

The Application of AHP to Prioritize EI Competences for Junior High School Principals in Taiwan

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Abstract—The aim of this paper is to demonstrate the application of analytic hierarchy process (AHP) as a feasible decision-making technique to prioritize emotional intelligence (EI) training needs of a specific group of junior high school principals. A hierarchical decision-making framework developed based on the Emotional Skills Assessment Process (ESAP) was structured into an AHP questionnaire issued to 9 principal candidates and incumbent principals as participants of the study. Results of the AHP analysis suggest that scenario-based EI interventions for enhancing important EI skills are made possible via AHP analysis. The EI framework and AHP technique were introduced with specific implications for planning EI trainings by taking contextually specific needs into consideration. Further research directions were discussed in an effort to maximize the effects of EI trainings for school principals.

Index Terms—leadership development, emotional intelligence, Emotional Skills Assessment Process, analytic hierarchy process, multiple criteria decision making

I. INTRODUCTION

Leadership effectiveness has been one of the century-old but the least consensus areas of studies. During the past decade, one variable that has gained much popularity as a potential attribute of effective leaders is the measure of Emotional Intelligence (EI) [1]-[2]. Further empirical evidences lend support to the notion that EI forms part of the key tenets in relation to leadership emergence, effectiveness and development in schools [3]-[4]. Despite much interest in relating EI to effective school leaders, there are few empirical studies that explicitly examined how EI can be improved based on contextually specific concerns with regarding to the prioritization of EI training needs [5]. For the purpose of detecting the priority of EI competences extracted from the literature on the construction of a scenario-based EI training module for a target group of school principals, a Multiple Criteria Decision Making (MCDM) model named the

Analytic Hierarchy Process (AHP) technique was employed to snapshot important EI demands perceived by a group of junior high school principals in Taiwan. The decision hierarchy structure and method used in the present study can move beyond them to facilitate the evaluation of relative weights of EI competences considered to be essential for effective leadership development in any given school context. Research questions that guide the proposed study were as follows:

1. How can the overall goal of this study be decomposed into a decision hierarchy structure pertaining to the development of an EI competence model for school principal preparation program in Taiwan?
2. What is the aggregate outcome of EI competence weights solicited from a group of stakeholders' judgments for the purpose of shaping a synthesized training module for preparing and developing a specific group of junior high school principals in Taiwan?

Results of the study, in particular, would contribute to future educational interventions for school leadership development in Taiwan, as well as other cultures in general.

II. LITERATURE REVIEW

A. Conceptualizing Emotional Intelligence

As emotional intelligence has gained popular attention as an academic area to be investigated, researchers have generalized various EI constructs and theories into three competing models: the ability-based model, the trait-based model and the skill-based model. The ability-based model endorsed by Mayer and Salovey encompasses three components: an ability to appraise others' emotions, an ability to regulate one's own emotions, and an ability to use emotions to solve problems [6]. In an attempt to bridge a theoretical connection between emotions and cognition, Mayer and Salovey's theoretical delineation has been under criticism because little evidence shows the various areas of ability-based EI are related to job performance and academic performance [7].

As a distinction of the ability-based model, the mixed or trait-based model proposed by Goleman and Bar-On defined emotional intelligence as being non-cognitive in nature and encompasses components from personal traits, such as empathy, optimism, adaptability, warmth, and motivation [8]. Goleman's update model divides 20 competences into four dimensions: self-awareness, self-management, social awareness and relation management [8]-[9]. By the same token, Bar-On's model of EI focuses on real-world practices. EI, claimed by Bar-On, is a set of non-cognitive functions and competences that play a pivot role in sustaining one's behavior and mind when coping with day-to-day situations [9]. Bar-On further maintained that the mixed or trait-based model is a predictor of individuals' potential for success. Fifteen factors and 133 items were used to measure the following components of emotional traits: self-awareness, assertiveness, empathy, self-actualization, independence, problem-solving, stress tolerance, and optimism [10]. Some of Bar-On's EI components can be grouped into mental ability (e.g., emotional self-awareness and problem solving) and others appear to be overlapped with personality traits (e.g., adaptability and optimism [11]. It is thus also called a mixed model. The mixed/trait-based model of EI tends to be more popular for non-academic usages than the ability-based approach [7]-[9].

