Chapter -3

MEASUREMENT SCALE DESCRIPTION
AND VALIDITY

3.1 Introduction

Allotting any numerical number to specific characteristics of an object is called as measurement (Malhotra & Dash, 2007; Stevens, 1946). When these allotments of numbers are done in a continuum having options of variety numbers based on some standardized rules, then that continuum is called as scale of measurement.

Measurement is a systematic, replicable process through which objects or events are quantified and/or classified with respect to a particular dimension or construct. This is usually achieved by the assignment of numerical values (Weiner J., 2007). The continuum, containing these assigned numbers is called as a measurement scale.

One of the major essentials of doing any types of fact based research is to construct a multi-dimensional instrument that can be applied for measuring any latent variable as perceived by the respondents. The objective is to end up with a parsimonious set of items which are responsible to significantly explain either explored or already established dimensions.

It is important to administer the major items to a representative sample in order to examine how well the items confirm expectations related to the structure of the measure in question (C.H. Chang, 2011). A highly reliable measuring instrument is one which gives the same measurements when one repeatedly measures the same unchanged objects or events. Content validity refers to the extent to which a measure represents all facets of a given social concept (G. A. Churchill, 1979). Content validity represents the items included in the survey instrument correctly link the concept to be analyzed and evaluated based on logic and concept rather than statistical (Rozilah A. A. et al, 2013). Construct validity refers to whether a scale measures or correlates with a theorized psychological construct.

3.2 Scale Description

The questionnaire was mainly adapted from previous studies, and modified according to the study requirements. To prepare the questionnaire, this study used multifactor instruments
related to different dimensions of employee attitude and perception at workplace. The present study is an attempt to study the link between HRM practices & job performance by examining employees’ job satisfaction, organizational commitment, quitting intention, negative word of mouth, organizational citizenship behavior and to study and compare the impact of human resource management practices on job performance in two best performing public and private sector hospital in Odisha. A 77-item survey instrument was used in order to explore the possible relationships among the study variables, namely human resource practices (HRP), job satisfaction (JS), organizational commitment (OC), organizational citizenship behavior (OCB), intention to quit (IQ), negative word of mouth (NWM), and job performance (JP). A thirteen item-measure developed by Tsaur and Lin's (2002) for HRP, 6 item-measure developed by Babin and Boles's (1998) for JS, 3 item-measure developed by Babin and Boles's (1998) for IQ, 3 item-measure developed by Babin and Boles's (1998) for NWM, 10 item-measure developed by Mowday et al. (1982) for OC, and 29 items representing 7 dimensions for OCB were considered to be taken initially. The various sub-constructs of OCB were; (1) helping behavior: a 2 item scale developed by Podsakoff and Mackenzie (1994), (2) organizational compliance: a 7 item scale developed by Williams and Anderson (1991), (3) sportsmanship: a 4 item scale developed by Podsakoff and Mackenzie (1994), (4) civic virtue: a 3 item scale developed by Podsakoff and Mackenzie (1994), (5) organizational loyalty: a 5 item scale developed by Moorman and Blakely (1995), (6) individual initiative: a 5 item scale developed by Moorman and Blakely (1995), and (7) self development: a 3 item scale developed by George and Jones (1997). Again, a scale of 14 item-measure developed by Fiedler (1993) for JP was also considered. All the measurements were taken on a five point Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree). The final survey instrument used for the study comprises of several numbers of sections. The first section “A” covers all type of items related to demographic profile of hospital employees. The second section “B” highlights the items related to employee attitude and perception. The detail questionnaire is annexed. All these 77 items were however checked for validity and reliability in pilot study and after modification, the final best fitted scales were used for final analysis and conclusion.

3.3 Scale Validity and Reliability Test Results

SPSS version 20 statistical software and Amos 17 were used to conduct validity and reliability test of all measurement items coming under different dimensions of study.
Cronbach’s alpha test and Composite or Construct Reliability (C.R) tests were applied to test reliability of different latent variables, for which data of pilot study got used.

To analyze construct validity of the survey instrument, Confirmatory Factor Analysis (CFA) was performed through Amos. SPSS was also used to perform the quantitative portion of this analysis. CFA was used separately for each dimensions of study, except “Intention to Quit” and “Negative Word of Mouth”. These two dimensions were not checked because of less numbers of loaded items. Measuring items having below 50 % factor loadings to the concerned constructs were not considered in the final analysis. For all the latent variables, convergent validity was checked through Average Variance Explained (AVE).

When the measures are less reliable or theory is tentative, it is better to use two stage approach estimation (Hair et al., 2009). With reference to the fact that some of the selected measures have not yet been established in the present study scenario, a two-stage approach using Structural Equation Modelling (SEM) was used. The first stage was to evaluate the measurement model to access the quality of measurement items, and the second stage was to test the structural model and relationship between dimensions.

