

Competency Modeling & Job Analysis

Current trends and debates in the academic literature

The current report details the state of the academic literature on competency modeling and job analysis. The paper begins by providing definitions of competencies, competency modeling, and job analysis. The next section summarizes current trends in the literature on competency modeling and job analysis. The final section uncovers some current debates in the competency modeling and job analysis literatures.

Definitions

Competencies: Although the definition appears to vary widely (Schippmann, et al., 2000), competencies are typically defined as a combination of knowledge, skills, abilities and other individual characteristics (often called KSAOs; including but not limited to motives, personality traits, self-concepts, attitudes, beliefs, values, and interests) that can be reliably measured and that can be shown to differentiate performance (Mirabile, 1997; Schippmann, et al., 2000; Spencer, McClelland, & Spencer, 1994).

Competency modeling: Competency modeling is typically defined as the identification, definition, and measurement of the KSAOs that are needed to perform successfully on the job (Bartram, 2004; Schippmann, et al., 2000). Competency modeling can be carried out using a few different approaches, but the most common are the individual job level and the organization level (Mansfield, 1996). The former deals with identifying the characteristics (i.e., KSAOs) that are necessary to be successful in a particular job (often referred to as a bottom-up competency model, and is quite similar to job analysis), whereas the latter takes into account organizational objectives, vision, and strategy and attempts to develop a set of competencies that are applied to the entire organization, a department within the organization, or a job family within the organization (Lawler, 1994; Prahalad & Hamel, 1990).

Job analysis: Broadly defined, job analysis involves collecting data about observable job behaviors, and delineating the knowledge, skills, abilities, and other characteristics needed to perform the job (Cascio & Aguinis, 2005; Harvey, 1991). This broad definition is typically broken into two separate approaches to job analysis: worker-oriented job analysis and task-oriented job analysis. Worker-oriented job analysis is often referred to as job specification and deals with the necessary KSAOs for successful completion of the job. As one can see, this is very similar in nature to the definition of competency modeling advanced above.

The other approach is referred to as task-oriented job analysis (also called work-oriented), and deals with what gets done on the job (i.e., the job relevant behaviors) and how the job is conducted (including the tools, machinery, information, and people with which the incumbent typically interacts). This approach is often referred to as a job description, as it details the necessary behaviors for successful completion of the job (Cascio & Aguinis, 2005).

Recent trends in competency modeling and job analysis

Automation of competency modeling/job analysis

The use of technology is changing the nature and execution of many areas of human resource practice (e.g., online assessments; Bartram, 2004). In an effort to streamline and make the process of competency modeling/job-analysis more efficient, Mason and Lin (2008) advocate the use of online data warehouses of competency models, web-based focus groups, and the use of online surveys to gather data from subject matter experts (SMEs) and incumbents. Others have utilized an online database of job information called the Occupational Information Network (O*NET) for the purpose of gathering position requirements and determining common tasks (e.g., McEntire, Dailey, Osburn, & Mumford, 2006; Reiter-Palmon, Brown, Sandall, Buboltz, & Nimps, 2006).

The implementation of these methods may have drawbacks, including the inability to detect and account for cultural differences, the lack of access to technology in certain areas of the world, and the inability to apply the pre-made models to specific jobs. Mason and Lin make some important recommendations for other practitioners who choose to implement job analysis or competency modeling using technology, including a great deal of planning in advance and ensuring that key stakeholders get involved. As Harvey (2008) points out, the automation of job analysis and competency modeling has tremendous potential to make the process more affordable and practical, but warns of the problems (e.g., inaccuracy) associated with applying an average profile to a specific job.

Strategic job analysis

Strategic job analysis involves attempting to identify the relevant tasks, behaviors, and KSAOs for a job as they are predicted to be in the future (Schneider & Konz, 1989). This approach represents a change from descriptive job analysis (with a focus on describing the job as it currently exists) to predictive job analysis (which focuses on how the job is expected to be in the future). The need for strategic job analysis is becoming more apparent because of the dynamic nature of modern-day organizations (with a greater reliance on rapidly changing project teams) and as organizations try to hire, train, and appraise the performance of new positions (Sackett & Laczko, 2003; Sanchez & Levine, 2001). Despite the increased call for strategic job analysis, very little research has been conducted on the topic, with most of the available literature on the topic being prescriptive in nature (with the exception of Arvey, Salas, & Gialluca, 1992; Bruskiwicz & Bosshardt, 1996) and focusing largely on how to carry out a strategic job analysis (e.g., see Schneider & Konz, 1989). The major findings from these few empirical studies suggest that strategic job analysis may be able to successfully identify future skill requirements. However, many questions remain, such as, how well can strategic job analyses predict successful performance?