Since there exists little empirical evidence in the literature about possible impacts of EI interventions on academic achievement, career success, personal wellness, and leadership development, Nelson and Low initiated the Emotional Skills Assessment Process (ESAP) in 1999 [12], [13]. Their undertaking aimed to fill the gap in the literature by offering a psychologically sound and practically sequential EI measure appropriate for diagnose proper trainings imparted to leverage a sense of self-awareness, controlling one's own emotions, and bringing about satisfactory results in life, work and academic pursuits. The Emotional Skills Assessment Process (ESAP) constructed by Nelson and Low has proven to be a valid and reliable measurement of EI by researchers in the U.S. and in Taiwan [4], [13]. ESAP is a self-assessment instrument containing thirteen skills of Assertion, Anger Control, Anxiety Management, Comfort, Empathy, Decision Making, Leadership, Drive Strength, Time Management, Positive Change, Commitment Ethic, Stress Management, and Self Esteem. Accordingly, the foundation of the emotional learning process is the construct of thirteen emotional skills molded to four key competencies of interpersonal development and health relationships, personal leaderships, self management, and intrapersonal development. Training techniques such as lectures, exercises, discussions, meditations, workshops and role play were provided as feasible and effective approaches for enhancing EI competences after the magnitude of change needed or desired for strengthening or focusing on were identified [12], [13].

B. Emotional Intelligence and Leadership Development

In recent years, there has been a developing body of research linking emotional competences with effective leadership. Evidences showed that leaders' behaviors

influence group members' emotions, which in turn would affect job performance [1], [2]. Researchers further supported notion that EI interventions significantly reinforced individuals' social/emotional skills and, relevant to the present study, leadership emergence and development [1], [2], [14]. Recently, studies on leadership have begun to support the view that EI learning significantly improves multiple facets of leadership outcomes, such as health management, leadership competences, service quality, to name a few [14]-[16].

The concern over whether EI can leverage leadership practices and performance is as important as how EI can be taught and improved for leaders. A notable framework for planning EI training programs or interventions were proposed to incorporate the following four considerations: (1) the need to take into account the contextual concerns where an EI intervention is to be carried on; (2) incorporating an EI intervention into the existing curriculum of a given program; (3) the need to ensure the acquired EI skills are transferable to other contexts; and (4) Adequate preparation are provided to those involved in planning and adopting the intervention or program. It was further emphasized that procedural competencies should be confirmed with situational specific focus perceived by a group of individual learners; furthermore, it is more effective to target on strengthening learning demands of aggregate emotional profiles of individual learners as effective means for enhancing overall EI competences [5], [17].

With the aforementioned literature supporting the significant contribution of EI trainings to leadership effectiveness and various leadership outcomes, developing EI skills and competences is thus imperative to improve leadership practices. The purpose of this study is to introduce the application of AHP to assess areas of emotional competences to be reinforced for a group of junior high school principals in Taiwan. Results of the AHP analysis would have implications for identifying priority of training needs for leaders from different organizational contexts.

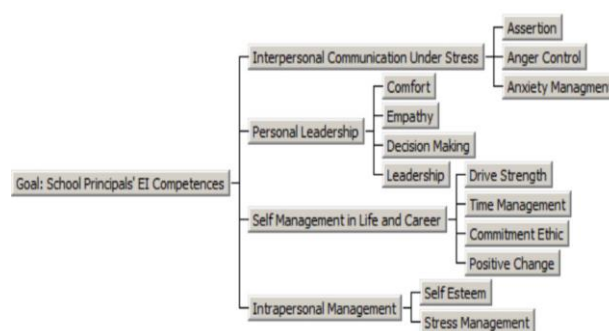


Figure 1. Emotional skills assessment process (ESAP) framework.

