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Identification of a Leadership Competency Model for use in the Development, Recruitment & Retention of Intermodal Transportation Professionals

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Executive Summary

Competencies are thought to be underlying behavioral characteristics that are causally related to criterion-referenced effective and/or superior performance in a job or situation (Spencer & Spencer, 1993). A competency model, then, has been defined as a collection of competencies associated with successful performance (Garman & Johnson, 2006). It has long been thought that competencies can be used for a variety of performance improvement purposes as they provide specific behavioral sets that can be defined, communicated, and used as the focus of training programs (Spencer & Spencer, 1993). Establishment of competency models have been linked to increased effectiveness in training and hiring procedures in a variety of industries (Ricciardi, 2005; Wang, 2003), and have been shown to improve overall leadership effectiveness (Calhoun, Dollett, Sinioris, Wainio, Butler, Griffith, & Warden, 2008). Though several general managerial competency models exist, recent research has shown the importance of having industry-specific leadership competency models in place to achieve superior leadership results (Calhoun et al.).

The purpose of this study was to identify the core competencies that predict highly effective performance in intermodal transportation managers that will pave the way for development of a core competency model and accompanying assessment tool that can be used to recruit, train, and retain effective transportation leaders. There were two overarching purposes of this research: 1) to identify the essential leadership competencies in intermodal transportation and organize them into a model, and 2) to begin the development process of a leadership competency measure which can be used in a variety of intermodal transportation agencies. Three separate samples were obtained in this four-phase study: 1) an expert panel of eleven human resource managers in transportation, 2) sixty-two mid-to-upper level managers, and 3) two hundred and twenty-eight peers/colleagues selected by the managerial sample to rate their performance. Both manager samples completed a 360 degree performance instrument specifically developed for use in this study, the *Intermodal Transportation Managerial Competency Questionnaire* (ITMCQ) www.leadershipsucessfactors.com.

Content analysis of the focus group data identified the following nine categories as critical leadership competency clusters: Leadership, Analytical, Marketing, Technical, Business Management, Communication, Financial, Sensitivity, and Strategic. The survey data, on the other hand, yielded the following competencies as most important to managers in intermodal transportation: perseveres in delivering what is promised even when obstacles arise, collaborates effectively with others, spends time and energy on the most important priorities, demonstrates high personal standards, and knows how to get things done. Further, the factors found to differentiate the superior and average leadership groups were; collaborates effectively with others, delivers superior results, and demonstrates functional/technical expertise. Putting this data together and collapsing the various areas yielded a three cluster model: Interpersonal Effectiveness, Technical/Industry-Specific Effectiveness and Self-Effectiveness. The initial version of the Intermodal Transportation Leadership Competency Model (ITLCM) is presented.

Introduction

As the demand for transportation continues to increase dramatically amidst the current population boom, an estimated 40 to 50 percent of the existing local, state, and federal transportation workforce near retirement (Martin, 2001). These baby boomers lead at all levels of the transportation industry, yet little succession planning has been done to specifically address the future shortage of competent managers (CTC & Associates LLC). Sen. George Voinovich, R-Ohio recently estimated that by 2010 approximately 600, 000 employees will retire (U.S. Dept. of Transportation). In order to meet the demands of the future shortages expected of competent leaders at the executive level, the transportation industry must continue to take steps to improve the training, recruiting, and managing resources available.

Most companies across a variety of industries have developed core competency models to steer managerial improvement and succession planning programs (Boyatzis, 2006; Calhoun et al., 2008). Establishment of empirically derived competency models specifically focusing on leadership acumen in targeted industries have been shown to greatly increase managerial performance (Calhoun et al., 2008). Thus, the purpose of this study was to identify a competency model for use in the intermodal transportation industry to effectively recruit, train, and retain new leaders. More specifically, we were interested in identifying and then organizing the essential, differentiating factors or competencies between highly effective leaders and typical leaders in the intermodal transportation field.

Competencies are distinct sets of behaviors applied to reliably complete a task that is directly linked to a critical outcome (Ricciardi, 2005). Though defined in various ways, at their core, a competency is simply an underlying behavioral characteristic that is causally related to criterion-referenced effective and/or superior performance in a job or situation (Spencer & Spencer, 1993). A competency model, then, has been defined as a collection of competencies associated with successful performance (Garman & Johnson, 2006). It has long been thought that competencies can be used for a variety of performance improvement purposes as they provide specific behavioral sets that can be defined, communicated, and used as the focus of training programs (Spencer & Spencer, 1993). Establishment of competency models have been linked to increased effectiveness in training and hiring procedures in a variety of industries (Ricciardi, 2005; Wang, 2003). Further, several empirically-based methods have been presented to identify competency models for specific industries (Ricciardi, 2005; Wang, 2003). The current project implemented such strategies via both qualitative and quantitative approaches to establish a competency model for the intermodal transportation industry. Based on mounting evidence that indicates the importance of having an industry-specific (i.e., intermodal transportation-specific) competency model for traditional work force development and HR purposes, the following research questions were generated. Which competencies or competency cluster areas differentiate superior from typical performers in intermodal transportation leaders? What are the essential competencies for successful performance of intermodal transportation leadership? Which competencies are weighted as and thought to be most important by industry leaders? Such questions initiated the current investigation.

Competency Background

What is a Competency?

