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Testing for measurement invariance for employee engagement across sectors in South Africa

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Abstract

The purpose of the study was to assess the employee engagement questionnaire's degree of factorial invariance across the main business sectors in South Africa. One of the limitations highlighted in previous studies was that the validity does not focus on invariance testing among different demographical groups. Given the differences between business sectors, the focus of this study was to determine whether the questionnaire can be used with confidence in different business sectors.

A quantitative research study was conducted using a database of a research company, which is made up of 285 000 business people from various industries, sizes of business and occupying different roles, reflecting the profile of the South African working population. A total of 4125 employees completed the employee engagement questionnaire. The results confirmed the validity and reliability of the questionnaire. The invariance testing as determined by structural equation modelling indicated mixed results. The final analysis indicates that invariance can be assumed for all the sectors except community and manufacturing.

The employee engagement questionnaire can thus be used with confidence in most of the surveyed sectors but needs to be tested individually for validity and reliability for the community and manufacturing sectors.

Key phrases

business sectors, employee engagement, invariance testing, quantitative research

1. INTRODUCTION

Employee engagement has consistently been rated as one of the top issues on CEO's lists of priorities for many years and the main focus of attention of both academics and human resources practitioners. Research provides ample evidence that engagement is strongly related to important business outcomes such as productivity, job satisfaction, work wellbeing, organisational culture, talent management, business performance, growth and stakeholder return, more satisfied and loyal customers, better quality products or services, greater growth potential and that it ultimately affects bottom line results (Hoole 2015:302; Werner 2015: 281-282).

According to Imandin, Bisschoff and Botha (2014:520), employee engagement is also gaining momentum in modern management practices as a managerial tool. According to Werner (2015:281), engagement is important because it has positive outcomes for both the individual and the organisation.

A study of nearly 8 000 business units in 36 companies found that those companies whose employees had high average levels of engagement also had higher levels of customer satisfaction, were more productive, brought in higher profits, and had lower levels of turnover and accidents than those at other companies (Harter, Schmidt & Hayes 2002:268). The question then is what does this construct entail?

According to earlier researchers such as Kahn (1990:694), employee engagement refers to a positive psychological state that consists of cognitive, emotional and behavioural dimensions. The personal role engagement theory (Kahn 1990:708; May, Gilson & Harter 2004:19) positions engagement as a motivational psychological state that gives rise to full and holistic investment of one’s preferred self into one’s roles.

Given that an individual will occupy multiple roles within their everyday life (Rothbard 2001:680) and that workers typically perform their work role as well as their role as an organisational member (Pratt & Ashforth 2003:311), it follows that employee engagement consists of two distinct, yet related types: job engagement and organisation engagement. Thus, job engagement is the extent to which an individual is “psychologically present‟ in their job role whereas organisation engagement is the extent to which an individual is “psychologically present‟ in their role as a member of the organisation (Saks 2006:213).

In 2008, Simpson (2009:1012) identified four types of engagement that were evident in the research namely “personal engagement” as defined by Kahn (1990:708), “burnout/engagement” as defined by Maslach and Leiter (2008:498), and “employee engagement” as defined by Harter, Schmidt and Hayes (2002:269) and “engagement” as defined by Schaufeli, Salanova, Gonzalez-Roma and Bakker (2002:84). According to Bakker, Schaufeli, Leiter and Taris (2008:8), and similarly expressed by Maslach and Leiter (2008:499), work engagement is considered an independent and distinct concept that is negatively linked to burnout.

As discussed above, it is clear that the literature on engagement shows that authors are not entirely unanimous about this construct (Nienaber & Martins 2015:2). Nienaber and Martins (2015:3) heeded the call for further research to clarify current theories and to further develop and refine current instruments. The results of their research accumulated in the development of a newly validated and reliable instrument measuring employee engagement concurrently on the individual and organisational levels.

Consequently the most appropriate description/definition for the purpose of their research was to define the construct as follows: "Employee engagement refers to 'engaged employees' at both the individual and organisational level, who are fully absorbed by and enthusiastic about their work, and so take positive action to further the organisation's reputation and interests" (Nienaber & Martins 2015:5).

2. INVARIANCE TESTING OF ENGAGEMENT

The popularity of the concept of engagement has given rise to a number of studies in the field by academics and human resources practitioners who all promote and market their own measuring instruments on engagement. In a number of instances these measuring instruments have been validated for a specific population group, organisation, sector or cultural group.

