

Psychometric Evaluation of BRT-13B : A Shorter Version of the Benchmark Resilience Tool

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Abstract

The Indian IT Industry is operating in an era of risk and instability. Success and survival in this uncertain environment demands the organizations to be resilient, which is not about responding to one time crisis. It is about continuously anticipating and adjusting to change. Research reveals that an organization having resilient people, systems, and processes can adjust to meeting the varying needs of its market with more confidence, making it essential to have an organization centric measure of resilience. Despite the growing importance of the concept, there are only few reliable and valid instruments available in the literature, and most importantly, none of the available instruments have been used to measure the resilience capacity of IT organizations. Keeping this gap in mind, this study evaluated the factor structure and psychometric properties of the recently developed, a shorter version of Benchmark Resilience Tool (BRT-13B) by considering a sample of Indian IT executives. An empirical research was conducted by considering 160 employees of 12 information technology firms located in few select states of Northern India and registered with NASSCOM. The data were collected using 13 items, BRT-13B scale. Confirmatory factor analysis verified the original two-factor structure. In this study, 75.537 % of the variance was jointly explained by the two factors (Planning and Adaptive Capacity). The results supported the dimensionality, reliability ($\alpha = 0.888$), and validity of the BRT-13 B instrument for measuring the IT executives' resilience.

Keywords : organizational resilience, benchmark resilience tool, short version, IT executives, psychometric evaluation

JEL Classification : L63, L86, M12, M19

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Service or the tertiary sector is one of the fastest growing segments of the Indian economy that has played an important role in positioning India on the world globe. The sector contributes about 60% to the national GDP, and successfully attracted FDI inflows of US\$ 40,684.98 million, that accounted for 18% of the total foreign influx during the period from April 2000 - September 2014, as per the statistics released by the Department of Industrial Policy and Promotion (DIPP, 2014). The big tickets that help in building the Indian service sector as a formidable brand in the global markets are the IT software and services (IT services) and IT enabled services (ITES) companies. The Indian IT industry is considered among the top five IT markets of the world in terms of economic value (NASSCOM, 2014) and contributes a whopping 8% to the national GDP (IBEF, 2013). The sector also provides direct employment to about 3.1 million people and indirect employment to 10 million people (NASSCOM, 2014).

According to a recent report released by NASSCOM, the industry's IT exports are estimated to grow by 13% at \$86 billion, with domestic revenues up by 9.7% at INR 1,910 billion, adding a stupendous figure to the existing industry revenues of \$118 billion in the current fiscal year. On the other hand, it cannot be denied that the IT industry is operating in an era of risk and instability, where it is withstanding an increasing number of economic,

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technological, and organizational change processes, most of which are happening simultaneously, giving little time to react. Success and survival in this era of VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) demand that the individuals, teams, and organizations be resilient, that is not about responding to any one time crisis. It's about continuously anticipating and adjusting to change.

Organizational resilience is a hot buzzword in the business world that focuses on how organizations respond favorably to adverse events (Bennett, Aden, Broome, Mitchell, & Rigdon, 2010). It is defined as an organization's capacity to foresee disruptions, adapt to events, and create lasting value (Bell, 2002; Brand & Jax, 2007). Research reveals that an organization having resilient people, systems, and processes can adjust to meeting the varying needs of its market with more confidence (Hamel & Valinkangas, 2003). The growing importance of resilience thereby makes it essential to have a quantifiable measure that enables empirical investigation in the domain of resilience in the work situation factoring at the organizational level.

Among the various available instruments, the recently developed measure - Benchmark Resilience tool (BRT-53) has gained widespread attention from researchers because of its simplicity and quantification methodology that evaluates behavioral characteristics and perceptions associated with a firm's ability to plan for, react to, and recuperate from adverse situations. Two shorter versions of BRT-53 (BRT-13A and BRT-13B) have been developed with a broader aim to simplify the extensive nature of the questionnaire and furthermore, to increase the participation rate (Whitman, Kachali, Roger, Vargo, & Seville, 2013). A comparative study by Whitman et al. (2013) revealed the second version, that is, BRT-13B to be more a reliable instrument as compared to its counterpart.

Keeping the results of this study in mind, we aim to evaluate the psychometric properties of BRT-13B scale in the Indian scenario with the broader objective of determining whether it can be used as a reliable and valid tool to assess organizations' resilience.