Since psychologist David McClelland (1973) first proposed competencies as potential differentiating factors of performance beyond intelligence nearly forty years ago, a considerable amount of research on the topic, as well as strong efforts to define what is meant by the term competency, have been documented. A majority of the work on competencies has come from consulting firms and corporations who investigate competencies of leadership acumen for particular industries. Indeed, there were few studies in the academic literature until the past decade. Great efforts have been made in recent years to clarify what is meant by the terms competency, competencies, and competency modeling. Before we progress in this paper, it seemed important to clarify these concepts as the purpose of this study is to develop a general managerial competency model.

Like other well researched psychological constructs, there was an initial lack of agreement between scholars on the definition of competency, as many struggled to distinguish it from similar concepts (Hollenbeck, 2009). More recently, however, researchers have focused on competencies as behavioral and observable abilities due to a desire to improve the applicability of competency scales (Boyatzis, 2007). Calhoun et al. (2008), for example, defined the term competency as, "Those behavioral and technical characteristics (competencies) that discriminate outstanding leadership performance from typical performance" (p.377). The emphasis in the Calhoun et al. definition is placed on the ability of competencies to differentiate highly effective from typical workers, which is a generally agreed upon aspect of competencies, and part of what makes them so valuable to organizational success. Further, most seem to agree that a competency refers to a skill or personal ability that is required to be effective on the job and that is critical to achieving targeted outcomes (Brownell, 2008).

In Spencer and Spencer's (1993) heavily cited text on the subject, "Competence at Work," the definition of competency focused more on characteristics. Spencer and Spencer (1993) followed Boyatzis's (1982) approach by suggesting that a competency is an underlying characteristic of a person that is causally related to criterion-referenced effective and superior performance in a job. By criterion-referenced the authors meant that the competency actually predicts who does something well or poorly, based on a specific criterion (Spencer & Spencer, 1993). The criterion referenced portion of their definition still stands today; however, using the term characteristic seems to have led the field of competency systems into murky waters. Use of the term characteristic implied close relation to personality trait rather than what McClelland (1973) seemed to originally call for in a behavioral approach. Further, Spencer and Spencer (1993) suggested that underlying characteristic "means the competency is a fairly deep and enduring part of a person's personality and can predict behavior in a wide variety of situations and job tasks" (p.9). Again, thinking of competencies in this manner makes it somewhat difficult to distinguish between competencies and personality traits, as this definition suggested that competencies are attributes that are enduring characteristics that predict highly effective versus typical or poor performers. Since this time several improved, more operational definitions of competencies have emerged.

Though the concept of competency still needs additional work to truly clarify its meaning and distinguish it from other psychological constructs, some good work has been produced to define it over the past ten years (Boyatzis, 2007; Tett et al., 2000). In a 2000 study by Tett et al.

in the journal, *Human Performance*, the authors took a more behavioral and modern approach to define competency. The following definition was offered, "A competency is an identifiable aspect of prospective work behavior attributable to the individual that is expected to contribute positively and/or negatively to organizational effectiveness." In this definition, the authors acknowledged the behavioral core of competencies. Along similar lines, Ricciardi (2005) defined competencies as "distinct sets of behaviors applied to reliably complete a task that is directly linked to a critical outcome" (p.488). This behavioral, contemporary view of competencies is similar to that presented above by Calhoun et al (2008), with the emphasis on key differentiating behaviors between superior and typical performers. This is also the definition in which the model developed in the current study was based. Thus, competencies are considered here to be behavioral characteristics (skills) of an individual which is causally related to superior performance in a job.

Based on these definitions, competencies in this study were thought of as those distinguishing learned behaviors that divide typical and superior performers on a specific job task. Competencies are a behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2007). Development of the transportation managerial competency model pulled from these definitions and also took the definition process a step further. Part of the purpose was to define the specific competencies that are both threshold and distinguishing competencies to transportation management in particular. Thus, the researchers were interested in identifying and including those competencies in the model that are both necessary to complete essential transportation management duties and also distinguish typical transportation managers from superior transportation managers.

Competency Models of Management

Examination of the literature on the topic of leadership and managerial competencies reveals a plethora of typologies, models, frameworks, taxonomies, and lists of various skills and attributes that have been generated in attempt to capture the underlying characteristics that separate highly effective from typical leadership and management practices (Brownell, 2008; Calhoun et al., 2008). Undeniably, several general managerial competency models have been produced. It's essential to recognize these models as they provided the foundation for the development of the transportation managerial competency model produced by this study. Most of the models have great overlap in the competency clusters listed and typically "get at" the same competencies, but were organized in unique ways. It seems the primary goal of most taxonomies has been to identify relatively few general dimensions while being as comprehensive and parsimonious as possible (Tett et al., 2000).

Both general managerial and industry-specific competency models have surfaced over the past twenty-five years. For the purposes of this study, the competency models presented in the empirical literature and from the dominant consultancy groups in business psychology are presented as they provided the foundation for development of the transportation managerial competency model and survey used to assess the competencies. Seven existing competency models or frameworks were identified in the literature. These seven were chosen based on their scientific rigor in development, how heavily cited they were in peer reviewed journals, and because they were generated by the leading scholars in the field of managerial behavior. Table 1 provides a summary of some of the reigning managerial and leadership competency models that were used to form the basis of the survey used in this study.