The question that arises now is whether these instruments have been tested for group invariance. No studies in this regard were found in the literature. According to Byrne (2004:272), it is usually assumed that a measurement instrument operates exactly the same way and that the underlying constructs being measured have the same theoretical structure for each group under investigation. As evidenced in reviews of the literature, however, these two critical assumptions are rarely if ever tested statistically. Each organisation, sector and country has its own unique culture and climate. It can thus be assumed that the same measurement tool might not always be applicable to all.

According to Martins and Martins (2015:612), culture can be represented at either the national or the organisational level. Global organisations need to carefully consider the differences in culture across countries to determine which management practices are likely to be most effective with different populations of employees. Martins and Martins (2015:612) continue to argue that organisational culture has a number of different roles such as a boundary-defining role: it creates distinctions between one organisation and others. Second, it conveys a sense of identity for organisation members. Thirdly, culture facilitates commitment to something larger than individual self-interest. Fourthly, it enhances the stability of the social system. Culture is the social glue that helps hold the organisation together by providing standards for what employees should say and do. Finally, it is a sense-making and control mechanism that guides and shapes employees' attitudes and behaviour.

According to Byrne (2004:273), historically, issues related to the equivalency of measuring instruments and the underlying latent constructs they were designed to measure have been largely ignored in research concerned with group comparisons. The past few years have witnessed a gradual increase in the number of studies reporting findings from tests for multi-group invariance based on analysis of covariance structures. Moerdyk (2009:11, 75-76) adds to the debate and argues that in a multicultural country such as South Africa, with its numerous language and ethnic groups, it is necessary to take differences into account in order to conduct fair assessments. The purpose of this study was thus to determine if the employee engagement questionnaire can be applied fairly across the different business sectors in South Africa.

3. RESEARCH OBJECTIVES

The research study had the following main research objectives:

- to confirm the validity of the employee engagement instrument by means of confirmatory factor analysis (CFA) across the measured sectors; and
- to determine if any measurement invariance (measurement equivalence) exist between the measured sectors.

4. RESEARCH METHODOLOGY

A quantitative research approach was followed in this study. This approach to research is primarily based on the acquisition of numeric data and the analysis thereof with mathematical or statistical tools (Remenyi 2015:148).The Employee Engagement Instrument (EEI) was developed by Nienaber and Martins (2014:493-494) and the validity and reliability were reported on in the second phase of the research (Nienaber & Martins 2015:16-17). In this third phase of the research study, confirmatory factor analysis (CFA) was conducted to confirm the validity of instrument. Secondly, a base structural equation model was compiled, consisting of the sectors with sufficient responses (see Table 1). This was followed by determining the goodness-of-fit indices across the seven sectors (See Table 5), the sector model comparisons and testing for invariance across the sectors.

TABLE 1: Demographic profile of participants

Item	Category	Frequency	%
Gender	Male	1994	48.3
	Female	2131	51.7
Years of service	0 to 1 year	281	6.8
	2 to 3 years	650	15.8
	4 to 5 years	510	12.4
	6 to 10 years	1113	27.0
	10 years and longer	1571	38.1
Year born	Born between 1978 and 2000	1285	31.2
	Born between 1965 and 1977	1690	41.0
	Born between 1946 and 1964	1150	27.9
Job grade	Top management	526	12.8
	Executive management	855	20.7
	Manager	1041	25.2
	Supervisor	442	10.7
	Employee	1255	30.4
	No response	6	0.1
Main industry (sector)	Agriculture, hunting, forestry and fishing	107	2.6
	Mining and quarrying	244	5.9
	Manufacturing	620	15.0
	Electricity, gas and water supply	97	2.4
	Construction	177	4.3
	Wholesale and retail trade	381	9.2
	Transport, storage and communication	433	10.5
	Financial intermediation insurance, real estate and business services	1252	30.4
	Community, social and personal services	732	17.7
	Private households	20	0.5
	Other	59	1.4
	No response	3	0.1

Source: Author's compilation based on survey results

4.1 Research participants

The database of a research company, consisting of 285 000 business people from various industries, sizes of business and occupying different roles, reflecting the profile of the South African working population, was used in this study. The database is permissioned, meaning everybody in the database gave permission to participate in online surveys. An electronic survey, administered by iFeedback.co.za online data collection portal was used by means of a mass e-mail invitation over a period of three weeks. Each potential participant received a personalised e-mail, stating the purpose of the investigation, that the survey will take ± 15 minutes to complete and inviting them to participate in the survey on a voluntary, confidential and anonymous basis. The invitation clearly indicated that the results are analysed anonymously without any reference to participants. In addition, the ethical clearance for this project was also obtained from the university in question. The aim was to receive approximately 5 000 completed questionnaires and to cover all sectors sufficiently. The respondents had to rate the items on a Likert five-point scale:

1= strongly disagree; 2= disagree; 3= unsure; 4= agree; 5= strongly agree

The results were only reported on an aggregated level meaning that no results could be tied down to any individual.