The CFA results with relation to five major constructs, namely, HRP, JS, OC, OCB and JP were evaluated and interpreted. The model fit indicators used for the goodness of fit are normal chi-square (CMIN/df, or Chi^2 / df), goodness fit index (GFI), comparative fit index (CFI), and the root mean square error of approximation (RAMSEA). Again, AVE and CR were also analyzed simultaneously. HR Practice was the first tested construct (Fig. 3.1 & Table 3.1).
As illustrated in Fig. 3.1 & Table 3.1, the normal Chi-square value is 5.026, which should be less than 3 in general. The RMSEA should also be less than 0.08, which is here 0.081, which may be manageable. In addition, GFI and CFI should be more than 0.9. Here, GFI is more...
than 0.90, but CFI is just less than 90%. The values of factor loading were also acceptable for all the measurement items (above 0.50 as shown in the figure 3.1), so that no items got deleted in the final analysis of HRP.

<table>
<thead>
<tr>
<th>Latent Variable (Construct)</th>
<th>Chi² value</th>
<th>df</th>
<th>Chi² / df</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRP</td>
<td>190.992**</td>
<td>38</td>
<td>5.026</td>
<td>0.928</td>
<td>0.873</td>
<td>0.081</td>
<td>0.51</td>
<td>0.92</td>
</tr>
</tbody>
</table>

** significant at 1% level

Again, considering the good value of average variance extracted (AVE >0.50, table 3.1) and construct reliability (CR > 0.70), these results showed that all the items in this construct could represent the employees’ perceived HR practices (HRP) in health care service sector in a better way which confirmed the construct validity.

In the same way, Fig 3.2 & Table 3.2 represents the CFA model and fit indices of job satisfaction (JS) construct. Although the values of good model fit showed a good model fit, but AVE and CR did not show the required results, indicating less construct validity of employee job satisfaction. Therefore, most of the items were not considered in the final analysis having below 50% factor loadings.

<table>
<thead>
<tr>
<th>Latent Variable (Construct)</th>
<th>Chi² value</th>
<th>df</th>
<th>Chi² / df</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JS</td>
<td>12.553*</td>
<td>5</td>
<td>2.511</td>
<td>0.991</td>
<td>0.989</td>
<td>0.056</td>
<td>0.33</td>
<td>0.56</td>
</tr>
</tbody>
</table>

* significant at 5% level

Out of total six measurement items of JS, three were not considered in final analysis because of less factor loadings. Interestingly, all the well loaded items were negative items.
Table 3.3 showed that all the indices for organizational commitment (OC) construct, like GFI, CFI, and RMSEA had acceptable values. However, AVE was not more than 50% and CR was also not more than 70%.

<table>
<thead>
<tr>
<th>Latent Variable (Construct)</th>
<th>Chi$^2$ value</th>
<th>df</th>
<th>Chi$^2$/df</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC</td>
<td>90.07**</td>
<td>22</td>
<td>4.09</td>
<td>0.965</td>
<td>0.955</td>
<td>0.80</td>
<td>0.22</td>
<td>0.62</td>
</tr>
</tbody>
</table>

** significant at 1% level
Looking at the figure 3.3, it was concluded that, out of total ten items of OC, the first six items (acceptance of organizational values and goals) were not highly loaded with the derived construct. Rest four items (willingness to exert extra efforts) were however loaded with higher values, and therefore remained as it is in the final analysis.

Similarly, figure 3.4 and table 3.4 gave the idea about valid measurement scale construction of the second order construct named as organizational citizenship behavior (OCB). Initially OCB had twenty nine items in total covering seven sub-con structs (helping behavior, individual initiative, organizational compliance, civic virtue, sportsmanship, organizational loyalty and self development).
Fig 3.4: CFA path diagram of Organizational Citizenship Behavior (OCB)

From figure 3.4, it was seen that except two sub-constructs (civic virtue and self development), all other five sub-constructs were poorly loaded in OCB, and hence not considered in the final analysis. Civic virtue was having 7 items and self development was of 3 measurement items.

### Table 3.4: CFA output results (OCB)

<table>
<thead>
<tr>
<th>Latent Variable (Construct)</th>
<th>Chi² value</th>
<th>df</th>
<th>Chi²/df</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCB</td>
<td>37.93**</td>
<td>10</td>
<td>3.79</td>
<td>0.978</td>
<td>0.907</td>
<td>0.076</td>
<td>0.13</td>
<td>0.34</td>
</tr>
</tbody>
</table>

**significant at 1% level

Table 3.4 also showed that all the indices for organizational citizenship behaviour (OCB) construct, like GFI, CFI, and RMSEA had acceptable values. However again, AVE was not more than 50 % and CR was also not more than 70% as that of OC.
Figure 3.5 showed the path diagram of CFA for job performance (JP). It may be observed that, out of total 15 measurement items, only 3 items are loaded with JP appropriately. Hence, only these three items of JP were considered in the final analysis.