Table 1. *Prominent Leadership and General Managerial Competency Models*

Source(s)	**Sample/population**	**Methodology**	**Structure**	**Competency Clusters**
Healthcare Leadership Alliance (HLA; 2005a,b)	General health administration at all levels.	Collaboration of six major health administration professional associations.	300 competencies in 5 clusters	Business knowledge and skills, communication and relationship management, knowledge of healthcare environment, professionalism, and leadership.
Healthcare Leadership Competency Model (HLCM; 2008)	84 randomly selected managers from across the field. Also, 75 mid- and late-career leaders deemed outstanding were interviewed.	Initial development included behavioral event interviewing, psychometric analysis, and cross-industry sector benchmarking.	3 overarching domains subsuming 26 behavioral and technical competencies.	3 Domains that include; Transformation, Execution, and People
Hay Group (McClelland/ McBer, 1973 and updated) Manager Competency Model	General managerial competency model	Observing and interviewing outstanding performers in various industries and then grounded in solid empirical research.	11 competencies organized in 4 clusters	Managing yourself, managing your team, managing your work, and managing collaboratively
Competencies for Leadership (Weiss, 2003)	General leadership and managerial competency model	Reviewed relevant models and synthesized via empirical techniques	4 "SEEDS" or foundational requirements and 4 general clusters	4 SEEDS; Sense of purpose, Energy and optimism, Engaging, Decision-Making. 4 Clusters; Personal effectiveness, Communication, Managing others, Thinking

Levenson, Van der Stede, & Cohen (2006) General Managerial Competency Model	Fortune 500 consumer products company with 52 geographic units dispersed across the US (N = 699)	Web-based survey of individual-level and unit-level competency level and performance ratings	3 levels; beginning, intermediate and advance. 3 categories of competency, multiple dimensions within each category	3 categories of competencies include; (a) technical/functional skills, (b) basic management skills, and (c) leadership skills (e.g., mentoring, networking, etc.)
Tett, Guterman, Bleier, & Murphy (2000) Hyperdimensional Taxonomy of Managerial Competence	110 randomly selected Academy of Management members (75 men and 35 women)	Binomial test analyses following survey mailout procedure	53 competencies making up 9 clusters	9 clusters include; traditional functions, task orientation, person orientation, dependability, open mindedness, emotional control, communication, developing self and others, and occupational acumen and concerns
Personnel Decisions International (PDI) PROFILOR	Hundreds of job analysis questionnaires from a variety of PDI clients on an international level	Based on major literature review and data from hundreds of job analysis questionnaires	24 competency areas and 130 leadership behaviors	Example of competency areas include; Drive for Results, Act with Integrity, Use Sound Judgment, Manage Execution, amongst others

One of the most heavily cited and highly regarded general competency model comes from the Hay Group, a psychologist based consultancy group that has been developing the gold standard in competency research since the competency movement emerged in the early 1970s. The Hay Group general manager competency model stems from the original work by David McClelland (1973) and Richard E. Boyatzis (1982) with the McBer consultancy group. McBer and Company (now a part of the Hay Group) carried out the first competency study in 1973 (Hay Group, 2001). Much of the current Hay Group model and methodology for its development stems back to the work of Boyatzis (1982). Boyatzis (1982) originally developed a nine competency model from interview-based assessments of 253 managers of 12 *Fortune* 500 firms and four public agencies. The nine competencies included; efficiency, concern with impact, proactivity, self-confidence, oral presentation skills, conceptualization, diagnostic use of

concepts, use of socialized power, and managing group process (Boyatzis, 1982). Ratings of the competencies were derived from coded interviews (Boyatzis, 1982). Stepwise discriminant analysis revealed that the ratings on these competencies yielded correct identification of superiors' ordinal assessment of managers' performance 51% of the time. However, the discriminant analysis was not tested with cross-validation, thus, classification accuracy estimates were most likely inflated due to chance associations (Russell, 2001). This suggested the need for further research on the development of and cross-validation of this competency model.

Since this original work, the Hay Group and their colleagues have conducted hundreds of competency studies on various jobs worldwide using similar methodology to that described above. Their most recent model, presented above, which contains four competency domains, is grounded in rigorous empirical methodology including behavioral event interviewing, traditional psychometric theory and analytic techniques, and in-depth analysis of the most extensive competency database in the world. In fact, they, along with Spencer and Spencer's (1993) seminal text, "Competence at Work," have devised the most elaborate listing of general managerial competencies, which they refer to as the competency dictionary. The Hay Group's focus has been on the competencies responsible for distinguishing outstanding mid- and first-level managers from typical managers. Thus, the model includes the most critical competencies for "defining excellence in a wide variety of management roles across industry" (Hay Group, 2001, p.2). The Hay Group model served as the foundation for the development of the intermodal transportation-specific managerial competency scale used to identify the model in this study, as their model is constantly updated and refreshed to meet current economic and political challenges of modern day society. The Hay Group model contains four clusters of competencies; Managing Yourself, Managing Your Team, Managing the Work, and Managing Collaboratively (Hay Group, 2001). Eleven competencies fall across these four domains. The eleven competencies include; empathy, self-control, self-confidence, developing others, holding people accountable, team leadership, results orientation, initiative, problem solving, influencing others, and fostering teamwork (Hay Group, 2001). This model is of particular importance to this study as it described a general competency model that can be used in various industries to develop industry-specific managerial competency scales.