Theoretical Framework

Definitions of resilience may be drained from several fields, including materials science, ecology, developmental psychology, organizational studies, and the wider social sciences (Holling, 1973; Lengnick-Hall & Beck, 2005; Luthans, 2002; Masten & Reed, 2002; Nash, 1998). Resilience, in general, is best perceived as a multidimensional construct that varies across time and circumstances. Professor Fred Luthans and his colleagues introduced the concept of resilience in the domain of positive psychology via the core concept of psychological capital (Luthans, Luthans, & Luthans, 2004). PsyCap is defined as :

an individual's positive psychological state of development that is characterized by the following (a) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (b) making a positive attribution (optimism) about succeeding now and in the future; (c) preserving towards goals and when necessary, redirecting paths to goals (hope) in order to succeed; and (d) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success. (Luthans, Youssef & Avolio, 2007, p. 3)

At the core of the resilience capacity is the bouncing back (and beyond) from setbacks and positively coping and adapting to significant changes. The domain of resilience in the work situation operates at three broader levels: Individual, team, and the organizational level. Resilience is defined at all the three levels in the same way, but with a different focus. At the broader level, that is, the organizational level, the people, system, processes, all need to be resilient so that they may 'weather the unknown storm' that may hit the organization anywhere and anytime.

Seville, Brunsdon, Dantas, Le Masurier, Wilkinson, and Vargo (2008) defined organizational resilience as an organization's ability to survive, and potentially even thrive, in times of crisis. The concept of organizational

resilience is important because of two basic reasons, firstly, because community resilience and organizational resilience are mutually dependent on each other (Dalziell & McManus, 2004); secondly, because being resilient can help organizations in gaining a competitive advantage (Parsons, 2007). Keeping the growing importance of the concept in mind, it becomes imperative to have an operational measure that enables the organization to measure its resilience capacity. Several researchers and scholars have generated theories as well as have developed frameworks to measure resilience at the individual as well as at the community level.

Few such measures include the Dispositional Resilience Scale-15 (DRS-15; Bartone, 1995, 2007), Resilience at Work scale (RAW; Winwood, Colon, & McEwen, 2013), Resilience Scale (RS; Wagnild & Young, 1993); Resilience Scale for Adults (RSA; Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005); The Brief Resilience Scale (BRS; Smith, Dalen, Wiggins, Tooley, Christopher, & Bernard, 2008); The Connor - Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003); Conjoint Community Resiliency Assessment Measure (CCRAM; Leykin, Lahad, Cohen, Goldberg, & Aharonson-Daniel, 2013); and the Family Resilience Assessment Scale (FRAS; Sixbey, 2005) (Refer to Table 1). However, there is paucity of reliable and valid instruments to measure resilience from an organizational perspective. Among the various available instruments to measure the resilience, the Benchmark Resilience tool (BRT-53) has gained widespread attention from researchers because of its quantification methodology that evaluates behavioral characteristics and perceptions associated with the firm's ability to plan for, react to, and recuperate from adverse situations.

The BRT-53 is a 53 item, two factor (Planning and Adaptive Capacity), resilience measure that is based on McManus's (2008) 13 theoretical constructs/indicators (Planning Strategies, Participation in Exercises, External

Table 1. Description of Various Scales Measuring Resilience

Instruments	Author	Constructs and Items	Purpose of measure	Target Population	Reliability Analysis	Validity Analysis
Resilience Scale for Adults (RSA)	Friborg et al. (2003)	5(37) (personal competence, social competence, family coherence, social support, and personal structure)	Designed to measure the protective factors that contribute to adult resilience	Patients from an adult outpatient clinic	Internal consistency Cronbach's Alpha of sub scale ranges from .67 to .90 Test-retest reliability (Four months) range from .69 to .84.	Convergent validity Present and supported by the positive correlations between the RSA and the Sense of Coherence Scale Discriminant validity Present and evidenced by negative correlations between the RSA and the Hopkins Symptom Check List-25.
Resilience Scale (RS)	Wagnild & Young (1993)	2(25) (personal competence and acceptance of life and self)	To identify individual resilience, a positive personality characteristic that enhances individual adaptation	Adults	Internal consistency Cronbach's alpha for the full scale came out to be .91	Convergent validity supported by positive correlations between the RS and life satisfaction and physical health Discriminant validity : evidenced by negative correlations between the RS and measures of depression
Resilience at Work (RAW) Scale	Winwood, Colon & McEwen (2011)	7(20) (Living authentically, finding your calling, maintaining perspective, managing stress,	To understand the elements of <i>workplace-resilience</i> , a skill that could	Multi-study sample (including health, manufacturing industry workers	Internal consistency reliability: Cronbach's alpha for the total scale is .84, for individual subscales	Convergent and discriminant validity: supported by negative correlation with maladaptive outcomes

