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REVISITING THE OCCUPATIONAL WORK ETHIC INVENTORY:

A CLASSICAL ITEM ANALYSIS

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Abstract

Self-rated work attitudes of employees (N=492) from six randomly selected manufacturing companies were obtained using the *Occupational Work Ethic Inventory* (OWEI) (Petty, 1995b). Many respondents failed to answer the item with the descriptor *apathetic* or marked the highest level of response on a 1-7 Likert-type scale. The suitability of this item was investigated using a comparison of average inter-item correlations, comparison of item-scale correlations, and an internal consistency analysis. The item with the descriptor *apathetic* failed to demonstrate evidence to support its inclusion in the instrument. It was concluded that this item should be dropped from the scale and replaced by another item that is more readily understood by workers.

Introduction

The term "work ethic" relates to the desirable work attitudes expected of employees. Positive affective work attitudes are not job-specific, but are skills which cut horizontally across all industrial and vertically across all jobs from entry level to chief executive officer (Sherer & Eadie, 1987). These non-technical work skills are considered by employers to be very important. In fact research indicates that almost 90% of job terminations or failure to promote is due to a lack of desirable work attitudes and habits in employees (Beech, Kazanas, Sapko, Sission, & List, 1978). In fact, employers aren't asking for technical skills in the workers they recruit (Oppenheimer, 2004). They think they can easily teach their employees what they need to know about technology. What they really want in employees, and have trouble finding, are the "soft" skills. For these reasons, researchers have sought to identify and measure affective characteristics that are considered desirable, and even necessary, for working people.

Early attempts to measure work attitudes include those of Beech, et al. (1978), who identified 63 affective work competencies that are considered important by industry and education and clustered them into 15 categories. These became the original 15 categories of the *Affective Work Competency Inventory* (AWCI) (Kazanas, 1979). The AWCI was further developed by Brauchle, Petty, and Morgan (1983) to produce the *Work Attitudes Inventory* (WAI) which was thought to more accurately measure work attitudes of employees.

The Occupational Work Ethic Inventory (OWEI) (Petty, 1995b) is the latest edition in the quest for a good instrument to measure occupational work ethic. It is a self-reporting type instrument developed by Petty as part of a National Science Foundation Funded grant. Items for the instruments were selected from a list extracted from a review of literature regarding work attitudes, work values, and work habits. After evaluation by a panel of experts, 50 items were retained. Of the 50 items, 11 items were reversely stated. The reverse items may prevent research participants from developing a response pattern based on quickly marking a rating on the Likert-type scale without reading or actually responding to the actual item (Hill & Petty, 1995). Descriptors selected for the final instrument were listed alphabetically and a random number table was consulted to sort the items in a random order (Petty, 1995a). The stem used for each item on the OWEI, *At work I can describe myself as* makes a definitive connection between the items and work, thereby eliciting responses that are within the realm of work ethic attributes. In a pilot study, the instrument was administered to 152 participants and Cronbach's coefficient alpha was calculated. The alpha value of 0.95 obtained for 50 items was robust. Because of this rather high coefficient alpha, all the items were left intact (Petty, 1995b).

A number of studies utilizing the OWEI are available in the literature. Among these are research conducted by Petty (1995a), Hill and Petty (1995), Hatcher (1995), Azam (2002), Brauchle and Azam (2004), and Petty and Hill (2005). Azam (2002) observed in a study with 454 employee and 581 supervisor responses that a substantial number of employees (31) failed to make a response on the OWEI item with the work attitude descriptor *apathetic*, and that another 42 responded to this item with the highest possible score of seven. This seems rather unusual, as people usually do not portray themselves most negatively unless they are extremely pessimistic. However, when the supervisors of these employees rated them on their work attitudes using the OWEI, only one instrument was returned without any response to the item with the descriptor *apathetic* and five items were found with the highest level of response, i.e., seven. On the basis of this information, a study of the suitability of the OWEI item with the descriptor *apathetic* seemed to be worth conducting.

Purpose of the Study

We investigated the following research question: *Is the item with the descriptor apathetic consistent with other items in the OWEI (e.g., is it a "good" item)?* Other related questions that we sought to address are: *What are the reasons for the failure of so many respondents to respond to this particular item? Why did so many respondents rate themselves so highly on this negative work attitude attribute?*, and, *Should this item be excluded from the OWEI scale?*

Method

Data for this study were obtained from previous research conducted by Azam (2002), in, which self-rated work attitudes of employees of six randomly selected central Illinois manufacturing industries were obtained by administering the OWEI. Supervisors of the employees rated the work attitudes of these employees using the same 50-item instrument. Responses from both employees and supervisors were used in the analysis. Inventories with more than five missing responses were discarded and mean values were used for inventories that contained five or less missing values.