Another recent landmark paper that must be mentioned in the discussion of empirically grounded models of competencies comes from the work of Tett et. al. (2000) at Wright State University in the Department of Psychology. In this eloquent study, the authors explored 12 of the most heavily cited taxonomies of managerial competence in the academic literature and then reported findings from three studies on the development and content validation of a "Hyperdimensional" Taxonomy of Managerial Competence (Tett et al., 2000). The term hyperdimensional is reportedly used to emphasize the quest for dimensions more specific than what models have previously proposed. As presented in Table 1 above, the Tett et al (2000) Hyperdimensional Taxonomy of General Managerial Competence, is a comprehensive model including 53 competencies that comprise 9 cluster or domain areas. The researchers linked each of the 53 competencies to competencies established and presented in the 12 taxonomies they reviewed. They produced this model by conducting three content validation studies. In these studies, the authors (Tett et al., 2000) mailed materials to the management participants and asked them to match 141 behavioral elements to various competency labels. The primary research question they asked in improving specificity of their model was the degree to which behavioral element could be uniquely classified into targeted competencies. They employed the binomial test to compare observed frequencies with those expected due to chance. Thus, they were able to

detect the number of people correctly classifying the element to the competency to reach statistical significance according to the binomial test. This methodology was employed to simply improve the specificity of managerial competency models. No doubt, the Tett et al (2000) model is one of the most elaborate and methodologically sound taxonomies reviewed for this study, and will be used and referenced in great detail as a comprehensive sounding board for critical competencies to include in the development of a transportation managerial competency scale as well as the Hay Group model. Again, we were interested in using existing models rather than re-creating the wheel. The reigning models identified were used to develop a comprehensive survey that could be administered to transportation executives. Several models and existing leadership theories were used to generate the survey.

Measurement Issues in Identifying Competency Models

Tett et al (2000) also dedicated a large portion of their manuscript to the current measurement issues facing the assessment instruments developed to accompany and apply the competency models reviewed. They suggested that several issues exist with most of the current assessment tools utilized today to measure general managerial competence (Tett et al., 2000). They reported that "Psychological test developers face many challenges in creating reliable, valid, and usable measures," (Tett et al., 2000, p.207). One of the most pressing measurement issues identified was the generality-specificity dilemma in which researchers in managerial behavior are caught between identifying general dimensions of managerial performance and also having to assume that specific exemplars within general categories are equivalent with respect to function, causes, and measurement (Tett et al., 2000). This is a great point as it can be seen by the listing of models above that several different specific competencies of varying meanings get lumped into certain clusters of management performance. More specifically, Tett et al (2000) called attention to the bandwidth and fidelity issue in personnel assessment in general. They explained that two important concerns of the generality-specificity issue are fidelity, which denotes the precision with which a measure captures a particular construct, and bandwidth, which refers to the number of distinct constructs sampled by a given measure (Tett et al., 2000). In other words, Tett et al. (2000) suggested that researchers developing measures of competencies are caught between either bandwidth or fidelity. That is, measuring a few things well (high fidelity, high interpretability) or more things less well (broad bandwidth, more comprehensive). They concluded that greater specificity should be the goal of contemporary approaches to measurement. They accomplished this goal through the methodology described above in their study in which they asked participants to match behavioral elements to the appropriate and corresponding competency. They then employed the binomial test to assess frequency versus chance responding. The Tett et al. (2000) study raised important questions regarding the rationale behind competency measurement tools that accompany highly complex models of managerial behavior, and their argument was therefore considered in the development of the current instrument. Thus, we developed a survey that specifically assessed the core competencies and behaviors identified to be critical in most of the reigning general managerial competency models.

Identifying Gaps in Current General Models of Leadership

Having just presented the reigning models of general managerial competence that were used as the theory backing the scale created for model development purposes, it is also important to point out weaknesses of most managerial competency models prior to moving forward.

Several authors in leadership and management have alerted scholars in this area to significant and concerning gaps in the current predominant competency models (Bolden & Gosling, 2006; Hollenbeck, 2009). In a recent study by Bolden and Gosling (2006), the authors compared a large review of leadership competency frameworks to an analysis of participant reports on leadership. The authors compared a total of 29 frameworks covering a vast spectrum of international organizations' competency models to a database of 250 practicing managers' perceptions of leadership and common challenges faced in their industry. Bolden and Gosling (2006) concluded that "a disturbing gap between attributes required of leaders as conveyed by practicing managers and popular leadership competency frameworks" (p.158) exists. The authors advanced their concern by explaining that competency frameworks tend to emphasize observable characteristics and behaviors while excluding moral and emotional concerns, which many leaders have argued are the dimensions that lie at the core of leadership (Bolden & Gosling, 2006). Further, the entire transformational leadership movement is based on moral responsibility and the ability to inspire employees at an emotional level yet few existing instruments tap these qualities. Thus, current leadership models may miss the boat in this area by focusing too exclusively on behavioral, observable skills (Bolden & Gosling, 2006). The current study will attempt to fill this gap as well by also including moral/emotional aspects in the definition and assessment of managerial competency, to thereby ensure representation of such qualities in the model developed.

Methodology for Generating the Models.

Most of the reigning models of leadership and managerial competency (Calhoun et al., 2008; Hay Group, 2001; Tett et al., 2000) are based on a four phase model development process thought to be the gold standard in competency modeling (Spencer & Spencer, 1993). The process follows these four basic steps: 1) identify the criteria that distinguish superior leaders from typical leaders, 2) the job effectiveness criteria established in phase 1 are then used to identify a clear group of effective transportation leaders and a comparison group of average performers, 3) data are collected using qualitative and quantitative approaches to compare the two groups, and 4) the data is analyzed via basic descriptive statistics, qualitative analytic techniques such as content analysis, and then superior and average groups are compared on various competencies. Behavioral Event Interviews (BEI) are the most commonly employed method to identify the core leadership constructs. BEIs entail asking managers to describe times when they have reacted to challenging situations in a positive way and also times when they reacted in a negative manner (Boyatzis, 1998), and then are used to discover differences between two types of job incumbents: those who have been nominated as outstanding and those who are nominated as typical.