		interacting cooperatively, staying healthy, building networks	be taught, practiced, and developed	(various), teachers, bank offices, corrections officers.	ranges b/w .60 to .89	of work pressure such as Chronic Fatigue, Poor Sleep, Physical and Emotional Health Problems (GHQ 12). Positive high correlation is reported among RAW score and Recovery, Health and Engagement in various samples
The Dispositional Resilience Scale (3) (USA/English)	Bartone (1995; 2007)	3(15) , commitment, control, and challenge	Designed with an aim to measure psychological hardiness	Adults	Internal consistency: Cronbach's alpha reported for the full scale to be 0.82 Test-retest reliability : (3 week) estimated to be 0.78	Author reported the good criterion related validity of the instrument across various samples
The Brief Resilience Scale (USA/English)	Smith et al. (2008)	1(6)	Designed as an outcome measure to assess the ability to bounce back or recover from stress	Adults	Internal consistency : Cronbach's alpha ranging from .80-.91 across all the samples Test-retest reliability: (1 month) estimated to be of .69 and (3 months) estimated to be .62	Convergent Validity supported by zero-order correlations between the BRS and personal characteristics, social relations, coping, and health outcomes for each sample, and positively correlations among the resilience measures, optimism, and purpose in life, and negative correlations with pessimism and alexithymia Discriminant Validity: supported by zero-order and partial correlations between each of the BRS, CD RISC, ego resiliency, and the health outcomes in the undergraduate sample(Sample 1) zero-order and partial correlations between the BRS, optimism, social support, and Type D and the health outcomes in the cardiac sample(Sample 2)
Connor-Davidson Resilience Scale (CD-RISC) effects of stress,	Connor and Davidson (2003)	5(25) personal competence, trust/ tolerance/ strengthening acceptance of change and secure relationships, control, spiritual influence	Designed for clinical practice as a measure of stress coping ability.	Adults	Internal consistency: Cronbach's Alpha reported for full scale to be 0.89 Test -retest reliability assessed from subjects in groups four and five with intraclass correlation coefficient of .87	Convergent and discriminant validity assessed by correlating the scores of CD-RISC scale with other more established instruments. (e.g. Sheehan Social Support Scale(SSS), Kobasa hardiness

						measure Perceived Stress Scale(PSS-10)) Convergent validity-Present : Discriminant validity-not present
Conjoint Community Resiliency Assessment Measure (CCRAM)	Leykin et al. (2013)	5(21) Leadership, Collective efficacy, Preparedness, Place attachment, Social trust	Designed to measure community resilience	Adults aged 18-86	Internal consistency: Cronbach's alpha reported for the full scale to be 0.92. Cronbach's alpha ranging from 0.75-0.85 across all dimensions & subdimensions.	Divergent & concurrent validity of the scale was measured using the correlations of indicator, factor and overall scale scores generated from different measures. CFA was used as the statistical technique for accessing the same.
Family Resilience Assessment Scale (FRAS)	Sixbey(2005)	6(66) Family Communication and Problem Solving (FCPS), Utilizing Social and Economic Resources (USER) Maintaining a Positive Outlook (MPO), Family Connectedness (FC), Family Spirituality (FS), Ability to Make Meaning of Adversity (AMMA)	Aimed to measure the family resilience	Adults	Internal consistency: Cronbach's alpha reported for the full scale to be 0.96 Cronbach's alpha ranging from 0.70-0.96 across all dimensions and subdimensions.	Concurrent &Divergent validity was assessed by correlating the scores of FRAS with more established instruments (e.g. Family Assessment Device 1 , Family Assessment Device 2 and Personality Meaning Index)
Benchmark Resilience Tool(BRT-53)	Stephenson, (2010); Stephenson et al., (2010)	2(53) Planning and Adaptive capacity	Designed to measure the organizational level resilience, to monitor organizations's progress over time, and to compare resilience strengths and weaknesses with other organisations.	Multi-study sample including organizations from various sectors and industries	Internal consistency: Cronbach's Alpha reported for full scale to be 0.95 and Cronbach's alpha ranging from 0.677-0.945 across all dimensions and subdimensions.	Face validity : Checked using the reviews from 34 experts from 4 organizations in Auckland. Convergent and Discriminant validity accessed using Exploratory factor analysis
Benchmark Resilience Tool (BRT-13B)	Whitman (2013)	2(13) Planning and Adaptive Capacity with same sub dimensions as in BRT-53	Designed to bring the short version of BRT-53 to measure the organizational-level Resilience	Multi-study sample including organizations from various sectors and industries	Internal consistency: cronbach's alpha ranging from 0.67-0.75 across all the three samples	No specific information found on construct and discriminant validity. Authors mentioned that validity of the scale was measured using the correlations of indicator, factor and overall scale scores generated from different measures

