A COMPARATIVE ASSESSMENT OF THREE ALTERNATIVE SCALING APPROACHES FOR THE MEASUREMENT OF STUDENT-TEAM PEER PERFORMANCE

Stuart Van Auken, Department of Finance and Marketing, California State University, Chico
Chico, CA. 95929-0051 (916-898-5773)

ABSTRACT

Students evaluated themselves and fellow team members through the use of three alternative measurement scales: the semantic differential, constant sum, and anchored expectations. Assessments of convergent validity between the approaches on three traits (extent, quality and overall contribution) revealed moderate correlations, thus suggesting that the properties of the measurement scales were responsible for other than a high convergence. A subsequent factor analysis confirmed the uniqueness of the scaling approaches and helped to suggest that the measurement approaches were tapping different aspects of the measured traits. Based on these findings, it is recommended that multiple measurement approaches for self and peer assessments be considered.

INTRODUCTION

Having resumed the use of student teams in my marketing research classes, I am now able to foster skill building in a way that was lacking in a traditional lecture format or class project assignment. This is because team projects enable students to conceptualize an entire issue and to bring their talents to bear on all of the project's many factors. In my traditional class projects, students were organized into task specialties and they subsequently missed much of what was occurring in other student task groups despite a sharing of information among class members as to task approach and accomplishment. Still, student teams are not without their problems, especially those that relate to performance evaluation. In this study, I contrast three scaling approaches for the measurement of peer evaluation (semantic differential, constant sum, and anchored expectation scales) with an emphasis on an assessment of their relative strengths, weaknesses, and convergencies. My focus will now concentrate on the first of these approaches: the semantic differential.

Semantic Differential

With my resumption of team projects, I used the seven-point semantic differential scale advocated by Haas and Seiglampooila (1994) to assess self and peer performance on numerous evaluative traits; however, I found that the resulting peer evaluations tended to truncate around the positive ends of the measured traits. I did note that an underperforming team member or social loafer could be revealed. However, I worried about the truly superior group performer who was typically going unrecognized in team-member evaluations. Basically, if team members were meeting expectations, it appeared that the positive ends of the scale positions (e.g., seven and sixes) were assigned to all group members.

Constant Sum Scale

To help remedy this situation, I developed a constant sum scale for measuring individual team-member performance. (See Figure 1.) This scale forces team members to make comparative judgments as to peer contributions and it represents a significant departure from the semantic differential scale and its absolute evaluations. In the semantic differential scale, each team member is evaluated separately or absolutely and not in relation to other team members. The use of the constant sum scale serves to reveal truly superior performing team members as well as social loafers (Van Auken 1994). As a result, I viewed it as being superior to the semantic differential scale in the making of individual peer and self evaluations.

Anchored Expectation Scale

With the subsequent use of both the semantic differential and constant sum scales for team evaluations, I decided to develop and evaluate a third scaling approach for the measurement of individual team-member performance. This approach is anchored to expectations and embodies "some" properties of both the semantic differential and constant sum scales, although the latter is conceptual and not mathematical. In this new scale, individual team members are evaluated on three traits (extent, quality, and overall contribution); yet, these traits are anchored to group expectations. An can be seen in Figure 2, if a team member meets group expectations on one of the attribute traits, that individual would be placed in the central or middle scale position. Deviations from
group expectations would in turn serve to reveal superior or inferior team-member performance. Thus, this approach forces evaluators to relate each peer and themselves to a group norm. Although team members are being evaluated independently like in the semantic differential scale, the forced comparison with the central scale position results in a judgment as to who met and who do not meet group expectations. Thus, superior and inferior performers with respect to these expectations may be revealed. In this regard, the approach is similar to the conceptual effect of the constant sum scale.

The benefit of this scale is seen in that a class team is forced to consider team expectations at the initiation of a project with respect to a team member’s extent, quality, and overall contribution. For example, a team may expect each team member to do their fair share and to provide a quality level of work that would meet an agreed upon grade expectation. Unfortunately, problems may exist as to norm setting. To illustrate, a team may primarily decide on a grade of C effort, while one team member may want the team to pursue a grade of A effort. However, the scale allows the team member who performs at a norm-breaking level to be identified and recognized. In fact, this was one of the reasons that I developed the anchored expectation scale, as I felt that some of my better students were being penalized because they had the misfortune to be on teams that were not high-performing and given a time constraint they were unable to make-up the deficiencies of other nonperforming team members.

Of course, the constant sum scale also permits the revelation of the breakthrough performer, yet it does not foster a setting of expectations. For example, a whole team could submit to me a substandard project effort, yet each team member could still be given identical point allocations. The anchored expectation scale is also open to problems due to a failure of a team to meet initial expectations, yet it does force a consideration of expectations and it may serve to enhance team member performance.

The Task

With the development of the anchored expectations approach, I decided to have ten of my student teams comprised of five students per team employ all three measurement approaches in their final evaluations of the extent, quality, and overall contributions of themselves and fellow team members. That is, they were to evaluate all team members using the semantic differential, constant sum, and anchored expectation scale formats. Of course, my students were informed of this at the initiation of their project and they were given copies of all three measurement approaches. They were also asked to consider group expectations for team performance and after project completion they were formally given the measurement instruments in a rotated sequence. This was done to help lessen the impact of order-bias that is attendant to assessments of alternative scale efficacy.

