
Organisational communication in higher educational institutions: scale development and validation

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Abstract: Many researchers have generated instruments to assess communication at an organisational level. Although these scales are alluring, but still, there is a scarcity of valid and reliable constructs to measure organisational communication (OC) from all perspectives. Therefore, this study is trying to deduce the factors of OC scale and develop a construct to assess communication in higher educational institutions (HEI). Item generation and scale refinement for OC construct involve survey of faculty members working with various HEIs in Delhi – National Capital Region, followed by construct, divergent, convergent, nomological and cross-validation using 576 faculty members, resulting in an organisational communication scale for higher educational institutions (OCHE). The empirical results indicate that the OCHE scale consists of four dimensions namely communication structure, style, behaviour, and barriers. The proposed OCHE scale can serve as an indicative tool that enables the authorities of HEIs to monitor and manage the internal communication practices within their organisations.

Keywords: organisational communication; communication barriers; higher educational institutions; HEIs; communication structure; communication behaviour; communication styles; India.

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1 Introduction

The progress of a country is highly reliant on high quality of education imparted by the higher educational institutions (HEIs) (Rasheed et al., 2016). It was highlighted by Adu and Denkyirah (2017) that education has a huge impact over the economic growth of a country. Post-independence the progression of Indian higher education system can be seen reaching heights in an incredible manner and turned out to be one of the world's largest higher education systems (The World University Rankings, 2018). This is realised through various roles played by the faculty members in the HEIs such as supervisory, educational and administrative roles (Ezzeldin, 2017). Various researchers and academicians have identified that organisational communication (OC) is one of the central activities in all the organisations whether they belong to educational, non-profit or for-profit (Downs and Adrian, 2004). A considerable amount of studies on educational institutions have determined that for shaping work as well as for the organisation itself, OC plays a vital role (Keyton, 2017). It fortifies the vision of an organisation, nurtures better processes, expedites organisational change, etc. (Wyatt, 2006).

OC is reliant on opportunities available for a relationship and network building and encouragement towards professional exchange via numerous approaches to corporate communication (Murphy, 2015). In the past few years, it has been seen that a lot of attention is focused towards morale and status of the teachers working in HEIs (Marsh, 2010; Goddard and Goddard, 2006). Thus, communication is imperative for HEIs both from success and effectiveness point of view (Hargie et al., 2002).

According to Samson and Daft (2009), OC refers to “the process whereby people share information relating to the organization’s goals, functions or operations.” It has various factors such as horizontal communication where the information is shared at the same level, vertical communication where the message is divided either upwards or downwards between several levels in the organisational hierarchy using the formal or informal channels of communication (Samson and Daft, 2009). It requires a platform to be provided to the employees who work in diverse departments as well as managers at various levels to be able to sustain the organisational operations (Ince and Gül, 2011). As far as HEIs are concerned, it includes all professional schools, universities and colleges where at the end of a professional course a certificate, diploma or degree is awarded to the student. To impart knowledge to the student’s faculty members are hired and to guide them the managers (directors and head of department – HoD) are appointed.

OC facilitates decision-making by management (Borca and Baesu, 2014). The decision-making process requires that the necessary facts are known to solve the problem or make a decision on any matter (Altinöz, 2009). In existing turbulent environment, effective communication is a necessary prerequisite (Arnold and Silva, 2011). Misapprehension is spread within the organisational employees when there is a deficiency of discussion at higher levels (Ince and Gül, 2011). Accordingly, the correct

information required to carry out business procedures is fulfilled through communication resulting in augmented work effectiveness (Altinöz, 2009).

1.1 Problem of the study and objectives

Though OC is considered to be very important for the success of HEIs yet OC conceptualisation specifically in the context of HEIs so far has not received an adequate attention from the researchers and practitioners worldwide (Ezzeldin, 2017). Indeed, Indian higher education system is also no exception in facing challenges due to inadequate communication (Gratz and Salem, 1981). Consequently, if the perceptions of the faculty members on OC are known, it can greatly propel the work on development programs in addition to the improvement in the educational activities (Ezzeldin, 2017). Thus, the present study is trying to develop a scale to assess communication in Indian HEIs to capture the perceptions of faculties towards communication.