A total of 4125 completed questionnaires were received. The demographic profile of the participants is reflected in Table 1.

The sample comprised 48.3% male and 51.7% female participants, while the largest generational group (41.0%) was born between 1965 and 1977, the typical Generation Xers. The variable on job grades showed that most respondents were employees i.e. not managing or supervising positions (30.4%), followed by managers (25.2%) and executive managers (20.7%). It is interesting to note that 38.1% had more than 20 years of service.

All industries were represented with the majority (30.4%) coming from financial services and insurance, followed by community, social and personal services (17.7%) and 15% from manufacturing. The lowest response rate was from private households (0.5%)

4.2 The measuring instrument

As mentioned, the EEI was developed by Nienaber and Martins (2014:493-494) and the validity and reliability was reported on in the second phase of the research (Martins & Nienaber 2015:16-17). The confirmatory factor analysis (CFA) in Structural Equation

Modelling was applied to confirm the factor structure of the instrument. Structural Equation Modelling is a multivariate technique which involves the amalgamation of multiple regression and confirmatory factor analytic techniques to assist in the assessment of developed models (Brewton & Millward 2001). Both the exploratory factor analysis and the CFA confirmed the validity, and the CFA statistics explained that the theoretical specification of the factors matched the construct of employee engagement adequately. Confirmatory factor analysis is a multivariate technique used to test (confirm) a prescribed relationship while exploratory factor analysis defines possible relationships in the most general form and then allows the multivariate technique to reveal the relationship(s) (Hair, Black, Babin and Anderson 2010:631).The average variances extracted (AVE) analysis confirmed the convergent validity while the correlation structure confirmed the discriminant validity (Nienaber & Martins 2015:17). The reliability analysis was calculated for all dimensions and sub-dimensions; all yielded adequate Cronbach's alpha values between 0.895 and 0.951.

4.3 Analysis techniques

To confirm the validity of the data for this population, the first step was to conduct principal component analysis (PCA). The PCA with IBM SPSS Statistics 22 (Statistical Package for the Social Sciences) was used to reduce the dimensionality of the data and to examine patterns of correlations among the questions used, and to measure the participants' perceptions regarding their engagement in their organisations.

The factorability of the correlation matrix was investigated using Pearson's product-moment correlation coefficient. Preliminary distribution analyses indicated that the assumptions of normality, linearity and homoscedasticity were not violated. The correlation matrix demonstrated a number of coefficients of 0.3 and above. The Kaiser-Meyer-Olkin (KMO) value obtained was 0.979, well above the recommended minimum value of 0.6 (Ismail & Yusof 2010:7). Values of the KMO statistic between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson & Sofroniou 1999:218-219). The Bartlett's (1954) test of sphericity was also calculated. This test measures the null hypothesis and that the original correlation matrix is an identity matrix.

Bartlett's (1954) test of sphericity reached high statistical significance, $p < .001$, indicating that the correlations within the R-matrix are sufficiently different from zero to warrant factor analysis (Field 2005). Fifty-one items were initially subjected to PCA and one of the variables (Q31- If I do not have the required skills, my business unit provides the necessary training) demonstrated very little contribution to the solution – not loading sufficiently on any of the components (< 0.3). The remaining 50 variables resulted in a 6-construct solution, explaining 65.588% (Table 2) of the variation in the data.

