Staff of Respondent Organizations
4.10 Statistical Testing and Data Analysis Procedures

The instruments for measuring the dependent variable (i.e., performance improvement) and the independent variables (i.e., the six competency groups) and the corresponding competency factors in the study, were modified from the instruments that have been used in past research that were proven to have high reliability and validity.

Upon obtaining the response from the respondents, the primary data was analyzed using statistical tools and techniques including the reliability analysis, validity analysis, and regression analysis.

After collection of the data, each individual item in the questionnaire was labeled using codes. Then the data was entered with the codes. The data set was saved in the Statistical Package for Social Sciences (SPSS) Windows version 21.00. The data collected was screened for errors in terms of completeness and consistency. The data set was analyzed using both the descriptive and inferential statistical techniques.

4.10.1 Statistical Tools Used in the Study

Statistical testing and data analysis procedures involved several tools, procedures, testing, and measurements. The various tests and analytical procedures as given below were used in the study.

Normality Tests

Screening continuous variables for normality is an important step in almost every multivariate analysis. Although normality of the variables is not always required for analysis, the solution is usually better if the variables are all normally distributed [Tabachnick and Fidell (2007)].

The most basic assumption in multivariate analysis is normality [Hair et al. (2006)]. Normality refers to the shape of the data distribution for an individual metric variable and its correspondence to the normal distribution. The shape of the distribution can be explained by the measure: skewness. Skewness is used to describe the balance of the distribution, that is, whether it is unbalanced and shifted either to the left or right [Tabachnick and Fidell (2007)].
If a distribution is unbalanced, it is skewed. A positive skewness denotes a distribution to the right while a negative skewness shifts to the left [Hair et al. (2006)].

A more reliable approach to test for normality is the normal probability plot [Hair et al. (2006)]. Besides using the normal probability plot, statistical tests can also be used to assess normality. In a normal distribution the values of skewness are zero [Tabachnick and Fidell, (2007)]. Each dependent latent variable in the model should be normally distributed for each value of each other latent variable. A rule of thumb to assess normality is based on the skewness values. Skewness values should be below 2.0 [Tabachnick and Fidell (2007)].

In this study, statistical tests based on the skewness values and normal probability plot was used to assess normality.

**Descriptive Statistics**

Measures of central location and dispersion viz. (mean and standard deviation) were studied for describing the nature of the data to yield meaningful information about criterion and predictor variables.

**Multicollinearity Diagnosis**

Multicollinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated. In this situation the coefficient estimates may change erratically in response to small changes in the model or the data. Multicollinearity does not reduce the predictive power or reliability of the model as a whole; it only affects calculations regarding individual predictors. That is, a multiple regression model with correlated predictors can indicate how well the entire bundle of predictors predicts the outcome variable, but it may not give valid results about any individual predictor, or about which predictors are redundant with others.

**Multiple Regression Analysis**

Regression analysis is the estimation of the linear relationship between a criterion variable and one or more predictor variables or covariates. *Multiple R* is the correlation coefficient between the observed and predicted values of the criterion variable. It ranges in value from 0 to 1. A small value indicates that there is little or no linear relationship between the criterion variable and the predictor variable. *R-Square* is a measure of the goodness of fit
of a linear model. It is sometimes called the coefficient of determination. It is the proportion of the variation in the criterion variable explained by the regression model. It is also the square of the multiple R, the correlation of the observed and predicted values of the criterion variable. It can range in value from 0 to 1. Small values indicate that the model does not fit the data well. **F test** is the ratio of two mean squares. The larger mean square is conventionally placed in the numerator and the smaller in the denominator. The degrees of freedom associated with the numerator and denominator is used in the evaluation of F statistics.

**t-test Statistics**

The t-test statistics was used to test whether or not two independent groups have different mean values on dependent variable. The t-test statistics allows us to answer this question by using the t-test statistic to determine a p-value that indicates how likely these results could have occurred by chance. By convention, if there is a less than 5% chance of getting the observed differences by chance, we reject the null hypothesis and conclude that a statistically significant difference was found between the two groups.

**4.10.2 Testing Procedure of Hypotheses**

**Multiple Regressions**

Multiple regression is an extension of simple linear regression. It is used when we want to predict the value of a variable based on the value of two or more other variables. Multiple regression allows us to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained. For example, we might want to know how much of the variation in performance improvement can be explained by interpersonal competency, technical competency, leadership competency and technological competency “as a whole”, but also the “relative contribution” of each independent variable in explaining the variance.

To determine the **“impact”** of competencies on the effectiveness and performance improvement of HR professionals together, a predictive model is required. For this purpose, the multiple linear regression model is used. Multivariate prediction is required as in real life situation customer involvement in different stage operates in complex interrelated and
interdependent environment. For this purpose the multiple linear regression model is required for assessing the impact of all six groups of competencies.