The OWEI was developed as an instrument with four proposed subscales; however, they were not subjected to extensive statistical analysis. Recent factor analytic studies have confirmed the presence of four factors, but there was little similarity between factors originally proposed for the instrument (but not tested) and the factors obtained in these later studies.

The correlation between two items in a scale reflects both their content-based similarity and distributional similarity (Bernstein, Garbin, & Teng, 1988). Factors that emerge as a result of similar distributional properties should be discarded. It is the content-based similarity that is to be considered when tying an item to a specific factor. None of the factor analytic studies shed any light on this phenomenon. Moreover, because it is possible that subscales or factors may correlate strongly just because they are measuring different aspects of the same affective state, we used a one-dimensional method of item analysis. To check the item's (item with the descriptor *apathetic*) suitability for the OWEI, we used the following procedures:

1. Comparison of average inter-item correlations.
2. Comparison of item-scale correlations.

3. Internal consistency analysis

SPSS 11 was used to conduct the correlation analysis, squared multiple correlations, and reliability analysis.

The second and third questions, e.g., why so many respondents failed to respond to this item and why they rated themselves so highly on this negative attribute, did not lend themselves to statistical analysis. Therefore, a semantic analysis of the item with the descriptor *apathetic*, and the nature and use in print of the descriptor *apathetic*, provided some clues. The results of this semantic analysis are presented in the discussion and conclusion sections.

Results

Average Inter-Item Correlations

A bivariate correlation analysis revealed that the item with the descriptor *apathetic* had the lowest inter-item correlations (-0.09 to 0.16) with other OWEI items. Seventeen negative correlations were noted. Six of the items showed significant (at $p < 0.05$) correlations with each of the other 49 items, 37 items showed significant correlations with all other items except the one with the descriptor *apathetic*, four items showed non-significant correlations with only one item (it was not the item with descriptor *apathetic*), one item had two non-significant correlations, and one item had four non-significant correlations. The item with the descriptor *apathetic* had significant correlations with only 10 items. This item also had the lowest average inter-item correlation (0.02). The nearest average inter-item correlation was obtained for the item with the descriptor *tardy* with value of 0.18, i.e., nine times higher than 0.02, the average

inter-item correlation obtained for the item with the descriptor *apathetic*. The overall average of inter-item correlations was found to be 0.37, which is 18.5 times 0.02, the average inter-item correlation obtained for the item with the descriptor *apathetic*.

Item-Scale Correlations

Item analysis by computing correlations between each item and the sum (or average) of all the items (i.e., the complete scale) was one of the two methods originally suggested by Likert, the proponent of the Likert scale (McIver & Carmines, 1981). The concept behind this recommendation is that each individual item of a highly correlated group of items should correlate substantially with the collection of remaining items (DeVellis, 1991). There are two methods for calculating item-scale correlations: (a) Corrected item-scale correlations, which are obtained by correlating the item with all the scale items *excluding itself*; and (b) uncorrected scale-items, which are obtained by correlating the item with all the items in scale *including itself*. DeVellis (1991), however, cautioned against using an uncorrected item-scale correlation because of the chance of inflating the correlation coefficient. Therefore, in this study we used corrected item-scale correlations.

We obtained correlations of each item and the sum of all items excluding the item itself by conducting a reliability analysis using SPSS 11. As indicated in Table 1, the lowest corrected item-scale correlation was for the item with the descriptor *apathetic* with a value of 0.033. The next lowest item-scale correlation of 0.2805 was for the item with the descriptor *tardy.* This correlation is eight and one-half times larger than the correlation for *apathetic*.

Table 1

Corrected Item Total Correlation, Cronbach's *Alpha if item deleted, and Squared Multiple Correlation*

Item Descriptor	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted	Squared Multiple Correlation
dependable	0.6562	0.9638	0.7362
stubborn	0.3228	0.9652	0.3588
following regulations	0.659	0.9638	0.6448
following directions	0.7088	0.9637	0.7022
independent	0.4591	0.9645	0.4886
ambitious	0.7019	0.9635	0.6872
effective	0.7152	0.9636	0.7022
Reliable	0.7152	0.9635	0.7797
Tardy	0.2805	0.9653	0.2714
initiating	0.5254	0.9642	0.4844
perceptive	0.6271	0.9639	0.5975
Honest	0.6974	0.9637	0.6131
irresponsible	0.5576	0.9641	0.4343
efficient	0.6877	0.9637	0.6561