Table 2. Distribution of the Respondents

Category	Number of respondents (N = 152)	%	Category	Number of respondents (N = 152)	%
Age (years)			Education Qualifications		
21-30	72	47.4	Graduate	45	29.6
31-40	57	37.5	Post Graduate	31	20.4
41 & above	23	15.1	Professional Education (B.Tech /M.Tech)	59	38.8
Total	152	100	PHD	12	7.9
Gender	Others	5	3.3		
Male	104	68.4	Total	152	100
Female	48	31.6	Total work Experience		
Total	152	100	0-5 Years	69	45.4
Position levels			5-10 Years	51	33.5
Entry level Executives (Trainee Software Engineer, Trainee Software Developer, Software Architect, Design Engineer, Application Developer, Product Engineer)	109	71.7	10 Years and more	32	21.1
Professional level Executives(Sr. Software Engineer, Sr. Software Developer(PHP), Sr. Software Developer(Dot Net), Software Analyst, Sr. Software Developer(Web design), Senior QA Analyst)	25	16.5	Total	152	100
Senior Management level Executives (Product Head, Sr. Analyst, Tech Lead, Project Manager, Service Head)	12	7.9			
Top Management Level Executives(Directors, CEOs)	6	3.9			
Total	152	100			

Resources, Recovery Priorities, Proactive Posture, Leadership, Staff Involvement, Situation Monitoring and Reporting, Minimization of silos, Internal Resources, Decision Making, Innovation and Creativity, Information and Knowledge). Few glitches appeared in the early administration of the scale because of the presence of a large number of items that demanded a significant commitment from respondents in terms of their time and energy. To overcome these issues and with a broader aim to increase the participation rate, another study was conducted that resulted in two shorter versions of BRT-53 (Whitman et al., 2013) as BRT-13A (for the selection of items, the criteria of best fitted items to the 13 theoretical constructs used in the development of the BRT-53 scale was chosen) and BRT-13B (the selection of items was based on 13 theoretical constructs using statistical correlations and the highest correlating item to the overall construct became the final criteria for the selection of the items of the scale). Furthermore, the results revealed that BRT-13B is more reliable as compared to BRT-13A (Table 1).

The study by Whitman et al. (2013) was undertaken in three different regions of New Zealand (Auckland, Hurunui, and Canterbury) that are culturally different from India. Furthermore, no study has been undertaken to evaluate the psychometric properties of the scale in the service sector targeted specifically at the IT organizations that work under extreme environmental conditions, and these aspects broadened the necessity of the present study.

Method

This study has considered and has focused upon the IT industry to represent the service sector and to accomplish the various objectives set for the research. Rule of five, that is, the subjects-to-variables ratio no lower than 5 (Bryant & Yarnold (1995) in David Garson, 2008) was selected. To collect the primary data, 12 IT firms located in few select states of Northern India and that are registered with NASSCOM were contacted during the period from March - July 2014. A sample of 160 IT executives, including team leaders and project managers was selected using the random sampling technique. Upon data entry and data cleaning, only 152 correct and usable responses fit for data analysis were gathered, corresponding to a response rate of 95%.

The data in the Table 2 shows a spread across various demographic dimensions for the sample (104 male and 48 females). Maximum percentage of the respondents (47.4%) fell in the age group of 21 and 30 years, with more number of respondents possessing professional qualifications like B.Tech, M.Tech than the regular graduation and post graduation degrees. The Table 2 also reveals that 72% of the respondents were from the entry level as compared to respondents from the professional and senior levels.

Measures

A handout containing a covering page of demographic questions, and short version of Benchmark Resilience Tool (BRT-13B) was prepared. The BRT-13B is a 13-item, two- factor scale that measures the organizational level resilience capacity. The respondents rated the items on a scale of 1 (“*strongly disagree*”) to 4 (“*strongly agree*”). For this research, the Likert rating was modified a bit, and items were rated on a scale of 1 to 5 instead of the original 1 to 4, as at times, the respondents might be “undecided,” so giving that option in the scale was fully reasonable and justified. The range varied from 1 to 65 and high scores lead to high resilience.