One study that is heavily cited in the literature for its rigor and thoroughness in developing a leadership performance scale based on a managerial competency framework dates back nearly twenty years to the work of Posner and Kouzes (1988, 1993). In this eloquent study, two phases, "Qualitative Perspective on What Leaders Do" and then "Measuring what Leaders Do," were conducted. These two phases follow a similar format to the four phase model (Spencer & Spencer, 1993) mentioned above as the typical competency framework development methodology used today. Managers attending leadership development seminars were first asked to describe a "personal best as a leader." Posner and Kouzes (1988) explained that the personal best question was really a 12 page survey that consisted of 37 open-ended questions (e.g., Who initiated the project? What made you believe you could accomplish the results you sought?) "focusing on an experience in which they got something extraordinary accomplished in an

organization" (p.484). They (Posner and Kouzes, 1988) reported that over 650 surveys of the original version were completed, and then an additional 450 managers completed a shortened version of the same survey. 38 in-depth interviews with managers in various public and private sector companies were also conducted (Posner & Kouzes, 1988). The authors reported that the qualitative data gathered was content analyzed first by the authors and then by two outside raters (Posner & Kouzes, 1988). Results revealed that a "fundamental pattern of leadership behavior which emerges when people are accomplishing extraordinary things in organizations is best described by the following five practices: 1. Challenging the process, 2. Inspiring a Shared Vision, 3. Enabling other to act, 4. Modeling the way, and 5. Encouraging the heart" (Posner & Kouzes, 1988, p.485). They went on to report that approximately 80% or greater of the behaviors and strategies described in respondents' "personal best case studies and interviews can be accounted for by these factors" (p.485). Posner and Kouzes (1988) developed the Leadership Practices Inventory (LPI) in what they referred to as the second phase of their study. The LPI was developed in the second phase via factor analysis, using principal factoring with iteration and varimax rotation. Posner and Kouzes (1988) reported that the factor analysis extracted five factors with eigenvalues greater than 1.0 and accounted for approximately 60% of the variance. Different subsamples were used to test the stability of the five factors and the five factors were similar to the five factors proposed (Posner & Kouzes, 1988). Internal reliabilities on the LPI ranged from .77 to .90, and the test-retest reliability was reported to be nearly .94 (Posner & Kouzes, 1988). Previous studies (Posner & Kouzes, 1988) in the area of competency modeling and accompanying survey development have paved the way in competency model development. The present study pulled from each of these approaches to establish a rigorous methodology to establish an empirically sound, intermodal transportation managerial competency model.

Methodology

Sample and Procedures

There were three samples obtained for this study in order to take a multi-method approach to developing the leadership competency model. The first sample obtained was a group of eleven senior human resource managers from a diversity of agencies that span the range of the intermodal transportation industry. The researchers sent out an email announcement to several human resource departments in both public and private intermodal transportation agencies inviting participation in a working conference to be held at a private university in the Western half of the U.S. Eleven human resource managers responded and participated in the conference. These eleven human resource managers took part in a two day working conference to identify the essential managerial and leadership qualities required for success in various intermodal transportation agencies. As a part of the conference, the researchers held a two hour focus group on leadership competencies in particular. Participants were asked to discuss leadership in their agency and provide detailed accounts of successful managerial and leadership experiences they had witnessed or been a part of in their career, and then identify the essential skills and behaviors involved in such success stories. Responses were recorded by the research team on a laptop computer and on a white board. Notes from the white board were then transferred to the laptop computer. This qualitative data was then content analyzed to identify the core competencies required for outstanding leadership.

The second and third samples obtained for this project were recruited from a Master's program in Intermodal Transportation Management at a private university in the Western half of the U.S. The students enrolled in the program that participated in this study were current managers in various intermodal agencies across the U.S. Each participant was asked to complete an on-line leadership competency measure, which is described in the instruments section below and was created based on the focus group data, and then list one to nine peers, colleagues, direct reports, or supervisors that could rate their performance on the competencies measured in the survey. Thus, each manager that participated provided a self-assessment of the competencies and then listed at least one rater to rank their performance on the same competencies. The peer rater sample was asked to respond to the same 33 items to rank the ratee's performance on each item, and then respond a second time to rank the importance of each competency or item. The self-assessment sample was composed of sixty-two mid-to-upper level managers, of which forty-one (66.1%) were male and twenty-one (33.8%) were female. The rater sample, which again were recruited by the self-assessment sample, was composed of a total of two-hundred and twenty-eight managers, of which one hundred and forty-five (63.3%) were male and eighty-three were female (36.2%).

Instruments

Intermodal Transportation Managerial Competency Questionnaire. The Intermodal Transportation Managerial Competency Questionnaire (ITMCQ) is a 360 degree assessment tool created specifically for this project. It can be found online at www.leadershipsucessfactors.com The ITMCQ is a measure of leadership competencies. Participants rank their ability to perform each item or competency and the importance of various leadership competencies. The ITMCQ is composed of two separate parts each containing the exact 33 items. Part 1 is a 33-item section for managers to self-assess their leadership abilities on a six-point Likert-type rating scale (1=Very Strongly Disagree, 6=Very Strongly Agree), while Part 2 is made up of the same 33 items but was designed for peers and colleagues associated with the managers that self-assessed their leadership performance to rate the manager on those same items, one time for the ratee's performance, and a second time on importance (1=Very Important, 2=Important, 3=Not Important). Each item is meant to measure an independent leadership competency (i.e., Is a role model who champions company values, Coaches employees to ensure they are successful, Coaches employees to develop careers, Collaborates effectively with others; is a good team player). Thus, participants in the self-assessment group (n = 62) completed the instrument once in regards to how well they perform each competency or item The rater sample (n = 228), which is obtained by the ratee's listing individuals to provide ratings of their performance, responded twice to each item, the first time in regards to how well the ratee performs each competency and then a second time in regards to the importance of each competency for successful completion of the job.