Cognitive task analysis

With the advent of the Internet and the great increase in technology across the workplace, today's jobs contain more cognitive complexity than ever before (Bartram, 2004). In an effort to best select and appraise the performance of today's workers, cognitive task analysis (CTA), that is, the identification and analysis of cognitive processes that underlie task performance, has been offered as a supplement to traditional task analysis (Chipman, Schraagen, & Shalin, 2000; Sackett & Laczko, 2003). The effectiveness of CTA at modeling the cognitive processes of jobs has recently been demonstrated in a large-scale meta-

analysis of 39 studies, which used a pre- and post-test design to examine the impact of CTA on performance (Lee, 2004). The results revealed a large overall effect size of 1.70 when using any CTA method, in any occupational setting, with any level of employee experience. Lee points out that this large effect size (1.70) translates to an overall mean percent gain in performance of 35%.

Despite this optimistic finding, Sackett and Laczo (2003) point out that there is no as yet agreed upon method for conducting CTA, and the process is very time consuming and effortful. Both of these concerns seem to limit the usefulness of this approach in new occupational settings. However, recent work by Yates (2007) on the development of a taxonomy of CTA methods is encouraging. Future studies should aim to demonstrate the use of various cognitive task analysis methods and how to use the data gathered from them in applied settings.

Personality-oriented job analyses

The use of personality as a predictor in selection is becoming more and more common in today's organizations (Cascio & Aguinis, 2003). Countless meta-analyses have demonstrated that a number of broad personality traits (which are enduring styles of thinking, feeling, and acting that characterize individuals), namely conscientiousness and integrity, are associated with high performance on the job (e.g., see Barrick & Mount, 1991; Ones, Viswesveran, & Schmidt, 2003). There have been several efforts to identify personality requirements of jobs, with examples including the NEO Job Profiler (Costa, McCrae, & Kay, 1995), and the Personality-Related Position Requirements Form (PPRF; Raymark, Schmit, & Guion, 1997). Both of these approaches attempt to identify relevant personality dimensions for a particular job.

Recent research using the PPRF by Cucina, Vasilopoulous, and Sehgal (2005) demonstrated that subject matter experts may be engaging in a self-serving bias to a small degree when rating the personality requirements of a job, but overall, their ratings were found to be predictive of scale scores on the PPRF. Further research is needed to determine whether relevant personality dimensions are more predictive of job performance than less relevant personality dimensions. Overall, the incorporation of personality into job-analytic efforts is an important step toward better description of jobs, and organizations should continue to implement such approaches to benefit their personnel practices.

Reliability of competency modeling and job-analysis ratings

An important part of any job analysis or competency modeling effort involves having incumbents, subject matter experts, or the job analysts themselves rate the importance of each competency, KSAO, task, or behavior statement. Ideally, these raters will agree with each other on the importance of these characteristics, demonstrating a high level of inter-rater reliability, and then the practitioner can move on in the process with their new list of statements. A recent meta-analysis of job analysis reliability examined the levels of inter-rater and intra-rater reliability from forty-six studies (Dierdorff & Wilson, 2003) and found that incumbents had the lowest reliabilities compared to analysts or technical experts. Additionally, the authors note that task data (defined as information about targets with a great deal of specificity) had higher reliabilities than generalized work data (defined as general activity statements that can be applied across a range of jobs and occupations).

Recent work by Lievens, Sanchez, and DeCorte (2004) found that the overall inter-rater reliability of competency modeling judgments is quite low. However, just as the meta-

analysis by Dierdorff and Wilson (2003) found, ratings made by SMEs are considerably more reliable across raters as compared to inexperienced incumbents. Lievens, et al. (2004) found that adding task statements to a competency modeling effort was able to improve SME inter-rater reliability. These authors echo the point made by Schippmann, et al. (2000) that adding some of the methodological rigor that is inherent in job analysis to competency modeling can improve efforts in this area.