TABLE 2: Total variance explained by exploratory factor analysis

Component	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	21.896	43.792	43.792	21.896	43.792	43.792
2	4.036	8.071	51.863	4.036	8.071	51.863
3	2.607	5.214	57.077	2.607	5.214	57.077
4	1.992	3.984	61.061	1.992	3.984	61.061
5	1.187	2.374	63.435	1.187	2.374	63.435
6	1.076	2.153	65.588	1.076	2.153	65.588
7	0.967	1.933	67.521			
8	0.918	1.837	69.358			
9	0.691	1.382	70.740			
10	0.664	1.328	72.068			
11	0.649	1.298	73.366			
12	0.598	1.196	74.562			
13	0.588	1.177	75.739			
14	0.577	1.155	76.893			
15	0.542	1.085	77.978			
16	0.506	1.013	78.991			

Note: Only the top section of the table is displayed

Source: Calculated from research results

Oblique rotation was used to accommodate the correlation among the components. Excluding factor loadings of less than 0.3 resulted in a reasonably simple structure (Thurstone 1947), with each of the six components showing a number of strong loadings, although there is a number of cross-loading situations that need careful interpretation. According to Hair *et al.* (2010:118), the generally agreed lower limit for Cronbach's alpha reliabilities is 0.70. Each of the extracted constructs demonstrates strong internal consistency, well above 0.70, as illustrated by the Cronbach's alpha coefficients listed in Table 3.

TABLE 3: Reliability statistics for the six extracted components

Subscale	Description	Number of items	Cronbach's alpha
C1	Team	11	0.933
C2	Organisational satisfaction	9	0.942
C3	Immediate manager	7	0.934
C4	Organisational commitment	12	0.932
C5	Strategy and implementation	7	0.904
C6	Customer service	4	0.813
Overall	All dimensions	50	0.973

Source: Calculated from research results

4.4 An overall industry structural equation model

A confirmatory factor analysis (CFA) was conducted in order to develop and specify the measurement model (Hair *et al*. 2010:646) on the first-order latent construct level. The AMOS (Analysis of Moment Structures) computer program was used to conduct the CFA.

The CFA was conducted using the six factors identified during the exploratory factor analysis. The next step in the process was the testing of hypotheses relating to group invariance. In accordance with the guidelines provided by Jöreskog, and explained by Byrne (2004:274), the testing of hypotheses relating to group invariance typically begins with scrutinising the measurement model. In particular, the pattern of factor loadings for each observed measure is tested for its equivalence across the groups.

Once it is known which observed measures are group invariant, these parameters are constrained to be equal, while subsequent tests of the structural parameters are conducted. As each new set of parameters is tested, those known to be group invariant are constrained to be equal across groups. Given the univariate approach to the testing of these hypotheses, as implemented in the AMOS program, this orderly sequence of analytic steps is both necessary and strongly recommended (Statistical Package for the Social Sciences [SPSS] (2006). As a prerequisite for invariance, it is customary to consider an initial or baseline model, which is then estimated separately for each group (Hair *et al.* 2010:646).

The baseline measurement model that was developed is depicted in Figure 3.