The ITMCQ was developed by the researchers specifically for this project and it is based on the reigning general competency models covered earlier in this report. Items were written to reflect the competencies identified in previous research and theory to be differentiating factors of performance at the managerial level. Cognitive interviews were conducted with two transportation managers to tailor the items to intermodal transportation in particular. The resulting instrument contained the 33 items, each covering a unique leadership competency.

Two internal consistency estimates of reliability were computed for the ITMCQ: a split-half coefficient expressed as a Spearman-Brown corrected correlation and coefficient alpha. For

the split-half coefficient, the scale was split into two halves such that the two halves would be as equivalent as possible. In splitting the items, we took into account the sequencing of the items as well as whether items assess particular aspects of leadership competence in intermodal transportation. This allowed for equal representation of varying aspects of competency on both halves. Values for coefficient alpha and the split-half coefficient were the same, .98, each indicating satisfactory reliability.

Model Development

The Intermodal Transportation Leadership Competency Model (ITLCM) was developed following the rigorous methodology set forth for competency research and modeling methods in the field (Boyatzis, Cowen, & Kolb, 1995; Spencer & Spencer, 1993). The model was developed in four-phases:

Phase 1:The criteria that distinguished superior intermodal leaders from typical leaders were identified. For this phase, intermodal transportation managers' importance ratings of various competencies were analyzed in tandem with qualitative responses from an expert panel composed of human resource managers asked to define effective performance criteria.

Phase 2: Composite performance scores based on self-assessments and peer feedback ratings of the identified differentiating factors in phase 1 were then used to identify a clear group of effective transportation leaders and a comparison group of average performers. This was established from a composite score of manager and peer performance ratings from the ITMCQ. The sample was divided in half based on their total performance score.

Phase 3: Data was collected using expert panels in human resources in intermodal transportation and the ITMCQ. Thus, there were two types of data: 1) qualitative data from an expert panel of 11 human resource managers who were asked to help brain storm the essential factors of leadership performance training needs in transportation, and 2) quantitative data from 360 degree feedback from both 62 mid-level managers (41 males and 21 females) and 228 of the managers' peers/colleagues.

Phase 4: The data was analyzed via basic descriptive statistics and qualitative analytic techniques such as content analysis to identify the most important competencies and to divide the group based on performance of these important competencies, and then the superior and average groups were compared on these competencies using independent sample t-tests.

Results

Model Development

Results from the expert panel of human resource managers in intermodal transportation revealed 9 core competency training areas for transportation mid-level managers. The content analysis identified the following nine categories: Leadership, Analytical, Marketing, Technical, Business Management, Communication, Financial, Sensitivity, and Strategic. These nine themes emerged relatively quickly in the focus group data. Each of these competency clusters were reported as essential by at least 50% of the eleven focus group members. Graph 1 displays the nine core competency areas.

Core Competency Training Areas

These nine core areas were identified by the human resource focus group to be the essential competency clusters for superior leadership performance in intermodal transportation. Over 50% of participants stated they believe these nine areas should guide future training at the executive leadership level. Essential competencies within each of these clusters were also identified. *The Leadership cluster* was thought to entail trust and honesty, cultural awareness, recognition of broad market forces that influence transportation, and sensitivity to government relations issues. *The Analytical cluster* was thought to include such competencies as the ability to take information from multiple sources and synthesize it into a business decision, while

