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Summary. The construct validity of a 10-item Organizational Culture Scale Focused on Artifacts oriented to measure traditional culture was analyzed under the unidimensionality hypothesis of the scale. Confirmatory factor analysis was conducted to assess the unidimensional structure, which took into account the method effects associated with reverse-worded items. The results based on the data from a sample of 926 subjects, 79.8% male, mean age of 33.4 years ($SD = 12.8$), working in different types of companies suggested the proposed unidimensional factor structure, with the elimination of two items from the scale. The resulting 8-item scale was reanalyzed, this time with the data of a second split-sample. Support was found for the scale's unidimensionality with this second dataset.

Since the 1980s, corporate organizations around the world have been adopting programs of organizational restructuring and cultural change. Most of these programs share the common fundamental aims of changing the old attitudes, values, and behavior among all employees by new ones. The evaluation of these changes is a major challenge. A number of quantitative measurements have been proposed to achieve this purpose (Ashkanasy, Broadfoot, & Falkus, 2000; Scott, Mannion, Davies, & Marshall, 2003). The culture of an organization produces observable indicators such as artifacts, forms, symbols, and rituals. However, none of organizational culture questionnaires focus on artifacts, which are the most visible levels of a culture. Schein (1985, 1999) define cultural artifacts as visible organizational structures, processes and behavior, e.g., human relationships, selection schemes, promotion and dismissal, training programs, evaluation and incentives, type of structure and rules, etc.

The Organizational Culture Scale Focused on Artifacts was proposed by Bonavia (2006) in order to advance in the solution of this gap. This is one of the first published scales using this method. It included a set of cultural artifacts to measure the extent to which an organization is traditional. The traditional organizational culture refers to the maintenance of conventional practices and customs, which are still present in many organizations today. For instance, overestimating the economic goals, promotion based on personal friendships and family ties, creativeness and capacity for innovation by the employees unvalued, importance of customs and traditions, evaluation schemes and controls based on failure and not on success, centralized and bureaucratic structure.

Bonavia (2006) suggested that further research on the scale's psychometric properties was required. The purpose of this study was to test construct validity using confirmatory factor analysis (CFA) with a different large sample to assess the

unidimensionality hypothesis of the scale, given that the results of the application of exploratory factor analysis in the aforementioned study supported a one-factor model underlying the test response data.

METHOD

Participants

The sample consisted of 926 subjects (the response rate was 61.6%) working in different Spanish companies in several economic sectors: construction ($n = 339$, 36.6%); metal, iron and steel ($n = 94$, 10.1%); retailers ($n = 72$, 7.8%); chemical ($n = 57$, 6.1%); teaching ($n = 55$, 5.9%); hotel trade ($n = 52$, 5.6%); public administrations ($n = 48$, 5.2%); healthcare ($n = 48$, 5.2%); transport ($n = 36$, 3.9%); extractive industry ($n = 32$, 3.5%); sales of services and products ($n = 32$, 3.5%); telecommunications ($n = 31$, 3.4%); and entertainment ($n = 30$, 3.2%).

The sample was 79.8% male ($n = 739$), and the mean age of the whole sample was 33.4 years ($SD = 12.8$). The average time that the workers' present job had been held was 6.6 years ($SD = 8.8$), and they had been, on average, 11.2 years in the present profession ($SD = 11.7$) and 7.3 years at their present company ($SD = 8.9$).

Measures

The questionnaire used in this study was based on the Organizational Culture Scale of Artifacts presented in Bonavia (2006), which measured the extent to which an organization is traditional versus nontraditional. The scale consists of 14 items: 7 items are worded in the direction of traditional organizational culture, and the remaining 7 are worded in a reversed fashion to reduce the effects of acquiescence (see Table 1 for examples of items). Subjects respond to items on a 6-point Likert-type scale anchored

by 1: Totally disagree and 6: Totally agree. Thus, after reverse-scoring the items worded in the direction of non-traditional organizational culture, a total score is formed by summation of the item scores. Higher scores on the scale mean a company has a traditional organizational culture whereas an organizational culture of a nontraditional kind would be associated with lower scores.

For this study, four items were eliminated from the original 14-item scale given the empirical results associated with its development (Bonavia, 2006): poor psychometric indicators were obtained for these four items, e.g., item-to-total correlations below .45, and communalities below .25. A common characteristic of these four items, which could be the cause of this poor functioning, is that some level of information about the company, that is not usually known by workers, is required in order to answer to them (e.g.: “Marketing strategies such as segmentation and market research are used” or “Generally, a long-term vision of things is valued more”). Thus, the final scale applied in this study was set by 10 items (see Table 1), four of which were reverse scored when obtaining the subjects’ total scores.

Procedure

Questionnaires were handed personally to the workers who were voluntarily participating in this study. Data protection and anonymity were guaranteed. A presentation was given to explain the instructions for completing the questionnaire. Questionnaires were given during working hours and at the work place. At least one member of the research group was present while the questionnaires were administered to guarantee that the information was treated confidentially and to answer any doubt about completing the scale.