Rater training in competency modeling and job analysis

One final area of recent research has been to extend the rater training findings from job analysis (see Cellar, Curtis, Kohlepp, Poczapski, & Mohiuddin, 1989; Sanchez & Levine, 1994) to competency modeling (Lievens & Sanchez, 2007). Sanchez and Levine (1994) found that rater training was helpful for improving the quality of ratings made by incumbents and by SMEs in a job analysis context. Recently, Lievens and Sanchez (2007) examined whether frame of reference training with a group of consultants would improve the quality of competency model ratings or not. Their results suggest that frame of reference training (which primes raters with an organizational category system for observing behavior and rating performance) can improve the discriminant validity, inter-rater reliability, and accuracy of the competency ratings compared to a no-training control group. These results suggest that organizations should implement training programs as a part of their competency model development efforts.

Debates in the literature

This section details a number of debates that exist in the literature regarding competency modeling and job analysis. These debates are framed as questions and the answer will contain several different viewpoints relevant to the debate.

- There is some disagreement about the definition of a competency. What is a competency?
 - A combination of motives, traits, self-concepts, attitudes or values, and content knowledge or cognitive skill, or any individual characteristic that can be reliably measured or counted and that can be shown to differentiate top performers from average performers (Spencer, McClelland, & Spencer, 1994).
 - A written description of measurable work habits and personal skills used to achieve work objectives (Green, 1999).
 - A knowledge, skill, ability, or other characteristic associated with high performance on a job (Mirabile, 1997).
 - Observable, behavioral capabilities that are important for performing key responsibilities of a role or job (Schippmann, et al., 2000).
- Is competency modeling a replacement for traditional job analysis?
 - Yes, job analysis is too time consuming, costly, and often inaccurate (Sanchez & Levine, 1999). Additionally, task based job analyses are unable to capture the changing nature of work, whereas competency models are better able to handle this issue (Lawler, 1994; Sackett & Laczko, 2003).
 - No, competency modeling is, in many ways, very similar to a worker-oriented job analysis where the fundamental KSAOs are identified (Sackett & Laczko, 2003; Sanchez & Levine, 2001). Additionally, competency modeling is considerably less rigorous and often fails to achieve the levels of reliability and validity attained by job analytic methods (Lievens, Sanchez, & DeCorte, 2004; Schippmann, et al., 2000).

- To what extent are competencies different from the traditional knowledge, skills, abilities and other individual characteristics (KSAOs) that are typically identified through job analysis?
 - Competencies identified at the individual job level are often very similar in nature to the KSAOs identified during a worker-oriented job analysis.
 - However, competencies identified at the organization level (“core competencies”) are more akin to organizational culture, mission, and goals than to KSAOs identified through job analysis.
- Does a competency model developed in one organization work for another organization?
 - Yes, competency profiles are useful for the same position across organizations (Mason & Lin, 2008).
 - No, competencies should be carefully constructed for each individual position; otherwise they have the potential to be inaccurate (Harvey, 2008).

Conclusions

The voluminous writing on competency modeling and job analysis is enough to leave one feeling unsure about which approach is best amid the debates. Well, the question of a singular overall best approach is perhaps not the right way to approach the issue. Instead, the approach that is chosen should depend on the conditions of the environment/job, the needs of the organization, and the ultimate uses of the competency model/job analysis (see Table 1 below). For example, if an organization is interested in developing a leadership training component for a succession planning program, then the best approach would likely be a top-down competency model, because the mission and goals of the organization will be important. However, if the organization is interested in developing a selection instrument for a new job in their IT department, then perhaps a strategic job analysis would be most appropriate because of the legal implications of a selection context and the forward looking aspect of the strategic job analysis. One could also employ a methodologically sound bottom-up competency model to this situation, ensuring to keep a focus on what competencies will be important for success in the future.

Table 1. Sample of different uses of job analysis/competency modeling depending on needs.