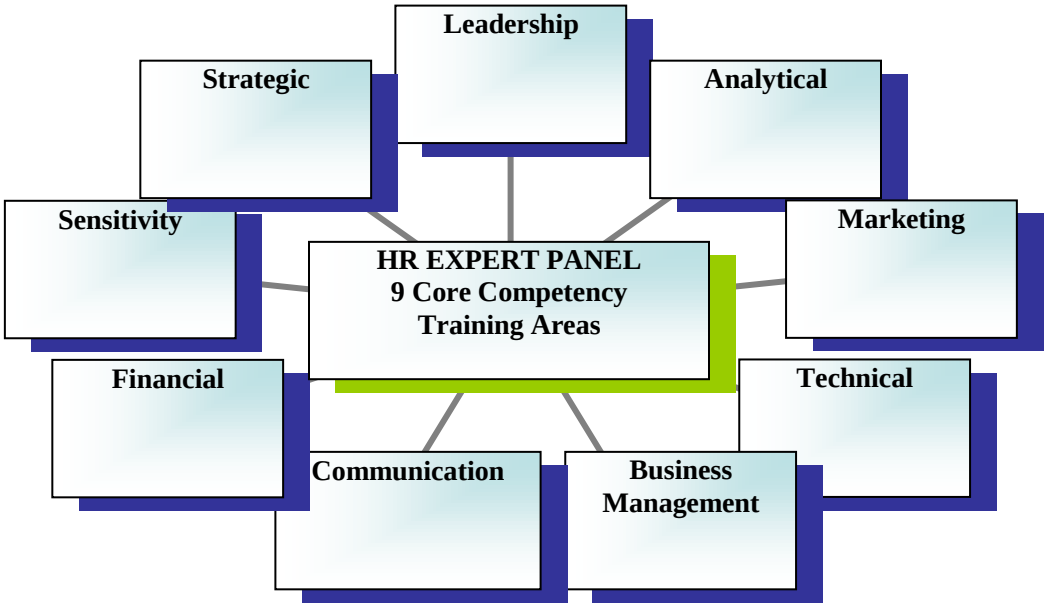

Figure 1

forecasting, modeling, budget planning, using history to predict the future, and market share for the future were all also included. *The Marketing cluster* included such competencies as marketing intelligence, knowledge of the competition, the ability to anticipate customer behavior, the ability to form lasting business relationships, and a working knowledge of the changing nature of business in intermodal transportation. *The Technical cluster* was thought to include such competencies as the ability to navigate software programs, engineering strategies, and to understand specific business information. *The Business Management cluster* was thought to include the competencies of government relations skills, managing a culture of safety, external negotiation skills, being a team leader, being highly motivated, having the ability to build and select a workforce, coaching and development, and to provide training. *The Communication cluster* was thought to include the ability to verbally express important messages, manage alliances, and express oneself in an effective manner to a diverse workforce. *The Financial cluster* was thought to include competencies such as understanding the cost of doing business,

how to manage financial systems, maintain the budget, effects of time in certain aspects of business such as dwell time, effects of labor costs, and an understanding of the cost benefits of operational decisions. *The Sensitivity cluster* was thought to include cultural sensitivity, diversity sensitivity, ethical sensitivity, legal sensitivity, public perception awareness, and regulatory sensitivity. And finally, *The Strategic cluster* was thought to include competencies such as vision of the market, possible acquisitions, develop long range strategic plans and understanding of changing technologies.

Two-hundred and twenty-eight intermodal transportation leaders were asked to rate the importance of each competency or item on an on-line survey. The following competencies were ranked as most important to managers in intermodal transportation: (1) Perseveres in delivering what is promised even when obstacles arise (M = 1.24, SD = .47), (2) Collaborates effectively with others; is a good team player (M = 1.25, SD = .49), (3) Spends time and energy on the most important priorities (M = 1.30, SD = .51), (4) Demonstrates high personal standards (M = 1.31, SD = .51), and (5) Knows how to get things done (M = 1.31, SD = .51). The ability to collaborate effectively with other team members, capability of delivering results, and degree of technical expertise were also ranked as highly important competencies.

Following identification of the most important competencies, the sample of sixty-two participants was cut in half based on composite self and other performance ratings of these critical factors. In other words, a single composite score was generated on overall performance or ability to complete the competencies listed on the instrument by summing both the self-assessment and the peer rating scores. This resulted in two sub-samples, which we labeled as superior and average performers. The most important competencies identified in earlier analyses were then analyzed to see if they truly differentiate the superior transportation managers from the average performers. Independent sample t-tests were conducted to test the hypotheses that superior performers would perform better on key leadership variables as opposed to average performers. The researchers used t-tests to determine if mean differences existed between the average leadership group and the superior leadership group on the core competencies identified as most important. The greatest statistical significance of mean differences between superior and average leaders came in the following areas: Collaborates effectively with others, $t(60) = 5.88$, $p < .01$, Consistently delivers superior results, $t(60) = 7.05$, $p < .01$, and Demonstrates functional/technical expertise, $t(60) = 6.95$, $p < .01$. Graph 2 displays the mean differences on these key leadership attributes.

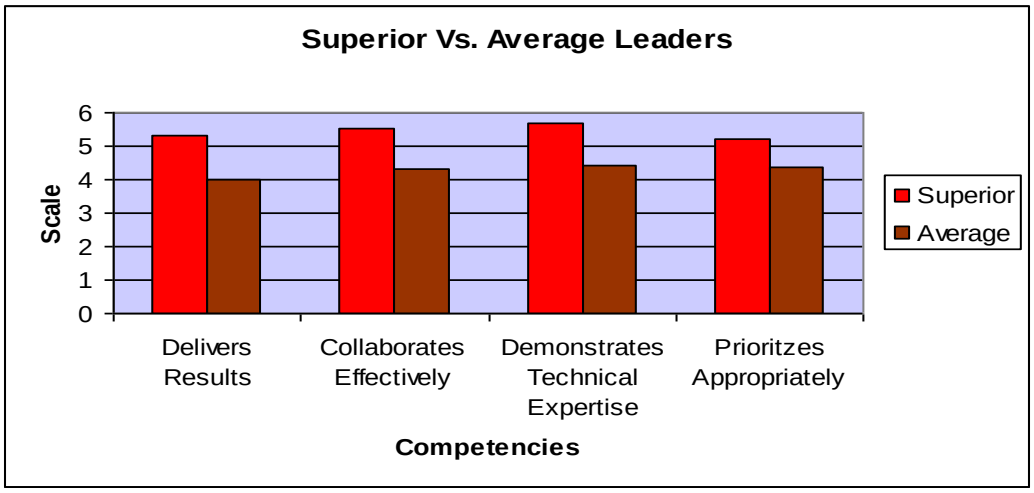

Figure 2. *Mean Differences between Superior and Average Leadership Groups by Key Competencies*

Collapsing the Focus Group and Survey Data into a Model

The content analysis of the focus group data identified the following nine categories as critical leadership competency clusters: Leadership, Analytical, Marketing, Technical, Business Management, Communication, Financial, Sensitivity, and Strategic. The survey data, on the other hand, yielded the following competencies as most important to managers in intermodal transportation: perseveres in delivering what is promised even when obstacles arise, collaborates effectively with others, spends time and energy on the most important priorities, demonstrates high personal standards, and knows how to get things done. Further, the factors found to differentiate the superior and average leadership groups were; collaborates effectively with others, delivers superior results, and demonstrates functional/technical expertise. Putting this data together and collapsing the various areas yielded a three cluster model: Interpersonal Effectiveness, Technical/Industry-Specific Effectiveness and Self-Effectiveness. Table 2 displays the initial version of the Intermodal Transportation Leadership Competency Model (ITLCM).