Data analysis

Prior to the CFA analysis, data screening indicated there were 883 complete data records of the 926 included in the dataset. The highest number of missing values per record was four, which only occurred with two data records. Missing data were handled through the imputation of the missing values for each variable based on cases with similar response patterns to the remaining variables. According to this procedure, the imputation of 35 data values was successful, so the number of complete data records increased to 915. Then, listwise deletion was used to handle the remaining missing data for the rest of the data analyses. The potential multivariate outliers in the dataset were identified by using the method based on examining the leverage indices for all the cases in the sample in the multiple regression of the scale total score over the item scores (Hair, Anderson, Tatham, & Black, 1998). A leverage value that was five times greater than the average leverage value was considered as the cut-off score to identify potential outliers. No outliers were detected in the dataset (the maximum leverage value was 2.31). Table 1 shows the score mean and standard deviation of all the scale items calculated from the entire sample.

Two subsamples (odd and even cases from a list of the data records ordered, first, by the company where the subject is working and, second, the data gathering chronological order) were created from the initial sample to be able to conduct a potentially extensive post-hoc model test and a cross-validation strategy. By considering the data collected through the questionnaires as ordinal, the polychoric correlation and the asymptotic covariance matrices were analyzed by the weighted least squared (WLS) estimation method with LISREL 8.54 (Jöreskog & Sörbom, 2001).

According to the one-factor hypothesis proposed in this study, all items were specified to be associated with a single factor (traditional organizational culture).

However, this one-factor model was specified with an error theory to reflect the method effects (correlated residuals) from the four reverse-worded items. This error theory was considered by taking into account the extensive literature which provides evidence of the presence of method effects in those scales entailing a combination of natural and reversed worded items (e.g. Bagozzi & Heatherton, 1994; Brown, 2003; Marsh, 1996). Goodness of fit was evaluated using the standardized root mean square residual (SRMR), the root mean square error of approximation (RMSEA) and its 90% confidence interval and test of close fit (CFit), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). These indices were considered because they provide different information about model fit, and they collectively offer a more conservative and reliable evaluation of the solution (Brown, 2006). By following the suggestions provided in Hu and Bentler (1999), the acceptable model fit was defined by the following criteria: SRMR $\leq .08$, RMSEA $\leq .06$ (CFit ns), TLI $\geq .95$, and CFI $\geq .95$.

RESULTS

Next is presented the CFA results for the 10-item scale in the split-sample with odd cases (n=458). All the overall goodness-of-fit indices suggested that the one-factor model fit the data well (Satorra-Bentler $\chi^2_{29} = 45.12$, $p = .029$; SRMR = .045; RMSEA = .035, 90% CI = .012 - .054, CFit (<.05) = .90; TLI = .95; CFI = .97). On the other hand, all the error covariances between the four reverse-worded items were statistically significant ($p < .01$), supporting the error theory considered in the model specification. Inspection of the standardized residual matrix showed some high values, especially those associated with the correlations between item 8 and other scale items (items 8 and 4 = -1.69; items 8 and 5 = 2.51; items 8 and 7 = -1.76; items 8 and 10 = 3.46). The modification indices suggested considering the estimation of the error covariation

parameters between items 2 and 5 (χ^2 decrease = 9.1), items 8 and 5 (χ^2 decrease = 9.1), and items 8 and 10 (χ^2 decrease = 17.9). Completely standardized parameter estimates (item factor loadings), their corresponding *t* values, and error variances from this CFA solution, are presented in Table 1. All the item factor loadings were statistically significant ($p < .01$), although observation of the error variances for items 7 and 8 indicated that the proportion of variance in these items, which is accounted for by the latent factor, was below .05.

INSERT TABLE 1 HERE, PLEASE

Despite obtaining a considerably good overall fit of the one-factor model, an inspection of the standardized residuals and the item parameter estimates indicated localized points of poor fit in the solution for items 7 and 8. Thus, the next step was to modify the model by eliminating these two items and by analyzing the potential fit improvement of the resulting 8-item scale model. As before, the specification of the one-factor model took into account the error covariances between the three reverse-worded scale items remaining in the scale. The results of the evaluation of the specified model showed an improvement of the overall goodness-of-fit indices (Satorra-Bentler $\chi^2_{17} = 16.81, p = .47$; SRMR = .029; RMSEA = .000, 90% CI = .00 - .042, CFit (<.05) = .99; TLI = .99; CFI = .99). In this case, the standardized residual matrix showed quite low residuals for all the covariances, except for items 2 and 5 (= -2.07). The modification indices suggested only having to add the error covariation parameter between items 2 and 5 (χ^2 decrease = 8.7). Nonetheless, the estimated value for it was rather low (= -.12), so it appeared irrelevant to consider this new modification in the model. Table 1 shows the completely standardized parameter estimates (item factor

loadings) corresponding to this CFA solution as well as the corresponding *t* values. All the item factor loadings estimates were statistically significant ($p < .001$). With regard to the item variance accounted by for the factor (R^2), the highest value was .50 (item 6), whereas the lowest value was .11 (item 10).