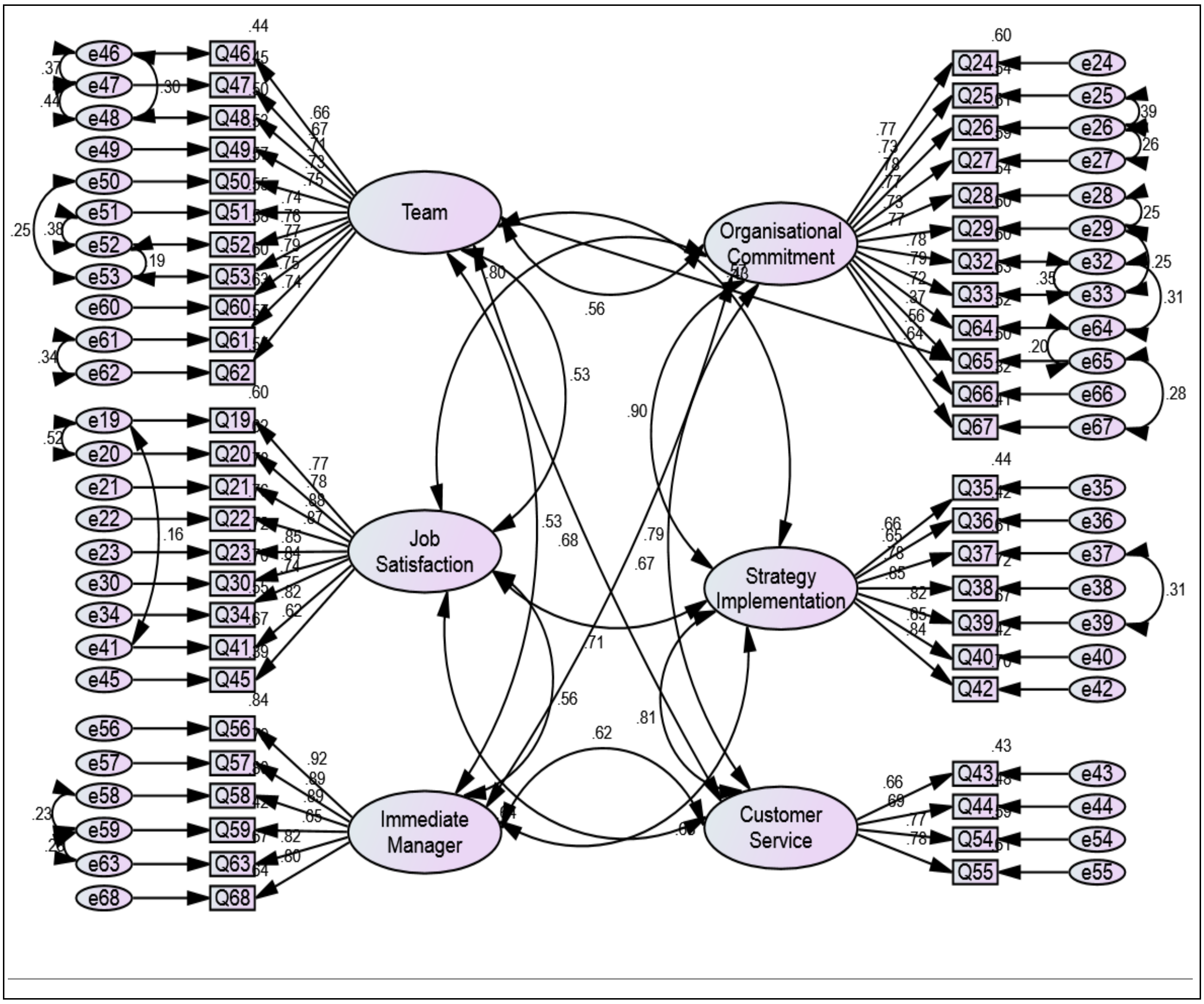

FIGURE 3: Overall measurement model

Source: Calculated from research results

Once the measurement model has been specified, its validity needs to be determined, which depends on establishing acceptable levels of goodness-of-fit

According to Hair *et al*. (2010:664-665), goodness-of-fit (GOF) indicates how well the specified model reproduces the observed covariance matrix among the indicator items. The model is depicted in Figure 3 and the goodness-of-fit results are shown in Table 4.

The "Goodness-of-fit" index (GFI) indicates the relative amount of the variances and covariances in the sample predicted by the estimates of the population. A value of 0.90 or above indicates a good model fit (Hu & Bentler 1998:449). Secondly, to overcome the problem of sample size, (Hair *et al*. 2010:676) suggest the root square error of approximation (RMSEA). Values ranging from 0.05 to 0.08 are deemed a "good fit". The next two indices are probably most appropriate, for they evaluate a baseline model, as in this study (Hair et al. 2010:667-668). The third index is the Normed Fit index (NFI) (Schumacker & Lomax 1966:127) that has a range from 0.0 to 1.0, of which the latter suggests a perfect fit. The fourth index refers to the Non-normed Fit index (NNFI) also known as the Tucker–Lewis index (TLI) (Schumacker & Lomax 1966:127). The latter also ranges from 0.0 to 1.0, but can fall outside the 0–1 range (Hair *et al.* 2010:672; Hu & Bentler 1998:427).

TABLE 4: Goodness-of-fit indices for the overall measurement model (all sectors simultaneously)

	Measurement model
Absolute fit indices	
Chi-square (CMIN)	19735.304
Chi-square degrees of freedom	2.539
P value	0.000
Goodness-of-fit index (GFI) index	0.828
Root mean square error of approximation (RMSEA)	0.020
Incremental fit indices	
Incremental fit index (IFI)	0.923
Tucker Lewis index (TLI)	0.917
Comparative fit index (CFI)	0.923
Parsimony adjusted measures	
Parsimony normed fit index (PNFI)	0.817
PCFI based on the CFI	0.856

Note: In the past, these indexes were generally used with a conventional cut-off in which values larger than 0.90 were considered good fitting models.