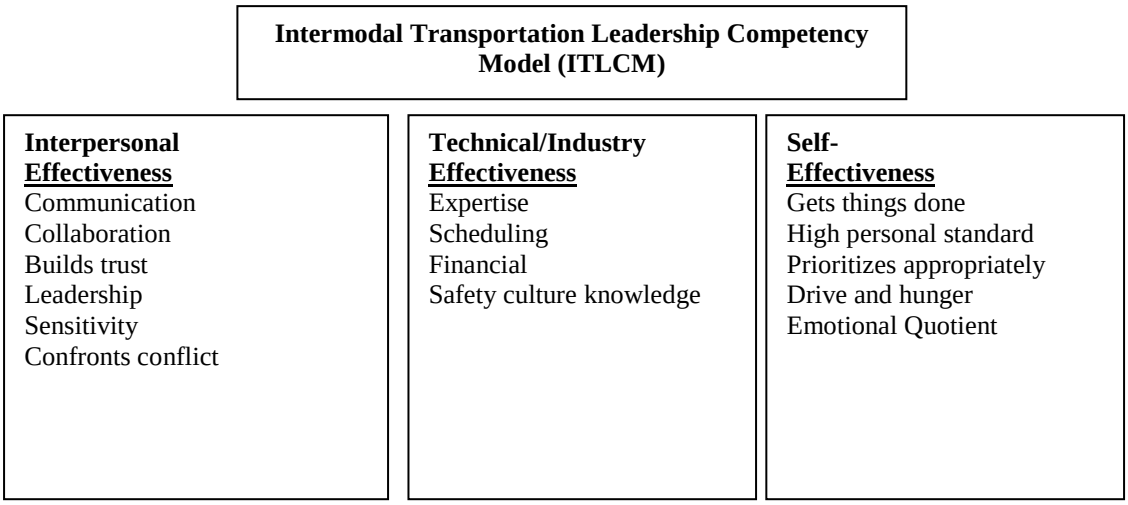

Figure 3

Discussion

This project aimed to assist current research projects underway by the Transit Cooperative Research Program (TCRP), which is sponsored by the Federal Transit Administration (FTA), as well as other government reports from the U.S. Department of Transportation, the Federal Highway Administration (FHA), and the American Public Transportation Association's (APTA) Workforce Development Initiative, to identify and model the essential leadership competencies in intermodal transportation. In 2001, the APTA's Workforce Development Initiative identified several critical problems in workforce development in the transportation industry. One of the primary workforce issues identified across several transportation agencies in the report was the deficit in quality managers as a result of the aging workforce and inability of all branches of transportation to attract and retain high performing executives. This concern, coupled with mounting evidence suggesting the efficacy of competency modeling to improve leadership effectiveness, provided a strong rationale to develop

a leadership competency model for the intermodal transportation industry. Thus, the aim of this project was to develop a core competency model that could be used to effectively recruit, train, and retain superior leaders in intermodal transportation.

Eleven human resource managers from across the country participated in a focus group held on a private University's campus. Content analysis revealed 9 core competency training areas for employees in intermodal transportation: Leadership, Analytical, Marketing, Technical, Business Management, Communication, Financial, Sensitivity, and Strategic. The HR panel also suggested that the leadership competency training cluster include the following components: trust and honesty, cultural attributes, and sensitivity to government relation issues. Quantitative results from a 360 degree feedback questionnaire of mid-to-upper level managers and their colleagues revealed that the superior group outperformed the average comparison group on several competencies including; delivering results, collaborating, getting things done, prioritizing appropriately, and building trust. In other words, these competencies were distinguishing characteristics between the groups.

Based on importance ratings from intermodal transportation leaders, the following items were ranked highest by mean values:

- perseveres in delivering what is promised even when obstacles arise,
- collaborates effectively with others,
- spends time and energy on the most important priorities,
- demonstrates high personal standards, and
- knows how to get things done.

Thus, these competencies were thought to be of the most importance to successful management in intermodal transportation.

One noteworthy observation from the findings in this study was that the highly effective leaders produced superior performance results in people-effectiveness areas. Thus, it was assumed that though technical/functional skills and abilities are critical, they are not sufficient alone for leadership acumen in transportation as a manager moves up the chain of command. In other words, technical and functional expertise may be more important in lower levels of management, while the interpersonal and self-effective clusters become more relevant as a manager moves into higher levels of leadership. A certain degree of interpersonal effectiveness and self-awareness must also be present in top leaders.

It is highly recommended that the three clusters of self-effectiveness, interpersonal effectiveness, and technical effectiveness that were identified as most important competency areas for executives in intermodal transportation in this study be validated over the course of the next year by acquiring additional data. It is recommended that a second, separate, large sample of mid-to-upper level transportation managers be obtained to validate the model and improve the accompanying survey. Thus, the recommended next phase is to validate and refine the model against additional data and behavioral observations. Further, the accompanying instrument or survey should become a primary focus of the research moving forward. It is highly recommended that additional research focus on improving the instruments available in general to build competency models. Thus, it is proposed here that future studies focus on further developing the ITMCQ, and explore how it can be used as a leadership performance tool in recruiting, hiring, and training programs in the future.

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