The general purpose of multiple regression is to learn more about the relationship between several independent or predictor variables and a dependent or criterion variable. In the social and natural sciences, multiple regression procedures are very widely used in research. In general, multiple regression allows the researcher to answer the general question “what is the best predictor of.......”.

In multiple regression, one has several independent variables, but only one dependent variable. The basic model is [Cohen (2003)]

\[
\hat{Y} = a + b_1 X_1 + b_2 X_2 + \ldots + b_p X_p
\]

Or, after employing standardized scores,

\[
\hat{Z}_Y = \beta_1 Z_1 + \beta_2 Z_2 + \ldots + \beta_p Z_p.
\]

Or it can be presented like this:

**Multivariate Regression Model**

\[
Y = a + b_1 \cdot X_1 + b_2 \cdot X_2 + \ldots + b_p \cdot X_p
\]

Here

- \(Y\) = Dependent Variable, \(a\) = Constant, \(b_1\) and \(b_2\) = Un standardised Coefficients
- \(X_1 \ldots X_p\) = Independent Variable

For example, one multivariate regression equation for this research is:

\[
PI = a + \beta_1 [S1] + \beta_2 [S2] + \beta_3 [S3] + \beta_4 [S4] + \beta_5 [S5] + \beta_6 [S6]
\]

Here \(PI\) (performance improvement) variable is expressed as a function of constant (a) and a slope (\(\beta_1\)) times the leadership competency group variable, \(\beta_2\) times interpersonal competency
group variable, $\beta_3$ times business competency group variable and so on. The constant is also referred to as the intercept. Here ($\beta$) Beta is *standardized partial regression coefficients*. These coefficients are called partial coefficients to emphasize that they reflect the contribution of a single $X$ in predicting $Y$ in the context of the other independent variables in the model. That is, “*how much*” does predicted $Y$ change from per unit change in $X_i$. The weight applied to $X_i$ can change dramatically if the context is changed (like adding one or more additional $X$ or delete one or more of the $X$ variables from the model). An $X$ which is highly correlated with $Y$ could have a low weight simply because it is redundant with another $X$ in the model.

The $\beta$ weights (also called *standardized partial regression coefficients*) could be looked at to determine the relative contribution of each independent towards predicting variable. The standardized coefficients “Beta” shows the effects of each independent variable on the dependent variable in standard deviations. The main benefit of these standardized measures allows for a direct strength comparison between the model’s six independent variables (leadership, interpersonal, business, technical, and analytical, and technological competency groups) and dependent variable (performance improvement).

Customarily, the degree to which two or more predictors (independent or $X$ variables) are related to the dependent ($Y$) variable is expressed in the correlation coefficient $R$, which is the square root of $R$-square. In multiple regression, $R$ can assume values between 0 and 1. To interpret the direction of the relationship between variables, one looks at the signs (plus or minus) of the regression or B coefficients. If a $\beta$ coefficient is positive, then the relationship of this variable with the dependent variable is positive if the $\beta$ coefficient is negative then it is negative. Typically speaking, the more variables that are inserted in a regression model, the higher the $R^2$ statistic, which means that the $R^2$ will improve even when essentially irrelevant variables are added. The Adjusted $R^2$ statistic is typically smaller than the $R^2$ statistic because it downward adjusts the $R^2$ statistic when additional variables of limited significance are added to a model. It is a common practice to say that one regression model “fits” the data better than another regression model if its adjusted $R^2$ statistic is higher [Cohen (2003); Rodgers and Nicewander (1988)].
Assumptions of Multivariate Linear Regression Model

Following assumption limitations are there when a multivariate regression model is used:

(i) Assumption of Linearity [Berry et al. (1985); Cohen (2003)]

First, as is evident in the name multiple linear regression, it is assumed that the relationship among variables is linear. In practice this assumption can virtually never be confirmed; fortunately, multiple regression procedures are not greatly affected by minor deviations from this assumption. However, as a rule it is prudent to look always at bivariate scatter plot of the variables of interest. If curvature in the relationship is evident, one may consider either transforming the variables, or explicitly allowing for nonlinear components.

(ii) Multicollinearity and Matrix III-Conditioning

This is a common problem in many correlations analyses. When there are very many variables involved, it is often not immediately apparent that this problem exists, and it may only manifest itself after several variables have already been entered into the regression equation. Nevertheless, when this problem occurs, it means that at least one of the predictor variables is (practically) completely redundant with other predictors.

4.11 Chapter Summary

This chapter presents the theoretical background, conceptual framework, research design, research instrument, respondents’ characteristics, sample design and data collection techniques. It first covers the rationale for the research approach and then develops the conceptual framework of the study. The chapter also proposes various hypotheses that were framed based on the literature support. It then describes in detail the research design, including sampling design and development of measurement instrument. This chapter also describes the methods used for collecting and analyzing the data. Subsequently, the profile of respondents is presented. Finally, an overview of statistical tools and techniques used for the data analysis along with the testing procedure of hypotheses are presented. The next chapter focuses on the data analysis and the results of statistical testing.