Analysis and Results

The data were analyzed using SPSS-21 and AMOS-21. The measurement scale was purified in four different stages as shown in the Figure 1.

The data was initially screened for normality, outliers, and multicollinearity. Univariate outliers were checked via Z-score values in SPSS ($z = \pm 3.29$ ($p < .001$, two-tailed test)) (Tabachnick & Fidell, 2001). The results revealed no abnormal or outside the range of predictable values, indicating the normality of data in this regard. Going further, multivariate outliers were checked using the Mahalanobis distance statistics using AMOS and the largest Mahalanobis d -squared value, or the observation with the furthest distance from the centroid, came out to be 21.657 with a probability value $> .05$ (Afifi & Azen, 1979), suggesting that the data were free from multivariate outliers.

The Table 3 represents the descriptive statistics for the data. In terms of standard deviation, there is a range from 1.13 to 1.24. Skewness(=| 1.15 and kurtosis(=| 0.89|) results confirm that none of the items were $>$ than the suggested cut-off points of | 3.00| and | 8.00| , respectively, pointing that the data were free from univariate non-normality (Kline, 1998). Furthermore, the data were screened for instances of multicollinearity via analysis of tolerance (TOL) and variance inflation factor (VIF). Multicollinearity was not present as all TOL

Figure 1. Purification Stages for the Measurement Scale

Data Screening for Normality, Outliers, and Multicollinearity

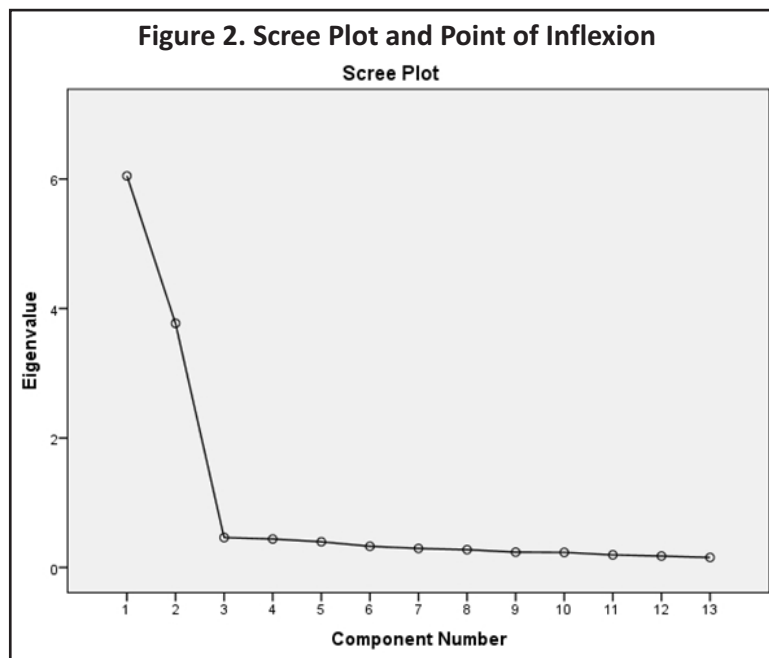
Reliability Analysis for checking the Inter constructs Reliability

Exploratory Factor Analysis for determining number of extracted factors

Confirmatory Factor Analysis for checking the model fit, assessing the dimensionality and validity for the proposed model

Table 3. Descriptive Statistics

No.	Items	Mean	SD	Skewness	Kurtosis
Adaptive Capacity					
1.	There is a sense of teamwork and camaraderie in our organization.	3.86	1.24	-0.96	-0.17
2.	Our organization maintains sufficient resources to absorb some unexpected change.	3.97	1.15	-1.00	0.09
3.	People in our organization "own" a problem until it is resolved.	3.88	1.23	-1.12	0.30
4.	Staff have the information and knowledge they need to respond to unexpected problems.	3.89	1.19	-1.11	0.29
5.	Managers in our organization lead by example.	3.89	1.16	-1.05	0.30
6.	Staff are rewarded for "thinking outside the box".	3.91	1.17	-1.10	0.37
7.	Our organization can make tough decisions quickly.	3.92	1.21	-1.14	0.37
8.	Managers actively listen for problems.	3.92	1.17	-1.15	0.52
Planning					
9.	We are mindful of how a crisis could affect us.	3.41	1.14	-0.57	-0.51
10.	We believe emergency plans must be practiced and tested to be effective.	3.39	1.18	-0.33	-0.89
11.	We are able to shift rapidly from business-as-usual to respond to crises.	3.51	1.21	-0.53	-0.71
12.	We build relationships with organizations we might have to work with in a crisis.	3.65	1.13	-0.76	-0.12
13.	Our priorities for recovery would provide direction for staff in a crisis.	3.63	1.19	-0.69	-0.45



indices were $> .10$ and all VIF measures were > 3 (Hair, Black, Babin, & Anderson, 2010).