Source: Calculated from research results

When fitting the model for the sectors, it was clear that not all sectors could be utilised in the model due to insufficient responses. Only seven sectors were subsequently included in the model (See Table 5). When fitting the model for all seven sectors simultaneously, the CMIN/DF fit statistic improved from 9.505 to 2.584 in the unconstrained model and to 2.539 in the constrained (Measurement weights) model.

GFI deteriorated from 0.897 to 0.830 in the unconstrained model and to .828 in the constrained (Measurement weights) model. CFI deteriorated from 0.941 to 0.923 in both the unconstrained model and constrained (Measurement weights) model.

RMSEA fit statistic improved from 0.045 to 0.020 in both the unconstrained model and the constrained (Measurement weights) model. An equality constraint tells the SEM computer program that, in reaching its solution, it must provide the identical unstandardised coefficient for all parameters within a set that has been designated for equality (even when equality constraints have been imposed, standardised coefficients may not be exactly the same within the constrained set). Unstandardized relationships indicate that for a one-raw-unit increment on a predictor, the outcome variable increases (or if B is negative, decreases) by a number of its raw units corresponding to what the B coefficient is. Standardized relationships indicate that for a one-standard deviation increment on a predictor, the outcome variable increases (or decreases) by some number of SD's corresponding to what the β coefficient is. The indices as portrayed in Table 4 are at the levels recommended by various researchers in the field (Hair *et al*. 2010:666-669; Schumacker & Lomax 1996:121)

4.5 Multi-sector invariance

In an effort to assess whether the measurement model was equivalent across sectors, the pattern of factor loadings for each observed measure was tested for its equivalence across the groups. Hair *et al*. (2010:670) see this as stage 1, namely configural invariance, which determines if the same factor structure exits in all sectors. It was, however, observed that a number of sectors did not contain a sufficient number of responses. The responses were thus grouped into seven sectors as indicated in Table 5.

The baseline model used to compare the regression weight equality constraints model was the one obtained from CFA across all sectors. The regression weights for the seven different sectors were constrained to be equal in the model (measurement weights) - the metric invariance stage (Hair *et al*. 2010:670).

The testing of a baseline model then yields one that could be identically specified for each of the seven sectors groups – scalar invariance (Hair *et al.* 2010:670). However, it is important to note that just because the revised model was specified in the same way for each sector, this in no way guarantees the equivalence of item measurements and underlying theoretical structure across each sector. These hypotheses need to be tested statistically.

TABLE 5: Sectors for invariance testing

Sectors	Frequency	Per cent	Valid	Cumulative
Agriculture, hunting, forestry and fishing, mining and quarrying	351	8.5	8.7	8.7
Manufacturing	620	15.0	15.3	24.0
Electricity, gas and water supply and construction	274	6.6	6.8	30.8
Wholesale and retail trade	381	9.2	9.4	40.2
Transport, storage and communication	433	10.5	10.7	50.9
Financial intermediation insurance, real estate and business services	1252	30.4	31.0	81.9
Community, social and personal services	732	17.7	18.1	100.0

Source: Calculated from research results

The goodness-of-fit indices for the seven sectors were subsequently determined and are portrayed in Table 6.

Interpreting these results, the following is noted:

- The RMSEA for all sectors are below the recommended 0.08 with financial being the lowest.
- With the exception of Agriculture, all the sectors' incremental indices are above the recommended 0.90.
- Both the PNFI and RCFI are below 0.90 for all sectors (the criteria being higher values indicate a better fit).

The next step in the process of determining group comparisons is the testing if the Measurement Weights model is significant, $\chi 2$ (Chi-square differences). These results are portrayed in Table 7.

The Chi-square change from the unconstrained model across the seven sectors to the Measurement Weights model is significant, $\chi 2 (264) = 324.021$, $p = 0.007 < 0.01$. Thus, the null hypothesis of equal measurement (regression) weights across the seven sectors can be rejected and multi-group invariance cannot be assumed. The results indicate a lack of fit in a multi-group analysis. The indices, however, suggest a partial degree of data fit between the sectors.