Situation	Job analysis				Competency modeling	
	Personal ity	Strategi c	Cognitiv e task	Work- oriented	Top- down	Bottom- up
Leadership training for succession planning					X	
Selection instrument for a new IT job		X				X

In addition, an organization can decide on the level of specificity that is desired and the organizational level at which the competency modeling/job analysis effort will be focused (see Table 2). For example, if an organization was interested in examining an individual job at a particular moment in time, they may consider conducting a job analysis. However, if

they were interested in applying this to multiple jobs, they may want to examine job competencies. Additionally, if an organization wanted to examine several job levels or their entire organization and make it specific to their organization, they should consider examining organizational competencies (or organizational strengths (Byham & Moyer, 2005)). If the organization was looking to determine broad competencies that apply across organizations, then perhaps core competencies would be the appropriate type of analysis.

Table 2. Level and specificity in job analysis and competency modeling.

		Specificity	
		Unique to each case	Applicable to many cases
LEVEL	Individual (job, role, job level)	Job analysis	Job competencies (multiple job approach)*
	Organization (several job levels, departments, or entire organization)	Organizational competencies (organizational strengths*)	Core competencies

*Adapted from Byham & Moyer (2005)

As one can see, the question of a singular best approach to job analysis or competency modeling is not a straight-forward one to answer, as it will depend upon several factors. Ultimately, the organization should consider their purpose for conducting the job analysis, their needs, and the environment within which the job takes place. A solid understanding of the fundamentals will help to maximize the fit between the job analysis or competency modeling approach taken and the outcomes of such a process.

References

Arvey, R. D., Salas, E., & Gialluca, K. A. (1992). Using task inventories to forecast skills and abilities. *Human Performance, 5*, 171-190.

Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.

Bartram, D. (2004). Assessment in organizations. *Applied Psychology: An International Review, 53*, 237-259.

Bruskiewicz, K. T., & Bosshardt, M. J. (1996, April). *An evaluation of a strategic job analysis*. Paper presented at the 11th annual meeting of the Society for Industrial and Organizational Psychology, San Diego, CA.

Byham, W. C., & Moyer, R.P. (2005). Using competencies to build a successful organization. A monograph of Development Dimensions International. Retrieved June 20, 2008, from www.ddiworld.com/thoughtleadership/forwardthinking.asp.

Cascio, W. F., & Aguinis, H. (2005). *Applied psychology in human resource management* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Cellar, D. F., Curtis, J. R., Kohlepp, K., Poczapski, P., & Mohiuddin, S. (1989). The effects of rater training, job analysis format and congruence of training on job evaluation ratings. *Journal of Business and Psychology, 3*, 387-401.