Exploratory Factor Analysis

An exploratory principal component factor analysis with varimax rotation was conducted to examine how and to what extent the items and sub constructs are linked to their underlying factors /indicators (Churchill, 1979). The appropriateness of factor analysis was assessed using Kaiser-Meyer-Olkin (KMO) and Bartlett's test of

Table 4. Results of Exploratory Factor Analysis and Reliability Analysis (Cronbach's Alpha)

Factor	Items	Loadings*	Communalities	Cronbach's alpha
Planning (PL)	PL_1	.812	.747	0.924
	PL_2	.888	.820	
	PL_3	.860	.759	
	PL_4	.890	.823	
	PL_5	.813	.710	
Adaptive Capacity (AC)	AC_1	.861	.752	0.951
	AC_2	.836	.714	
	AC_3	.863	.764	
	AC_4	.865	.755	
	AC_5	.870	.775	
	AC_6	.883	.810	
	AC_7	.851	.746	
	AC_8	.797	.644	

*Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations

sphericity. The former one ensured the overall measure of sampling adequacy with a value of 0.920 (>0.50) (Kaiser, 1974), and the latter statistics supported for the validity of the instrument with a value of 1633.194, $df=78$, significant at $p = 0.000$ (Stevens, 2012). Two factors (Planning and Adaptive Capacity) with Eigen values greater than one were extracted (Fabrigar, Wegener, MacCallum, & Strahan, 1999), and after rotation, their values came out to be 5.968 and 3.852. Further, the sum of squared loadings from the two components had the cumulative value of 75.537 % in elucidating the total variance in the data.

A closer look at the scree plot analysis reflects the point of inflexion at factor three and thereby substantiates the two-factor structure of BRT-13B Instrument. The results obtained from eigen value and scree plot analysis using EFA support the retention of the two factor structure of BRT-13B Instrument for the validity analysis (Refer to Figure 2).

The application of EFA on the data resulted in same two factors even after about 4-5 iterations. Moreover, none of the questionnaire items correlated too highly ($r > 0.8$ or $r < -.8$) or too lowly ($-0.3 < r < 0.3$) with other items (Field, 2013). Furthermore, no items warranted removal as none of the items depicted the factor loadings less than 0.4) and communalities for each variable crossed the cutoff point of 0.5 as suggested by Field (2013) (Table 4).

Reliability Analysis

The reliability analysis of BRT-13B with 13 items and two factors was undertaken to verify how strongly the attributes are related to each other (Hair et al., 2010). Cronbach's alpha for the full scale came to be 0.888 that exceeds Nunnally's reliability criterion of 0.70 level (Hair et al., 2010). Dimension wise, the value of Cronbach's alpha came to be 0.924 for Planning and 0.951 for Adaptive Capacity (Table 4).

Confirmatory Factor Analysis

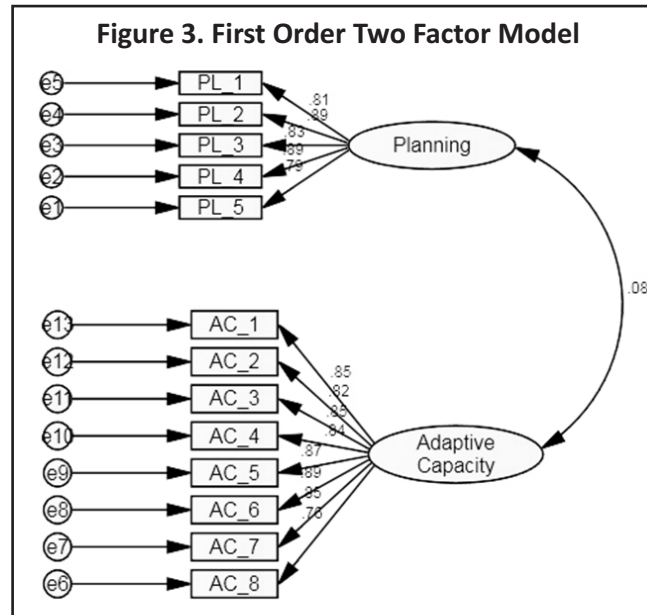
Going further, confirmatory factor analysis using maximum likelihood (ML) estimation was used to examine the hypothesis regarding the number of factors, factor loadings, and factor inter correlations. The model fit was assessed by comparing the independence model with the hypothesized model. The results reveal that the independence model, which tests the proposition that all variables are uncorrelated, was a poor fit for the data and