However, the goodness of fit results of the 8-item model could be a consequence of the data-driven modeling effect. Thus, the model was cross-validated with the even-subject sample ($n=457$) derived from the original sample. The results of the CFA for the 8-item model under the unidimensional hypothesis with the second split-sample showed that the one-factor model fits the data quite well (Satorra-Bentler $\chi^2_{17} = 35.22$, $p = .006$; SRMR = .048; RMSEA = .048, 90% CI = .025 - .071, CFit (<.05) = .51; TLI = .92; CFI = .95). Only the Tucker-Lewis index did not reach the previously considered cut-off value ($TLI \geq .95$). Moreover, the *t* values of all the indicators of traditional culture for this CFA solution (see Table 1) were statistically significant ($p < .001$). The highest explained variance was, once more, for item 6 ($R^2 = .43$), whereas the lowest corresponded to item 7 ($R^2 = .15$).

CONCLUSION

The CFA results suggest that the Organizational Culture Scale Focused on Artifacts measures a single construct, and in this way, fulfils one of the most critical and basic assumptions of the measurement theory, that is, the set of items forming a scale measure has just one thing in common (Hattie, 1985). The common aspect is that this scale is designed to measure a cultural dimension of organizations, which was named traditional culture in Bonavia (2006). This type of culture is characterized by gathering a set of cultural artifacts such as overestimating the economic goals, highly competitive and markedly individualistic, promotions based on personal friendships and family ties,

creativeness and capacity for innovation not valued in the employees, importance of customs and traditions, evaluation schemes and controls based on failure and not on success, and a rigid and bureaucratic structure.

The organizational culture analysis allows anticipating some consequences when trying to implement changes to it (Schein, 1999). Any change program requires taking into account the precedent situation in order to overcome it. A very traditional culture can endanger the incorporation of the desired changes. The Organizational Culture Scale Focused on Artifacts was designed to satisfy this goal and preliminary versions of it have proven to be useful in some Spanish companies to increase the employee involvement (Quintanilla & Bonavia, 1996), to develop systems for the prevention of occupational risks (Boada, De Diego, & Macip, 2001), and to implement programs to reduce absenteeism (Boada, De Diego, Agulló, & Mañas, 2005).

This new shorter version of the Organizational Culture Scale Focused on Artifacts presented herein offers suitable estimates of internal consistency and construct validity. Among limitations of this study, we cannot be sure that our research is entirely free of the biases due to self-reported information. Additional testing is recommended to assess concurrent and predictive validity, as are other estimates which ensure the psychometric goodness of this scale. It would be also desirable this scale was applied to samples from other countries as a way to evaluate if our results can be generalized to other contexts so they are not just a national phenomenon.

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TABLE 1: ITEM FACTOR LOADINGS (T VALUES) AND EXPLAINED VARIANCE (R^2) OF THE 10- AND 8-ITEM VERSIONS OF THE ORGANIZATIONAL CULTURE SCALE OF ARTIFACTS

Item	<i>Mean</i>	<i>SD</i>	10-item Scale Odd Sample		8-item Scale Odd Sample		8-item Scale Even Sample	
			$\beta (t)$	R^2	$\beta (t)$	R^2	$\beta (t)$	R^2
1. The focus on problems takes into account mainly their effects on economic factors, with little consideration of the impact on people.	3.71	1.60	.57 (11.84)	.33	.58 (11.84)	.33	.53 (10.50)	.28
2. Human relations are principally based on cooperation, consensus, and group well-being (the contrary of competitiveness and individual well-being)*	2.67	1.54	.42 (6.99)	.18	.43 (7.04)	.18	.45 (7.38)	.20
3. The most important bases for promotion are personal friendships and family ties.	3.06	1.79	.65 (14.03)	.42	.64 (14.07)	.41	.55 (10.82)	.30
4. Creativeness and capacity for innovation are valued in employees.*	3.03	1.56	.46 (8.13)	.21	.47 (8.27)	.22	.43 (7.08)	.18
5. In this company, it is often heard “it has always been done like that” or “this is the proper way of doing it”.	3.92	1.56	.50 (9.63)	.25	.49 (9.52)	.24	.41 (6.96)	.16
6. The aims of systems of evaluation and control are to punish more than to reward.	2.83	1.58	.70 (15.07)	.49	.71 (15.51)	.50	.65 (13.14)	.43
7. Conflict is treated as a normal aspect of company life, from which valuable experience can be gained.*	3.28	1.45	.13 (2.05)	.02	---	---	---	---
8. The structure is highly centralized, i.e., the majority of matters have to pass through very few hands.	4.36	1.48	.20 (3.31)	.04	---	---	---	---
9. The structure is flexible, i.e., it adapts quickly and successfully to changes that may affect its survival.*	3.02	1.44	.36 (5.81)	.13	.37 (5.98)	.13	.38 (5.99)	.15
10. The rules and regulations favor unnecessary bureaucracy that must be rigorously respected.	3.48	1.57	.35 (6.11)	.12	.34 (5.79)	.11	.44 (7.63)	.19

*Reverse-scored items (10-item scale alpha = 0.69; 8-item scale alpha = 0.72)