Table 1 (Continued)

Item Descriptor	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted	Squared Multiple Correlation
adaptable	0.6896	0.9637	0.6131
Careful	0.6309	0.9639	0.596

appreciative	0.7173	0.9635	0.6178
accurate	0.6503	0.9639	0.5746
emotionally stable	0.661	0.9637	0.5914
conscientious	0.7385	0.9635	0.6304
depressed	0.4222	0.9648	0.3994
Patient	0.4986	0.9643	0.3982
punctual	0.5396	0.9642	0.4928
devious	0.3368	0.9652	0.4343
selfish	0.5329	0.9643	0.5069
negligent	0.527	0.9642	0.4679
persevering	0.4167	0.9646	0.2938
likeable	0.6352	0.9639	0.6209
helpful	0.7569	0.9634	0.7056
apathetic	0.0328	0.9667	0.1082
pleasant	0.6496	0.9638	0.6724
cooperative	0.7472	0.9635	0.7056
hard working	0.733	0.9635	0.6856
rude	0.4944	0.9644	0.5565
orderly	0.5894	0.964	0.4343
enthusiastic	0.693	0.9636	0.6823
cheerful	0.6986	0.9636	0.7293
persistent	0.6613	0.9637	0.5852

Table 1 (Continued)

Item Descriptor	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted	Squared Multiple Correlation
persistent	0.6613	0.9637	0.5852
hostile	0.3922	0.9648	0.5256

dedicated	0.7428	0.9634	0.8354
devoted	0.7444	0.9633	0.8317
courteous	0.7546	0.9634	0.7674
considerate	0.7271	0.9635	0.7379
careless	0.4663	0.9645	0.3745
productive	0.6968	0.9636	0.6368
well groomed	0.5581	0.9641	0.4264
friendly	0.7222	0.9635	0.7534
loyal	0.7424	0.9634	0.7174
resourceful	0.7328	0.9635	0.7056
modest	0.3988	0.9648	0.2725

Low values of squared multiple correlation may indicate inconsistent items in the scale (DeVellis, 1991). We calculated squared multiple correlations (SMC) for each item by regressing the item on all of the remaining items. The SMC is an estimate of communality, i.e., the extent to which item shares variances with the other items. Table 1 showed the lowest SMC (0.108) was for the item with descriptor *apathetic,* followed again by the item with the descriptor *tardy*. However, the SMC obtained for the item with descriptor *tardy* was two and one-half times higher than that for the item with descriptor *apathetic*.

Internal Consistency Analysis

To estimate reliability, we conducted an internal consistency reliability analysis using SPSS 11. The analysis revealed seven items (with descriptors *apathetic, tardy, stubborn, devious, depressed, hostile, and modest*), which were suspects for bad items because the exclusion of each increased instrument's coefficient alpha. As evidenced in

Table 1, the highest *increase* in coefficient alpha (0.002) was obtained when the item with the descriptor *apathetic* was excluded. This increase in alpha is four times the increase in alpha brought about by excluding its nearest rivals (the item *tardy*). Therefore, we concluded that the item with the descriptor *apathetic* was not consistent with the other items.

The research question focused on the consistency of the item with the descriptor *apathetic* with respect to the other items in the OWEI. Other questions were concerned with the reasons so many respondents failed to answer this item, why those that did respond rated themselves so highly on this negative work attitude attribute, and whether this item should be excluded from the OWEI Scale. Because the latter three questions did not lend themselves directly to statistical analysis, they are addressed in the discussion and conclusion sections.

Discussion

Over the years, a number of researchers have cautioned against using vocabulary in item statements that is complex and difficult to comprehend by general population (Edwards, 1957; Robinson, Rusk, & Head, 1968). They argued that when language is not simple, clear, and direct, an item statement may be a source of confusion. One of the better suggestions in this regard comes from DeVellis (1991), who suggested that scale developers take into consideration the reading difficulty level at which items are written. This warrants particular attention in a country where a significant portion of the workforce is not native speakers of English, the language in which the OWEI items are written.

The word *apathetic* is not a frequently used word. The frequency of occurrence of the word *apathetic* is a paltry one to two times per million words (Thorndike & Lorge, 1952), who also noted that at the end of the 11th grade a student may master the words that have a frequency of occurrence of three to four per million words. Because the word *apathetic* has a frequency of occurrence of one to two per million words, average high school graduates would likely find it difficult to comprehend. Those who are not native speakers of English would find it still more difficult to understand. This low frequency of use may be the reason that a significant number of employees failed to make responses or responded at the highest level (7 on a scale of 1-7) to the item with the descriptor *apathetic*.