Table 5. Summary of Goodness-of-Fit Indices for the Organizational Resilience Instrument

	Absolute Fit Indexes				Incremental fit Indexes		Parsimony-Adjusted Measures	
	$\chi^2(df)$	P value	χ^2/df	SRMR	CFI	TLI	RMSEA	PCLOSE
Optimal Value	—	> 0.05 ^a	<3.0 ^b	<.08 ^a	>.90 ^c	>.95 ^d	<.06 ^d	>.05 ^a
Hypothesized first order two factor model	82.707 (64)	0.058	1.292	0.041	0.988	0.986	0.044	0.624

Note: NFI= Normed fit index; CFI= Comparison fit index; TLI= Tucker-Lewis index; RMSEA= Root mean square error of approximation; SRMR= Standardized root-mean square residual; PCLOSE=P of close fit

Source: a. Hair et al. (2010) b. Kline (1998) c. Bentler (1990) d. Hu and Bentler(1995)



,therefore, it should be rejected, $\chi^2(78, N=152) = 1691.056, p < 0.005$. Literature has revealed that the chi-square statistics is extremely sensitive to sample size (Byrne, 2013), and focusing on it alone might result in interpreting the wrong results. Keeping the limitation in mind, we also checked the other goodness of fit indices to access the model fit for the hypothesized two-factor model. Furthermore, the lack of consensus on the preferred indices of fit in the literature (Bentler, 1990; Hu & Bentler, 1995; Kline 1998) motivated us to rely on multiple goodness of fit indices, residual error terms, and modification indices (Arbuckle & Wothke,1990).

The CFA results depicted in the Table 5 reveal that the $\chi^2 (64, N=152) = 82.707, p > 0.005, SRMR = 0.0413, CFI = 0.988, TLI = 0.986, RMSEA = 0.44$, and $PCLOSE = 0.624$ represent the good model fit. A close assessment of standardized residuals and modification indices (MI) support the model's significant fit as no residual value is greater than 2.58, a value above this is considered as large and an indicator of model misfit (Joreskog & Sorbom, 1988). Additionally, the model reveals no large covariance between any of the error terms, which again supports the model fit results (refer to Table 5 and Figure 3).

Validity Analysis

Construct validity of the scale items was examined through the convergent and discriminant validity at different stages.

↳ **Convergent Validity** : Factor loadings, composite reliability, and average variance extracted (AVE), these three

Table 6. Psychometric Properties of BRT-13B Measure

		Factor Loading (Squared Multiple regression)	CR	AVE	IC	(SIC)
Optimal Value	Item Codes	>0.5 ^a	> 0.7 ^a	> 0.5 ^a	.078	0.061
We are mindful of how a crisis could affect us.	(PL_1)	0.813	0.925	0.712		
We believe emergency plans must be practiced and tested to be effective.	(PL_2)	0.89				
We are able to shift rapidly from business-as-usual to respond to crises.	(PL_3)	0.833				
We build relationships with organizations we might have to work with in a crisis.	(PL_4)	0.887				
Our priorities for recovery would provide direction for staff in a crisis.	(PL_5)	0.793				
There is a sense of teamwork and camaraderie in our organization.	(AC_1)	0.846				
Our organization maintains sufficient resources to absorb some unexpected change.	(AC_2)	0.816				
People in our organization "own" a problem until it is resolved.	(AC_3)	0.85				
Staff have the information and knowledge they need to respond to unexpected problems.	(AC_4)	0.844	0.951	0.708		
Managers in our organization lead by example.	(AC_5)	0.867				
Staff are rewarded for "thinking outside the box".	(AC_6)	0.893				
Our organization can make tough decisions quickly.	(AC_7)	0.846				
There is a sense of teamwork and camaraderie in our organization.	(AC_8)	0.765				

Note: Composite Reliability (CR), Average Variance Extracted (AVE), Innerconstruct Correlations (IC), and Squared Interconstruct Correlations (SIC).