The project was one that required a breakthrough effort for each team. In this regard, each team was required to run the following SPSS software packages on their collected data: multiple regression, ANOVA, and Chi square. An inability to consummate this step would result in project failure. Additionally, teams were asked to create tables of data and to interpret their results. Thus, a failure to properly interpret statistical data would result in grade reduction. Overall, the project was challenging and provided an opportunity for the revelation of the social loafer (Harkins and Jackson 1995; Jackson and Williams 1985; Latane’, Williams, and Harkins 1979) and the breakthrough performer (Van Auken 1994).

SCALE COMPARISONS

Given three alternative approaches for the measurement of team-member performance, I sought to determine the extent of their convergence. If all three approaches when measuring each of the three traits (i.e., extent, quality, and overall contribution) produced highly convergent results, then each measurement approach could be viewed as a surrogate for the other. Conversely if the approaches did not converge, this would suggest that each approach was tapping different aspects of the trait and that the methods were sufficiently different to consider their inherent advantages and disadvantages in the selection of a scaling approach for peer and self evaluation.

To accomplish the assessment of alternative scaling-approach convergence as to each of the three traits, I developed a multitrait-multimethod correlation matrix which is seen in Table 1. As can be noted, the correlations within the heterotrait-monomethod triangles were substantial, thus suggesting a high level of internal consistency among the three traits for each measurement approach. In fact, the Cronbach alpha values for the three alternative methodologies are as
follows: constant sum - 95; anchored expectation - 96; semantic differential - 86. Given that the extent, quality, and overall contribution traits are conceptually related, these alphas are quite expected.

Assessments of monotrait-heteromethod correlations (i.e., the convergent validity coefficients) in Table 1 revealed only moderate convergencies. For example, the correlation between the constant sum scale and the anchored expectation scale as to the extent of one's contribution was only .39. Overall, the lowest convergent validity coefficient equaled .32, while the highest equaled .55. Further, the average convergent validity coefficient equaled .43. These results suggested that the methods of measurement were somewhat different and that there were to some degree tapping different elements of the extent, quality, and overall contribution traits.

To further assess the departure among the three methodological approaches, a principal component factor analysis with varimax rotation was run. The results of this analysis appear in Table 2. As can be seen, three factors emerged. These factors accounted for 88.3% of the variance in the collected data. Further, each methodological approach loaded heavily on a separate factor. The first factor represented the anchored expectation scale, while factors two and three represented the constant sum and semantic differential scales, respectively. These results helped to confirm that the three methods were sufficiently different and that they were revealing different insights into individual team-member performance.

THE APPROACHES: ADDITIONAL FINDINGS

Since the three alternative approaches do not reveal high convergent validity and given that they load on separate factors, a brief description of additional findings is warranted. Consistent with my prior observations, the average scores for the semantic differential scale on the extent, quality, and overall contribution traits were as follows: 5.80, 6.48, and 6.37, respectively. As can be observed, the scores are truncated around the high-end scale position (i.e., a value of seven); thus truly superior or breakthrough performers within each team may be going unrecognized. The semantic differential scale, however, does have the potential for revealing the social loafer. As would be mathematically expected, the average score for the constant sum scale on each of the three traits equals a value of 20 (100 points divided by five team members). However, the range of scores for the extent and quality contribution traits was from 5 to 35, while the overall contribution trait produced a range of 5 to 30. The standard deviations for the extent, quality, and overall contribution traits equaled 3.22, 3.19, and 3.19, respectively. Clearly, the constant sum scale can reveal the superior or breakthrough performer, as well as the social loafer. Further, the anchored expectation scale, in which the meeting of group expectations was anchored to a value of three produced average scale values of 3.30, 3.32 and 3.32 for the extent, quality and overall contribution traits. Scores also ranged from 1 to 5 for each of the traits with standard deviations of .74, .73, and .71 for the extent, quality and overall contribution traits, respectively. This scale also evidences potential in revealing the superior or breakthrough performer as well as the social loafer, yet it is unique in that it addresses team expectations, while the constant sum scale does not.

CONCLUSIONS

The measurement of peer and self performance within student teams continues to be a difficult task. Its complexity is highlighted when it is considered that different scaling approaches for team-member evaluation can yield different insights. Like the biological sciences, different slides of the same phenomena when viewed through a microscope may yield different perspectives. In this case, the constant sum, anchored expectation, and semantic differential scaling approaches may be likened to different slides portraying different insights into peer and self evaluations. With respect to this, the semantic differential scale ignores a relative comparison of individual team members on a given trait, instead each member is evaluated independently on that trait. Alternatively, the constant sum scale forces relative or comparative judgments for each group member on each trait. In other words, each team member is evaluated relative to all other team members. Still, this scale ignores team expectations. A third scale, entitled anchored expectations, which was developed for this study, appears to tap elements of individual and comparative judgments, yet may present a problem with respect to an interpretation of group expectations among team members. Thus, it is suggested that all three variants be used in team member evaluations so as to bring as much information to bear as possible on
the peer and self evaluation process. By so doing, some of the perplexing and confounding issues in teammember evaluations may be effectively managed.

REFERENCES


Figures and Tables are available from the author by request.