TABLE 6: Engagement: goodness-of-fit indices – sectors

	Community	Agriculture	Manufac-turing	Electricity	Wholesale	Transport	Financial
Absolute fit indices							
Chi-square (CMIN)	3144.128	2508.693	2995.376	2151.892	2371.299	2468.920	4089.811
Chi-square degrees of freedom	2.882	2.299	2.746	1.972	2.174	2.263	3.749
P value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GFI index	0.844	0.774	0.827	0.761	0.798	0.808	0.877
RMSEA	0.051	0.061	0.053	0.060	0.056	0.054	0.047
Incremental fit indices							
IFI	0.928	0.892	0.914	0.908	0.917	0.924	0.939
TLI	0.922	0.883	0.907	0.900	0.910	0.918	0.934
CFI	0.927	0.892	0.914	0.907	0.917	0.924	0.939
Parsimony adjusted measures							
PNFI	0.829	0.764	0.808	0.769	0.795	0.809	0.852
RCFI	0.860	0.827	0.848	0.842	0.851	0.857	0.871
Participants	732	351	620	274	381	431	1252

Source: Calculated from research results

TABLE 7: Model comparisons for seven sectors

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	264	324.021	0.007	0.002	0.002	-0.002	-0.002

Source: Calculated from research results

After an investigation of the regression weights and regression patterns per sector, it was then decided by the researcher to exclude sectors one by one from the above model comparisons to determine if insignificance can be determined. In an effort to determine which of the sectors in the group differ the most regarding the measurement weights, they were left out of the multi-group comparisons one by one. Since none of the subsets of 7 sectors individually resulted in indications of invariance, subsets of 5 were considered and one such subset (all except Manufacturing and Community) resulted in indications of invariance.

Table 8 indicated that if community and manufacturing are excluded, an insignificant resulting P value is obtained (value > 0.05).

TABLE 8: Excluding sectors

Sector excluded	Resulting P value
Agriculture	0.005
Manufacturing	0.028
Electricity	0.003
Wholesale	0.019
Transport	0.016
Financial	0.007
Community	0.030
Manufacturing and community	0.066
Wholesale and community	0.048

Source: Calculated from research results

Table 8 thus indicates that factorial invariance can be assumed for five of the seven sectors, thus indicating equality across the five sectors. Regarding the fit indices, when fitting the model for the five sectors simultaneously, the CMIN/DF fit statistic improves from 9.505 to 2.492 in the unconstrained model and to 2.451 in the constrained (Measurement weights) model. GFI deteriorates from 0.897 to 0.827 in the unconstrained model and to 0.825 in the constrained (Measurement weights) model. CFI deteriorates from 0.941 to 0.924 in both the unconstrained model and constrained (Measurement weights) model.

The RMSEA fit statistic improves from 0.045 to 0.024 in the unconstrained model and to 0.023 in the constrained (Measurement weights) model.

The indices of the 5 sectors model were at the levels recommended by various researchers in the field (Hair *et al*. 2010:672; Hu & Bentler 1999: 1).

5. CONCLUSION

The results of the confirmatory factor analysis confirmed the validity and reliability of the employee engagement questionnaire. The data were thus used to proceed with invariance testing among the seven sectors.

The results of the analysis indicated that multi-group invariance could not be assumed for the seven sectors. The researchers then investigated the indices, regression weights and patterns and decided to exclude sectors in subsets of 5 from the model comparisons to determine if insignificance can be determined. The subsequent results then indicated that two sectors, namely manufacturing and community, needed to be excluded from the invariance testing to obtain factorial invariance. It can thus be stated that the constructs for all five of the sectors, (agriculture, electricity, wholesale, transport and financial) as measured by the employee engagement questionnaire were formed in the same manner. The validity and reliability of the engagement questionnaire pertaining to manufacturing and community sectors, however, need to be determined separately.

An investigation of the sectors indicated that the community sector consisted of government institutions. It thus appears that employee engagement is experienced differently in government. This observation is supported by Olivier (2015:181) in his research on local governments which are mission-driven but non-profit, thus measuring “success” is far more difficult and some elements are difficult to measure because they are preventative in nature. With regard to manufacturing, an investigation of the items indicates a number of instances where the results differ from the sector patterns.

These differences were especially highlighted for the dimension of team work, indicating that team work is applied differently in the manufacturing environment pertaining to employee engagement. This confirms the results that employee engagement is experienced differently in the manufacturing sectors. This analysis thus confirmed earlier statements that the validity and reliability cannot unconditionally be assumed for individual geographical and biographical groups as subsets of a measured overall population.

In summary, it would appear that the EEI can be used with confidence to measure the employee engagement constructs across the sectors of agriculture, electricity, wholesale, transport and financial.

It is proposed that future studies focus on the determining of the reliability and validity of the employee engagement questionnaire in the manufacturing and government sectors.

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