### Table 3.5: CFA output results (JP)

<table>
<thead>
<tr>
<th>Latent Variable (Construct)</th>
<th>Chi$^2$ value</th>
<th>df</th>
<th>Chi$^2$/df</th>
<th>GFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP</td>
<td>199.632**</td>
<td>77</td>
<td>2.593</td>
<td>0.947</td>
<td>0.917</td>
<td>0.057</td>
<td>0.16</td>
<td>0.71</td>
</tr>
</tbody>
</table>

** significant at 1% level

Again, from table 3.5, it was also seen that except AVE, all other parameters were in acceptable conditions. But, because of very low AVE, scale got modified for final analysis.
3.4 Measurement Model and Test Results

After the investigation of all measuring items of individual dimensions of study separately, most of the items were found to have less factor loadings in their respective constructs. Few constructs were also having low level of composite reliability and AVE. Hence, all these low loaded items were not considered in the final scale and again validity and reliability analysis was done, which is presented in the table 3.6.

Table 3.6: Scale validity and reliability test results after scale modification

<table>
<thead>
<tr>
<th>Latent Variables (Constructs)</th>
<th>Cronbach’s Alpha</th>
<th>AVE</th>
<th>Construct Reliability (CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRP</td>
<td>0.895</td>
<td>0.51</td>
<td>0.92</td>
</tr>
<tr>
<td>JS</td>
<td>0.801</td>
<td>0.54</td>
<td>0.78</td>
</tr>
<tr>
<td>OC</td>
<td>0.826</td>
<td>0.52</td>
<td>0.81</td>
</tr>
<tr>
<td>OCB</td>
<td>0.803</td>
<td>0.51</td>
<td>0.82</td>
</tr>
<tr>
<td>JP</td>
<td>0.731</td>
<td>0.50</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table 3.6 showed the appropriate values of AVE and CR, which were suitable for final analysis. Table 3.6 also demonstrates the Cronbach’s alphas related to all such constructs consisting of all items in the final model. With the exception of job performance (JP), all other alphas are greater than 0.800, which is generally suggested as the minimum alpha value to be considered reliable for group research. The 0.800 is only a suggested value, and the 0.731 value for this latent variable is close to the value and it is believed that the alpha value for JP is still in higher side to be used in the final analysis.

All these modified scale items were again taken to find out the measurement model containing all the required constructs, which is shown in figure 3.6.
Table 3.7 represents the output results of test of goodness of fit of this measurement model. As mentioned earlier, the value more than 0.9 for GFI, CFI, NFI and IFI would be good for model fit (Chin and Todd, 1995). In addition, both RAMSEA below 0.08 and normal chi-square (Chi^2/df) below 3 show a good model fit (Ghasemi, 2010). However, as p-value of chi
square is required to be larger than 0.05, it depends on the number of variables which are indicated in the model, and in many cases it may not reach the needed level (Hair et al., 2009). Therefore, in the current study all the modified constructs were seen to have good values of model fit indices (table 3.7).

Table 3.7: Measurement model results of goodness of fit

<table>
<thead>
<tr>
<th>Chi² value</th>
<th>df</th>
<th>Chi² / df</th>
<th>GFI</th>
<th>CFI</th>
<th>NFI</th>
<th>Parsimony ratio</th>
<th>IFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1382.69**</td>
<td>419</td>
<td>3.3</td>
<td>0.938</td>
<td>0.946</td>
<td>0.894</td>
<td>0.901</td>
<td>0.947</td>
<td>0.069</td>
</tr>
</tbody>
</table>

** significant at 1% level

Hence, based on the result of confirmatory factor analysis through Amos 17, it was found that all the constructs and sub-constructs related to HRP, JS, OC, OCB, and JP of healthcare service industries were having good construct validity after few modification in final model, so that almost all the concerned modified latent variable items were the perfect measuring variables of this study.

3.5 Summary

This chapter describes the study variables for measuring different concepts and constructs used in the research. The operationalization of the constructs and sub-constructs has been delineated. To test the reliability and validity of all the variables used in the survey instrument, pilot study was conducted and the data collected were used in SPSS-20 and Amos-17 software packages. Confirmatory Factor Analysis (CFA), Average Variance Explained (AVE), Composite Reliability (C.R), Cronbach’s alpha test and model fit indices were found out to test the reliability and validity of all the variables used in the study. Almost 50% of the initially taken items were found to be reliable and valid. The other items, which did not fit properly for the measurement, were discarded in doing final analysis and interpretation.
REFERENCES


