Communication

The Learning Enabling Structure: Validating a Measuring Instrument

Bijaya Mishra & A.Uday Bhaskar

There are diverse opinions regarding the design of a learning organization. As has been pointed out by existing literature, system-level learning occurs when organizational structure, culture, and its people centric elements interact with each other. Interaction of these attributes shapes the nature and extent of organizational learning. The structural dimension defines the 'real energy' of an organization competing on dyna-mic capability in a knowledge economy. A study has been carried out by the first author in 2006 in IT sector pertaining to construction of a learning enabling structure scale. The present study, an exten-sion of the earlier research, aims at a better understanding of the factor structure and content of the construct. It empirically validates the scale using data from non-IT sectors.

Bijaya Mishra is Assistant Professor, Asia Pacific Institute of Management, New Delhi. E-mail: bijayamishrauday@gmail.com. ***A. Uday Bhaskar,*** is Assistant Professor, International Management Institute, Delhi. E-mail: uday@imi.edu.

Organizational Learning: The Concept

The concept of organizational learning got a new avatar with the advent of Peter Senge's work in 1990's. He coined the term 'learning organization'. After his best selling book 'The Fifth Discipline: The Art and Practice of the Learning Organization', was published in 1990, Senge succeeded in propagating the concept of learning organization. From its more theoretical and academic perspective, it was Senge who was the first, who made it easy to understand and comprehend.

The literature predominantly emphasizes the learning organization as a particular organizational form (Goh 2001). There are diverse opinions regarding the design of learning organization like Senge's ('Five Disciplines'), Garvin's (experimenting with new approaches, problem solving, etc.), Pedler's 11 characteristics of a learning company and so on. Gephart et al. (1996) describe learning organizations focus primarily on systems-level organizational learning. This system-level learning occurs when organizational

structure, culture, and its people centric elements interact with each other. Interaction of these attributes shapes the nature and extent of organizational learning. The structural dimension defines the 'real energy' of an organization competing on dynamic capability in a knowledge economy. The structure of an organization represents the building block on which it rests. It contains a myriad of jobs, departments, divisions, employee interactions, and so on. So any change in organizational identity requires simultaneous modifications in its structure. In order to make a 'learning organi-zation', the organi-zational structure and processes underlying it, need to be facilitators of learning. So what are the factors that underlie a learning organization structure in the Indian context? How to measure the structural dimension of a learning organization? Literature contains a number of references to the learning organization and its characteristics. An instrument developed by Mishra et al (2006) was used in the present study to measure the degree to which respondents considered their own organization to conform the factors ascribed to the learning organization structure. This paper reports on the research and analysis being undertaken to better understand the factor structure and content of the construct. The study is an extension of research that has been conducted by Mishra et al (2006) in the Indian IT sector in 2005-06. As has been reported earlier, the learning enabling structure scale (LESS) was validated on a sample of executives from IT organizations. One of the suggestions that emerged for future research was that the scale needs to be further validated by a cross section of emplo-yees from organizations operating in other sectors/industries. This study aims at:

- A better understanding the factor structure and content of the construct.
- Empirically validating the instrument using data from non-IT sectors.

Research Methodology

Initially the scale was tested and validated among 213 respondents in IT organizations. The final version of the instrument consists of 13 items (Appendix 1). On the basis of factor analysis, two factors emerged and were labeled as creative problem solving (CPS) and Boundarylessness. CPS represents generating ideas and collecting information by using multifunctional teams. Team members unleash their potential when they are exposed to different problems and ideas. In an organization, where opportunities are provided to members to voice and share their feelings, ideas, and tacit knowledge, it boosts their self confidence and results in 'creative problem solving'. It is of paramount importance for organizations to unlearn, learn, and re-learn.

Boundarylessness defines a situation where breaking down of barriers within and between firms occurs. It eliminates the chain of command, creates empowered teams, and helps in effective intra-organizational and inter-organizational

communication. This fosters sharing and learning.

The scale has a 6-point Likert type format with values ranging from 1= strongly disagree to 6=strongly agree. A high score on each of the dimension means the higher end of the continuum and indicates the higher degree of learning.

We selected an organization in power sector located in New Delhi. Initially 250 respondents were targeted. Simple random sampling method was chosen for collecting data across all levels in the organization. After three to four personal visits, a total number of 109 useable responses were obtained, representing a return rate of 43.6 percent.