2 Review of literature

The efficiency, effectiveness and production ability of the HEIs can be augmented and supported through communication which smoothly controls its functions and performance (Ezzeldin, 2017). OC helps in improving the educational and organisational processes, over and above, hugely influences a number of procedures in HEIs and its life (Morreale and Pearson, 2008). In HEIs, particularly for directors or HoDs, OC plays a vital role in promoting coordination amongst people, teamwork, formalising and controlling structures and processes of the institute (Hoy and Miskel, 1982). In the educational environment, OC is essential to have successful collaborative activities (Morreale et al., 2017). The existence of appropriate organisational communication in higher educational institutions (OCHE) allows recognition of significant concerns and brings all the employees on a common ground to work and develop a sense of unity and identity (Fraser and Villet, 1994). The significant concerns identified in the above process can be cleared through the general information exchange during formal meetings. So, maintenance of effective OCHE depends on the directors/HoDs that are responsible for the educational settings and the faculty members who build an atmosphere that supports the educational process.

Numerous researches have shown unique relationships between OC and some key results. For example, outcomes such as organisation climate satisfaction (Mueller and Lee, 2002), job satisfaction (JS) (Muchinsky, 1977), organisational commitment (Varona, 1996), etc. are found to be positively and significantly correlated to OC. Specifically in non-western organisational context, few factors of OC are not appropriate. In the case of Guatemalan organisations study not all the elements of OC scale were found to be suitable for the organisations (Varona, 1996). In US organisations, the supervisor-subordinate relationships defined in various factors of communication patterns are found to be very different from Malaysian organisations factors (Abu Bakar et al., 2007). It has been seen in various researches that most of the scales developed on OC do not propose the applicability of their dimensions (Gray and Laidlaw, 2004; Koning and de Jong, 2007). Further, it is exemplified that many of the constructs of OC focusing on

factors like organisational climate and structure are not applicable in the Malaysian organisation settings (Nasrudin et al., 2006).

Some researchers have developed theories as well as generated frameworks to assess communication at an organisational level. Many of such scales include the organisational communication questionnaire (OCQ; Roberts and O'Reilly, 1974), organisational communication audit questionnaire (OCA; Wiio, 1976), communication audit survey (CAS; Goldhaber et al., 1977), communication satisfaction questionnaire (CSQ; Downs and Hazen, 1977), interpersonal communication in organisations (Penley and Hawkins, 1985) and Malaysian OC measure (Bakar and Mustaffa, 2013). The details of constructs, as mentioned above, are given in Table 1. But still, there is a scarcity of valid and reliable constructs to measure OC from all perspectives. For example, OCQ is unable to include dimensions related to intra-organisation and inter-department, incapable of considering communication content and purpose, included insufficient items in communication-related factors, etc. (Muchinsky, 1977; Greenbaum et al., 1988). Similarly, CSQ fails to include top management and interdepartmental communication items in their dimensional structure (Greenbaum et al., 1988). Likewise, CAS resulted in a low factorial validity of the various dimensions of the construct which demanded a further reconsideration of the scale (Greenbaum et al., 1988). Correspondingly, OCA is considered to be very lengthy, costly as well as its reliability and validity is not established thoroughly (Greenbaum et al., 1988). Further, interpersonal communication in organisations focused more on attitudinal outcomes but concentrated less on communication behaviour and content of the individuals of the organisation (Penley and Hawkins, 1985).

Finally, it can be said that most of the OC constructs are lacking in various essential dimensions such as message, content and climate factors, flow and structure factors, etc. Moreover, as per the knowledge of the authors, no efforts by the researchers have been made universally in measuring the perception of faculties towards OCHE. Therefore, to bridge this gap, this study is aiming towards establishment and validation of the OC construct. The primary goals of this research are to deduce the factors of OC scale and systematically develop a construct to assess communication in HEIs in India.