Source: ^a Hair et al. (2010)

statistical proven methods were used to assess the convergent validity. Standardized loadings exceed the acceptable criteria of 0.5 for all the items (Hair et al., 2010; Fornell & Larcker, 1981), with all the items exceeding the value of 0.7 . Further, the value of composite reliability exceeds the acceptable criteria of 0.7 (Fornell & Larcker, 1981 ; Hair et al., 2010) for all the factors, and the average variance extracted (AVEs) for all the latent variables is greater than the threshold value of 0.5 (Fornell & Larcker, 1981). Besides, the results reveal that the CRs for all the factors are greater than the AVE's (Hair et al., 2010). Overall, the model shows no convergent validity issues, depicting that the latent factors are well explained by their observed variables (Table 6).

➤ **Discriminant Validity** : As suggested by Hair et al., (2010), there are no "cross-loadings" in the factor structure obtained from EFA results. Further, it is suggested in the literature that the discriminant validity can be evaluated by comparing the construct average variance extracted (AVE) estimates with the corresponding squared interconstruct correlation estimates (*SIC*). (*AVE* > *SIC*) (Hair et al., 2010). The results depicted in the Table 6 clearly show that all the variance extracted (AVE) estimates are larger than the corresponding squared interconstruct correlation estimates (*SIC*), thereby depicting that the indicators have more in common with the construct they are associated with than they do with other constructs, thereby representing good discriminant validity in the model. From the results, it can be interpreted that the constructs are truly distinct from other constructs, that is, they are multidimensional in nature.

Discussion

The factor structure of the BRT-13B obtained with a sample of IT executives provides a strong evidence of internal structure. Consistent with this study, previous research also found strong psychometric properties for the instrument (Whitman et al., 2013). The scale demonstrates good internal consistency (Cronbach's alpha = 0.89). Both EFA and CFA successfully validate the original two-factor and 13 item structure of the instrument. Confirmatory factor analysis of the two original factors of the BRT-13B has shown that Factor one (Planning) and Factor two (Adaptive Capacity) jointly explain 75.537 % of the variance. Furthermore, the results depict that both the factors are significantly different, possessing very low intra factor correlations, with no cross loadings across all the factors. The BRT-13B scale across the sample of IT executives presents good convergent and discriminant validity, thereby depicting that the latent factors are well explained by its observed variables, and all the constructs of BRT-13B are truly distinct from each other, and thereby fully support the conceptual interpretation of the instrument as a unidimensional model. Therefore, it is a scale that can confidently assess resilience capacity of IT firms.

Conclusion and Strategic Implications

To conclude, this study is the first to examine the psychometric properties of BRT-13B, the short-form version of the Benchmark Resilience Tool (BRT-53) in the Indian IT context. The results of the study reveal that an organization's ability to adapt and develop plans beforehand is at the heart of its ability to display resilient characteristics. The ultimate source of growth and survival in this VUCA (Volatile, Uncertain, Complex, and Ambiguous) environment for an IT organization is its ability to react and adapt to the situations using existing predestined planning and capabilities, and simultaneously working proactively to develop new capabilities to respond dynamically to situations.

The results demonstrate that organizational resilience is a quantifiable construct, assessment of which is necessary for improving the overall organizational performance. The BRT-13B scale may prove most useful to researchers and practitioners. The instrument may be used as a reliable and valid diagnostic tool for identifying the organizational resilience capacity and thereby, acts as a starting point for increasing resilience. The short version of the original BRT-53 tool may help in increasing the response rate and decreasing the omission rates during surveys. The shorter version may be used repeatedly by managers to assess the effectiveness of any resilience building intervention being initiated in the organization. Moreover, identifying IT employees with lower resilience scores may assist organizations in tailoring strategies that might improve individual as well as organizational effectiveness. According to Seville et al., (2008), measuring organizational resilience would help organizations in identifying their capacity to withstand adversities and disasters beforehand and assist in formulating strategies accordingly.

Limitations of the Study and Scope for Future Research

The current study has several limitations that are worth noting. The questionnaire was administered among the employees of one specific industry, that is, the IT industry, and the sample respondents were from a single country (India), which may be treated as a limitation of the study. However, the questionnaire was designed in such a way that its application can be generalized to any domain and to any country.

This study investigates the internal validity of the BRT-13B instrument. Further research could scrutinize the link between BRT-13B and other resilience scales. On the other hand, it cannot be denied that the BRT-13B has not been previously scrutinized in the Indian culture and on a sample of IT organizations; so, the present study adds to the literature of resilience on this measure by examining its psychometric characteristics in another culture and other demographic group.

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