- Chipman, S. F., Schraagen, J. M., & Shalin, V. L. (2000). Introduction to cognitive task analysis. In J. M. Schraagen, S. F. Chipman, & V. L. Shalin (Eds.), *Cognitive task analysis* (pp. 3-23). Mahwah, NJ: Erlbaum.
- Costa, P. T., McCrae, R. R., & Kay, G. G. (1995). Persons, places, and personality: Career assessment using the Revised NEO Personality Inventory. *Journal of Career Assessment, 3*, 123-139.
- Cucina, J. M., Vasilopoulos, N. L., & Sehgal, K. G. (2005). Personality-based job analysis and the self-serving bias. *Journal of Business and Psychology, 20*, 275-290.
- Dierdorff, E. C., & Wilson, M. A. (2003). A meta-analysis of job analysis reliability. *Journal of Applied Psychology, 88*, 635-646.
- Green, P. C. (1999). *Building robust competencies: Linking human resource systems to organizational strategies*. San Francisco: Jossey-Bass.
- Harvey, R. J. (1991). *Job analysis*. In M. D. Dunnette & L. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Harvey, R. J. (2008, April). Discussant comments. In C. Murphy (Chair), *Practical considerations and future directions in job analysis and specification*. Symposium conducted at the 22nd annual meeting of the Society for Industrial and Organizational Psychology, San Francisco, CA.
- Lawler, E. E. (1994). From job-based to competency-based organizations. *Journal of Organizational Behavior, 15*, 3-15.
- Lee, R. L. (2004). The impact of cognitive task analysis on performance: A meta-analysis of comparative studies. *Dissertation Abstracts International, 65*, 7A. (UMI No. 3140506)
- Lievens, F., & Sanchez, J. I. (2007). Can training improve the quality of inferences made by raters in competency modeling? A quasi-experiment. *Journal of Applied Psychology, 92*, 812-819.
- Lievens, F., Sanchez, J. I., & DeCorte, W. (2004). Easing the inferential leap in competency modeling: The effects of task-related information and subject matter expertise. *Personnel Psychology, 57*, 881-904.
- Mansfield, R. S. (1996). Building competency models: Approaches for HR professionals. *Human Resource Management, 35*, 7-18.
- Mason, C., & Lin, L. (2008, April). The application of a streamlined job analysis to human resource systems: Important considerations, best practices, and lessons learned. Paper presented at the 22nd annual meeting of the Society for Industrial and Organizational Psychology, San Francisco, CA.
- McEntire, L. E., Dailey, L. R., Osburn, H. K., & Mumford, M. D. (2006). Innovations in job analysis: Development and application of metrics to analyze job data. *Human Resource Management, 16*, 310-323.
- Mirabile, R. J. (1997, August). Everything you wanted to know about competency modeling. *Training and Development, 73-77*.
- Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (2003). Personality and absenteeism: A meta-analysis of integrity tests. *European Journal of Personality, 17*, S19-S38.
- Prahalad, C. K., & Hamel, G. (1990, May-June). The core competence of the corporation. *Harvard Business Review, 79-91*.
- Raymark, P. H., Schmit, M. J., & Guion, R. M. (1997). Identifying potentially useful personality constructs for employee selection. *Personnel Psychology, 50*, 723-736.
- Reiter-Palmon, R., Brown, M., Sandall, D. L., Buboltz, C., & Nimps, T. (2006). Development of an O*NET web-based job analysis and its implementation in the U.S. Navy: Lessons learned. *Human Resource Management Review, 16*, 294-309.

- Sackett, P.R., & Laczko, R.M. (2003). Job and work analysis. In W.C. Borman, D.R. Ilgen, and R.J. Klimoski (Eds.), *Handbook of psychology: Industrial and Organizational Psychology* (Vol. 12, pp. 21–37). Hoboken, NJ: Wiley.
- Sanchez, J. I., & Levine, E. L. (1994). The impact of raters' cognition on judgment accuracy: An extension to the job analysis domain. *Journal of Business and Psychology, 9*, 47-57.
- Sanchez, J. I., & Levine, E. L. (1999). Is job analysis dead, misunderstood or both? In Kraut, A.I., Korman, A.K. (Eds.), *Evolving Practices in Human Resource Management*. San Francisco: Jossey-Bass.
- Sanchez, J. I., & Levine, E. L. (2001). The analysis of work in the 20th and 21st centuries. In N. Anderson, D. S. Ones, H. K. Sinagil, & C. Viswesvaran (Eds.), *Handbook of Industrial, work, and organizational psychology* (pp. 70-90). London: Sage.
- Schippmann, J. S., Ash, R. A., Battista, M., Carr, L., Eyde, L. D., Hesketh, B., et al. (2000). The practice of competency modeling. *Personnel Psychology, 53*, 703 – 740.
- Schneider, B., & Konz, A. M. (1989). Strategic job analysis. *Human Resources Management, 28*, 51-63.
- Spencer, L. M., McClelland, D. C., & Spencer, S. (1994). *Competency assessment methods: History and state of the art*. Boston: Hay-McBey Research Press.
- Yates, K. A. (2007). Toward a taxonomy of cognitive task analysis methods: A search for cognition and task analysis interactions. *Dissertation Abstracts International, 68*, 4A. (UMI No. 3261819)

About ICF International

ICF International (NASDAQ: ICFI) partners with government and commercial clients to deliver consulting services and technology solutions in the energy, climate change, environment, transportation, social programs, health, defense, and emergency management markets. The firm combines passion for its work with industry expertise and innovative analytics to produce compelling results throughout the entire program life cycle, from analysis and design through implementation and improvement. Since 1969, ICF has been serving government at all levels, major corporations, and multilateral institutions. More than 3,000 employees serve these clients worldwide. ICF's Web site is www.icfi.com.

Additional Information

For more information about competency modeling, please visit www.icfi.com/competencies or contact:

Christina Curnow
+1.703.934.3673
ccurnow@icfi.com