III. METHODOLOGY

A. Hierarchy Model Development

To fit the overall scope of the study, an initial decision hierarchy was developed on the basis of Nelson and

Law's framework of Emotional Skills Assessment Process (ESAP) classified into four core competences and thirteen EI skills areas to be included in the AHP analysis procedure. The hierarchical framework with three levels of the goal, the 2nd-level dimensions and the 3rd-level skill areas, as shown in Fig. 1 below, was plotted by Expert Choice 11.5 software package prior to participants' judgments and calculations of dimensional- and factor-level weights based on which global factor priorities are ranked [18].

B. AHP Instrumentation

An AHP questionnaire was designed aligned with the ESAP hierarchical framework before issuing to the target group of 9 participants. A total of 13 factors (EI skills) were identified pertaining to the four dimensions (core competences) considered to be highly relevant for planning EI interventions. AHP questionnaires allow participants to judge a value scaling from 1 to 9 to rate the relative priorities between pairs of criteria with respect to a specific goal. Pairwise comparison procedure, as the cornerstone of AHP, facilitates participants independently rate the relative importance of each criterion to the goal [18], [19]. To guard against invalid or missing comparisons, a detailed instruction was provided for comprehending the 1-to-9 scale as shown in Table 1 below.

TABLE I. SCALE USED IN AHP PAIRWISE COMPARISONS

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Very strong importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values	When compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j , then j has the reciprocal value when compared with i .	

C. Participants

In adopting MCDM techniques, the size and composition of the panel of participants is the foremost concern [2]. A typical panel size ranging from 7 to 15 members is suggested for decision science research [20], [21]. With respect to the issue of panel composition, a homogenous group of experts selected based on their reputation, experience, knowledge and demographic characteristics in the given field under investigation is

recommended to develop consensus and valid opinions [22], [23]. In light of the above discussions, the present study purposefully recruited 9 in-service junior high school principals and principal candidates from the Northern part of Taiwan as the AHP task force for modeling purpose. The 9 participants were enrolled in a graduate program of education at a tertiary setting in Taoyuan, Taiwan. Controversies and disagreements in decision making regarding levels of importance placed on dimensions and factors among the 9 participants could be solved by mathematical choice aggregation computed by AHP.

IV. AHP DATA ANALYSIS RESULTS

A. AHP Procedure

Expert Choice 11.5 was applied to compute the dimension weights and factor ranking. The validity of the survey result was verified in accordance with Saaty's consistency test, aiming to justify a direct measure of consistency of judgments done by the participants. A consistency ratio ($C.R.$) is calculated to demonstrate how far decision-makers' aggregated judgments are from ideal consistency. It is obtained by dividing $C.I.$ by Random Index ($R.I.$). $C.I.$ is given by Expert Choice 11.5.

Model Name: EI competences for Principals

Synthesis: Summary

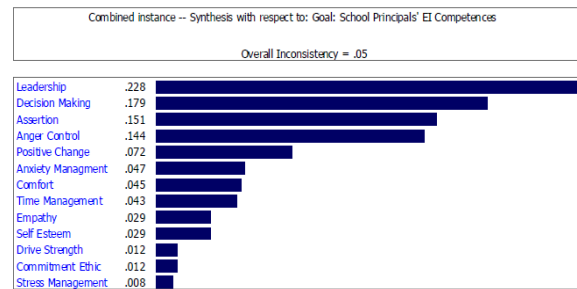


Figure 2. Overall prioritization of 2nd-order factors

According to Saaty, the first-level matrix size in the present study is 4, yielding a $R.I. = 0.90$ [19]. The rule-of-thumb is that a $C.R.$ value of less than 0.10 indicates a reasonably consistent and acceptable judgment. On the other hand, a $C.R.$ value of greater than 0.10 suggests that the decision-makers should reevaluate their judgments [18], [19]. As can be seen in Fig. 2 above, the overall inconsistency = 0.05 (i.e. $C.I. = 0.05$), indicating that the present study yields an acceptable level of overall $C.R.$ of 0.056, which was satisfactory in terms of the level of consistency. Result of the analysis showed that the 9 participants reached consensus on the final ranking of factors computed by the Expert Choice software.