DeVellis (1991) recommended that if an item's average correlation with other items is sufficiently lower than the overall average of inter-item correlations, and dropping the item raises the overall coefficient alpha, then the item should be eliminated from the scale. The item with the descriptor *apathetic* has an average inter-item correlation of only 0.02, which is the lowest one observed. This value is only a fraction of the overall average inter-item correlation (0.37).

According Murphy and Likert (as cited in McIver and Carmines, 1981), a zero or very low correlation of the item with the sum of all items represents an undifferentiating item. An undifferentiating item may decrease reliability and/or validity of the scale and should not be included in the scale (McIver & Carmines, 1981). As with item-scale correlation, items with the lowest squared multiple correlations are also possible candidates for exclusion from scale (DeVellis, 1991). In this study, the item with the descriptor *apathetic* had the lowest corrected item-scale correlation (0.033) and the

lowest squared multiple correlation that we observed. It is noteworthy that both the item-scale correlation and the squared multiple correlation are far smaller than other item-scale correlations and squared multiple correlations by a factor of eight and one half and two and one half, respectively. Therefore, this item may be a good candidate for exclusion from the scale.

One of the two methods originally mentioned by Likert for conducting an item analysis of a Likert or Likert-type scale is based on the *criterion of internal consistency* (McIver & Carmines, 1981). Internal consistency is typically equated with Cronbach's *coefficient alpha*. Negative correlations among items, low item-scale correlations, and weak inter-item correlations tend to reduce coefficient alpha. Conversely, dropping an item that has a sufficiently lower-than-average correlation with the other items will raise *coefficient alpha* (DeVellis, 1991), indicating a more reliable instrument. In this study, the highest increase in coefficient alpha (0.002) occurred when the item with the descriptor *apathetic* was dropped. It may be mentioned here that an increase in alpha by 0.002 is not an insignificant one because of the relatively large number of items in the scale (50 items). Exclusion of a few other items also brought about an increase in coefficient alpha, but to a much lesser extent. Therefore, we concluded that the item with the descriptor *apathetic* also failed this test.

Conclusion

In *all* of the tests performed, the behavior of the item with the descriptor *apathetic* showed up as more of an outlier than a normal item. Therefore, this item is a prime candidate to be dropped from the OWEI.

Results of this investigation indicated that (a) the item with the descriptor *apathetic* is an inconsistent item in the OWEI, (b) it is probable that many failed to respond to this item because it does not embody the desirable characteristic of using simple, clear, and direct language (Edwards, 1957; Robinson, Rusk, & Head, 1968) and because the word *apathetic* is a very infrequently used word in the English language and is unlikely to be well understood by non-native English speakers or employees with less than a high school education, (c) 9.25% of the workers who responded probably rated themselves highest on this item because they did not understand it at all, and (d) the item with the descriptor *apathetic* makes little or no contribution to the understanding of work ethic and it should be dropped from the OWEI Scales.

There are some additional lines of reason in support of these conclusions. One might pose the argument that a single item on an instrument with 50 items is inconsequential. However, we should remember that work ethic is a very important consideration for workers and employers. We have known for some time that good work attitudes, values, and habits are important to both groups. Employers consider them to be essential (Secretary's Commission on Achieving Necessary Skills, 2000), and workers who are terminated or not promoted are far more likely to have demonstrated poor work values, attitudes, and habits than a lack of technical skills (Beech, 1982). Clearly, non-technical skills are necessary for success in the labor market (The Secretary's Commission on Achieving Necessary Skills, 2000; Oppenheimer, 2004)). If Career and Technical Education is to succeed in producing graduates who can gain and hold employment in a competitive world, it must enhance their work ethic as well as their technical skills. This requires that non technical work ethic skills be taught in schools. In

order to know the extent to which these skills can be taught to students the skills must be measured, and we need instruments like the OWEI to provide some useful benchmarks. Given the importance of these non-technical skills for the success of workers in the labor market and the success of business in a competitive world economy, it is important that the instruments that measure them be as reliable and valid as possible.

For this population, the item with the descriptor *apathetic* failed to demonstrate evidence to support its inclusion in the *Occupational Work Ethic Inventory* (OWEI) in *any* of the following tests: (a) comparison of inter-item correlations, (b) comparison of item-scale correlations, and (c) internal consistency analysis). Based on our population's response to this instrument, we have every reason to believe that the OWEI would provide a more accurate measure if the item with the descriptor *apathetic* is dropped from the scale and replaced by another item that is more readily understood by workers.

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