The average age of respondents was 34.73 years (SD of 10.07 years) and average experience was 11.02 years (SD of 9.08 years). Of the total sample of 108, 83 were male and 25 were female respondents. The respondents were asked not to mention their names and were assured confidentiality of the data.

Empirical Assessment

Reliability is the degree to which a scale accurately measures something free of error (Prous et al 2009). The reliability of each construct was determined by computing the alpha coefficient of internal consistency (Cronbach 1951). The most popular test within the internal consistency method is the Cronbach coefficient α (Nunnally 1978; Cronbach 1951). Cronbach's alpha computes internal consistency reliability among a group of items combined to form a single scale. It can also be computed for any subset of items. Peterson (1994) writes that "Conceptually, reliability is defined as the degree to which measures are free from error and therefore yield consistent results". Nunnally and Bernstein (1994) stressed the importance of Cronbach's coefficient alpha, because it provides actual estimates of reliability. Nunnally recommended in 1967 that "the minimally acceptable reliability for preliminary research should be in the range of 0.5 to 0.6, whereas in 1978, he increased the recommended level to 0.7. Armstrong and Foley (2003) suggested that "the closer Cronbach's alpha is to 1.0, then, the more reliable the scale". Das et al (2008) in their work cited 'Nunnally (1978) advocates that the newly developed measures can be accepted with Cronbach's α of more than 0.60, otherwise 0.70 should be the threshold. The measure with Cronbach's α 0.80 or more is significant and reliable'. Table 1 summarizes the Cronbach's alpha for individual and overall constructs. The Cronbach's alpha for the two constructs are .91 and .84 indicating a high reliability of the instrument. The overall Cronbach alpha of .92 confirms that this instrument is highly reliable.

Table 1: Cronbach s alpha for Individual and Overall Constructs

Constructs	No. of items	Cronbach's alpha
Overall	13	0.92
Dimension 1	8	0.91
Dimension 2	5	0.84

Detailed Analysis

Nunnally's (1978) item analysis method is adopted in this study. This method considers the correlation of each item with each construct. Specifically, the item-score to construct-score correlations are used to determine whether an item belongs to the construct as assigned, or belongs to some other construct, or if it should be deleted. If an item does not correlate highly with any of the constructs it should be deleted. Saraph et al. (1989) and Zhang et al. (2000) also used this method to evaluate the assignment of items to constructs for developing the instruments. Table 2 shows that all the values are greater than or equal to .70. In this study, all the items are assigned appropriately.

Validity

The validity of an instrument refers the extent to which it measures what is intended to be measured. "The extent to which a construct or a set of measures correctly represents the concept of study, and the degree to which it is free from any systematic or non-random error defines the validity of the construct. Validity is concerned with how well the concept is defined by the measure(s), whereas reliability relates to the consistency of the measure(s)" (Das et al 2008). In this study, the validity of the instrument is tested by content and construct validity.

Table 2: Correlation Matrix for the Construct of LESS (Pearson Correlation)

Dimension	1	2	3	4	5	6	7	8	9	10	11	12	13
No.1	0.741					0.785	0.840		0.815	0.851	0.704	0.783	0.741
No.2		0.815	0.712	0.714	0.852			0.810					

Note: Item numbers in the table are same as the item numbers in the instrument. Correlation is significant at the 0.01 level.

The content validity of an instrument is the extent to which it provides adequate coverage of the investigative questions guiding the study (Cooper & Schindler 2006). So, if there is a general agreement among the subjects and researchers that the instrument has measurement items that cover all aspects of the variable being measured then that measure has content validity (Das et al 2008); therefore an instrument is considered to have content validity if it contemplates all of the related aspects of the concept under study (Prous et al 2009).

The constructs for the two dimensions of LESS were developed based on both an extensive review of the literature and detailed evaluations by academicians and practicing managers. In the first instance, the scale was given to a panel of 12 judges for determining the 'face validity'. The team of judges consisted of professionals and experts in related fields. They were requested to access each item and categorize it under one of the two dimensions operationally defined earlier. The percentage of judges' agreement with respect to the

categorization of each statement in one of the dimensions of learning enabling structure scale was determined. The items sharing 75% or more of judges' agreement were selected. In this way, the .instrument is refined and in the final stage, the pretest subjects indicated that the content of each dimension was well represented by the respective items employed.