2.1 The construct conceptualisation

On the basis of past literature, numerous dimensions of OC have been observed, such as information received, information sent, sources of information, quality of information, channels of information, communication relationships, cultural communication, supportive communication, communication climate, information flow, communication flow, respect, message characteristics, leader communication skills and many more (Goldhaber et al., 1977; Dasgupta et al., 2012; Mohr and Spekman, 1994; De Nobile, 2013; Penley and Hawkins, 1985; De Nobile et al., 2013; Abu Bakar and Mustaffa, 2013; Yamaguchi, 2017; PeoplePulse, 2018).

The proposed scale for measuring OCHE is conceptualised to constitute five critical dimensions, namely communication structure, communication style, communication behaviour, communication barriers and media effectiveness (see Table 2). These dimensions are further categorised in 11 sub-dimensions as illustrated in Table 2. The proposed dimensions are conceptualised by the dimensions included in existing OC scales. Only those dimensions are included which suitably describe OC in the context of the HEIs.

Table 1 Details of various instruments measuring OC

Scales	Author	Dimensions and items	Purpose of measure	Target population and sample size	Reliability analysis	Validity analysis
OCQ	Roberts and O'Reilly (1974)	16(35) (Desire for interaction, directionality upward, directionality downward, directionality lateral, accuracy, summarisation frequency, gatekeeping, overload, satisfaction and four modalities – written, face-to-face, telephone, and other channels of communication, trust in superior, the influence of superior and mobility aspirations)	Designed to make comparisons regarding communication in various organisations	Mixed sample – 1,218 (including industry, health, financial institution employees, military men)	<p><i>Test-retest reliability:</i> (three weeks) range from 0.69–0.87</p> <p><i>Internal consistency:</i> Cronbach's alpha of dimensions ranges from 0.62–0.84</p>	<p><i>Face validity:</i> Non-differentiable and confusing questions were eliminated</p> <p><i>Construct validity:</i> Dimensions inter-item correlations > correlations in items forming different dimensions</p> <p><i>Convergent-discriminant validity:</i> Supported by discriminations and convergencies as resulted by inter-correlations</p>
OCA	Wito (1976)	12(76) (Overall communication satisfaction, amount of information received from different sources-now and ideal, amount of information received about specific job items-now and ideal, areas of improvement, job satisfaction, availability of computer information system, allocation of time in a working day, respondent's general communication behaviour, organisation-specific questions and information-seeking patterns)	To determine how well the organisational goals are translated into desired-end-results through the communication system	Organisational employees – 6,000	<p>Internal consistency: Cronbach's alpha of items was 0.97</p>	<p><i>Face validity:</i> Review of literature confirms this of high level.</p> <p><i>Factor analysis:</i> Four factors elucidated 27.8% of the variance</p> <p><i>Regression analysis:</i> 37.6% of the variation in the dependent measure was found which demonstrates that OCA achieve its purpose of measuring the climate variables</p> <p><i>Contingency analysis:</i> It distinguishes amongst the levels within the organisation showing that communication has a different function in dissimilar organisational eventualities</p>

Table 1 Details of various instruments measuring OC (continued)