B. Data Analysis Result

As can be seen in Fig. 2, the priority weights among 2nd-order dimensional factors and their ranking was synthesized by Expert Choice. The result presented in Fig. 3 shows the overall weights for the 1st-order criteria (dimensions), and local and global weights for the 2nd-

order criteria (factors). ‘Personal Leadership’, has an overall weight of 47.5%, plays the most important role in participants’ judgments of critical dimension selection, followed by the dimension of ‘Interpersonal Communication Under Stress’ accounting for 31.5%, the dimension of ‘Self Management in Life and Career’ for 15%, and the dimension of ‘Intrapersonal Management’ for 6.1%. Among the 2nd-order criteria (factors) presented in Fig. 2, the top five factors perceived to be critical for school principals in ranking order are ‘Leadership’ has the highest weight (22.8%), followed by ‘Decision Making’ (17.9%), ‘Assertion’ (15.1%), ‘Anger Control’ (14.4%) and ‘Positive Change’ (7.2%). The last three choices are ‘Drive Strength’, ‘Commitment Ethic’ and ‘Stress Management’, with a total weight of less than 0.4%.

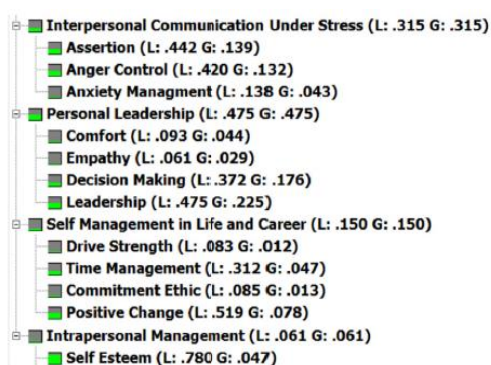


Figure 3. Local and global weights of dimensions and factors

V. CONCLUSION AND DISCUSSIONS

In the leadership literature, EI has been underscored as a key determinant of leadership effectiveness and success, which in turn could affect a variation of organizational outcomes [1], [4], [16]. Studies on educational leadership further confirmed that school principals’ EI correlated positively with teachers’ attitudes and students’ academic performances [24]-[26]. Nevertheless, research on the incorporation of EI training into leadership interventions is grossly inadequate. Since on-size-fit-all course offering is time-consuming and may not be sufficient to meet individual needs, the purpose of the present study aimed to deal with the longstanding history of concerns over how EI can be trained and improved by offering a decision-making technique for planning procedural and systematic EI interventions for school principals, targeting on perceived EI skills to be improved via a scenario-based approach.

The present study utilized AHP as a MCDM technique to specifying priority training needs perceived by the 9 participants enrolled in a graduate program of education. The AHP results showed that the EI skill areas of ‘Leadership’ and ‘Decision-Making’ clustered under the dimension of ‘Personal Leadership’, ‘Assertion’ and ‘Anger Control’ classified into the dimension of ‘Interpersonal Communication’, and ‘Positive Change’ under the dimension of ‘Self Management in Life and Career’ were among the top priority EI skill areas ranked by the participants.

Specific contents and activities adopted from Nelson and Low’s EI enhancement practices for enhancing EI competences in relation to the prioritization results include practicing the use of assertive statements and responses in role plays, controlling and managing anger through Time-Out and relaxation activities, accepting leadership responsibilities for positively influencing a person, leading by behavioral samples, sharing problems and making decisions in teams, and targeting on a specific personal behavior for change and make it happen [12].

The study is certainly with its limitations. One major limitation of the study lies in the contextually specific application of AHP analysis; EI interventions planned and developed based on results of the present MCDM analysis, therefore, cannot be generalized to the population. However, the EI framework and method introduced in the study can be extended to other samples for scenario-based analyses, which allow for retrieving contextually specific needs of participants in need of EI trainings. Another area for further investigation would be to empirically examine if the EI competences or overall leadership performance of the target group of school principals are significantly heightened through EI training intervention prioritized by AHP analysis. As an extension of the present study, further psychometric research can be undertaken to develop the proposed EI competence model into a sound questionnaire for principal leadership evaluations. Since EI has been documented in the literature as a key predictor for leadership effectiveness, the study may open a new realm of incorporating systematic EI course coverage into leadership preparation and developments for principal candidates and incumbent principals.

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