Construct validity is the capacity of an instrument to adequately measure a theoretical construct (Prous et al 2009). A commonly used method to compute construct validity of an instrument is 'Exploratory Factor Analysis' (EFA). EFA can be used to uncover the underlying structure of a relatively large set of variables, establish links when the observed and latent variables are unknown or uncertain. EFA determines how and to what extent the observed variables are linked to their underlying constructs (Byrne 1998). EFA is the most common form of factor analysis. It is used when there is no prior theory and factor loadings are used to intuit the factor structure of the data. EFA helps to identify whether selected items cluster on one or more than one constructs and thus unidimensionality of constructs is assessed' (Das et al 2008).

In this study EFA is used for construct validation. For better interpretation, and to obtain clear loading, the items were rotated using Varimax rotation. According to Hair et al. (2005) factor loadings greater than 0.30 are considered to meet the minimal level; loadings of 0.40 are considered more important; if the loadings are 0.50 or greater, then they are considered highly significant (Das et al 2008). So in this study, the threshold point that is used for factor retention is 0.5. Those items, which had a loading of 0.5 or more on more than one factor, were included in the factor on which they had the highest loading. This yielded two factors. Factors having eigen values greater than one are considered significant and all other factors with eigen values less than one are considered insignificant and are disregarded. Though the number of factors remains same as that of the original one, the item patterns changed. Item numbered 1and 8 interchanged after validation. To explore more, first, a factor analysis of the scale was performed with all the original items and by excluding item 1, and then the same was repeated by excluding item 8**.** But the item categorization remains unchanged. Table 3 shows the results of factor analysis.

Table 3: Results of EFA for the Two LESS Constructs

Rotated Component Matrix		
STR1	.583	.472
STR2	.523	.623
STR3	.178	.707
STR4	1.148E-02	.808
STR5	.444	.718
STR6	.712	.324
STR7	.778	.313
STR8	.568	.581
STR9	.732	.384
STR10	.842	.193
STR11	.622	.289
STR12	.754	.227
STR13	.811	-1.661E-02

As reported earlier, the instrument was originally validated in the IT sector and the 13 item scale consisted of two dimensions namely 'creative problem solving' and 'boundarylessness'. In the current study which is undertaken in the power sector, the construct validity results show the following: two items viz., no.1 and no.8 are interchanged. So the new factor groupings are, (no.1, 6, 7, 9, 10, 11, 12, and 13) and (no.2, 3, 4, 5, and 8). For the present study, the eight items are labeled as Dimension 1 and the rest five are labeled as Dimension 2**.**

Discussion & Conclusion

If we compare the findings of the study with the previous ones by the same author, the following trend is note-worthy:

- The number of dimensions or factors remains the same i.e. two.
- The item groupings changed in the sense that item 1 and 8 are re-grouped.

This may be due to the nature of sampling unit chosen, i.e. power sector, or may be the nature of time in which the study is undertaken. The previous study was conducted four years back. Another point that may be attributed to this difference is the number of sample size. The current one (N=109) is far less in number in comparison to the previous one (N= 213).

The data used in this study were obtained solely from one organization and hence, generalization is to some extent limited. Further, the validity methods used are content and construct validity. Future studies may focus on these points and carry forward this research in a larger sample from more number of companies and further validity testing methods.

This empirically reliable and valid LESS instrument, consisting of two factors (13 items) can be used in other studies. Managers can use this instrument to evaluate the learning organization implementation programs in their organizations and identify problem areas requiring further improvement. Researchers will be able to use this measure for gaining better understanding to develop applicable structural factors relevant to learning organization.

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Appendix 1

Learning Enabling Structure Scale (LESS)

The statements below describe the characteristics of an organization structure. Please read the sentences and indicate the degree to which these prevail in your organization by putting a tick mark in the appropriate box where 1= Strongly disagree (SD) and 6= Strongly agree (SA).

Statements	1 SD	2	3	4	5	6 SA
1. Enough autonomy is given to business units to function independently						
2. Communication flows freely across the organization						
3. Work is allocated to multi-functional teams.						
4. Various functions in the organization are integrated by use of information technology						
5. Here due emphasis is given on information s haring as a key to gaining knowledge						
6. A cross-functional perspective is taken to solve problems in the organization.						

6. A cross-functional perspective is taken to solve problems in the organization.
7. Employees are encouraged to participate in problem-solving.
8. Organizational culture encourages learning from best practices from within the organization.
9. Organizational culture encourages learning best practices from other organizations
10. Teams of employees from various departments assemble together to bring out new ideas
11. Good ideas are examined and adopted no matter where they come from
12. Ideas once approved get implemented without any hassles
13. Organizational system is transparent for building trust and confidence