Scales	Author	Dimensions and items	Purpose of measure	Target population and sample size	Reliability analysis	Validity analysis
CAS	Goldhaber et al. (1977)	9(122) (Receiving information from others, sending information to others, follow-up on information sent, sources of information, timeliness of information received from key sources, organisational communication relationships, organisational outcomes, channels of communication and demographics)	Designed to assess communication systems of the organisation at a given point in time	Organisational employees – 2,301	<i>Internal consistency:</i> Cronbach's alpha of dimensions ranges from 0.69–0.90	<i>Face validity:</i> To bring more clarity and relevance problematic items were eliminated <i>Predictive validity:</i> Pragmatic purposes were met, organisational outcomes were linked and could foresee future conduct concerning communication strengths and weaknesses <i>Factorial construct validity:</i> Only four factors were similar to original CAS factors out of eight emerged factors <i>Construct validity:</i> Reasonable construct validity in the eight-factor solution with a high average correlation between sub-scales ranging from 0.38–0.54
CSQ	Downs and Hazen (1977)	8(40) (Communication climate, supervisory communication, organisational integration, media quality, co-worker communication, corporate information, personal feedback and subordinate communication)	To identify level of communication satisfaction experienced by respondents	Organisational employees – 225	<i>Internal consistency:</i> Cronbach's alpha of dimensions ranges from 0.74–0.95	<i>Construct validity:</i> Reasonable construct validity in the eight-factor solution with a high average correlation between sub-scales ranging from 0.38–0.54
Interpersonal communication in organisations	Penley and Hawkins (1985)	5(19) (Task communication, performance communication, career communication, personal communication, and communication responsiveness)	To define subordinate and supervisor's interpersonal communication behaviour	Military base – 207	<i>Internal consistency:</i> Cronbach's alpha of dimensions ranges from 0.75–0.86	No validity test applied
Malaysian organisational communication measure	Bakar and Mustaffa (2013)	6(57) (Information flow, communication climate, message characteristics, communication structure, group bond and respect)	Developed to measure various facets of organisational communication in dissimilar cultural backgrounds	Employees of university, regional development authority, economic development corporation, state secretary office – 316	<i>Internal consistency:</i> Cronbach's alpha of dimensions ranges from 0.67–0.83	<i>Content validity:</i> Due to a high level of inconsistency in recognising the specific items for dimensions 57 items were retained out of 386 items <i>Criterion-related validity:</i> All dimensions of organisational communication contributed differently in causing variance in the dependent variable

Table 2 Conceptualisation of the OCHE

<i>Factor</i>	<i>Sub-factors</i>	<i>Description</i>	<i>Items</i>	<i>Reference</i>
Communication structure	Upward communication	The employee sends information related to more details required to carry out their job responsibilities, their progress on the job, etc.	<p>I send information regarding...</p> <ul style="list-style-type: none"> • My job-related problems/working conditions (CommStruc_UC1) • My job progress (CommStruc_UC2) • Clarification on instructions related to my job (CommStruc_UC3) 	Goldhaber et al. (1977)
	Downward communication	The HoD/director sends information related to employee jobs such as pay, benefits, etc. and organisational concerns such as failures, management problems, etc.	<p>I receive information from HoD/director about...</p> <ul style="list-style-type: none"> • Job instructions (CommStruc_DC1) • Organisational policies (CommStruc_DC2) • Organisational developments/changes (CommStruc_DC3)* • My performance (CommStruc_DC4) • Growth and development opportunities (CommStruc_DC5) 	
	Horizontal communication	It refers to sharing of critical knowledge, information and coordination laterally amongst the employees.	<ul style="list-style-type: none"> • My co-workers and I readily share important information that is critical to our success (CommStruc_HC1) • My department readily shares important information with other departments and vice-versa (CommStruc_HC2) • My co-workers and I have informative and worthwhile group meetings (CommStruc_HC3)* 	PeoplePulse (2018)
	Informal communication	Some of the information that does not reach the employees formally comes through the grapevine.	<ul style="list-style-type: none"> • Most of the information I receive on a daily basis is passed down through the informal talks (grapevine/gossips) (CommStruc_IC) 	

Notes: * Items were deleted before conducting EFA.

** Items were deleted during EFA.

Table 2 Conceptualisation of the OCHE (continued)

<i>Factor</i>	<i>Sub-factors</i>	<i>Description</i>	<i>Items</i>	<i>Reference</i>
Communication style	Aggressive style	The HoD/director display their thoughts and sentiments and promote their wants in such a manner that it infringes the employee's rights.	My HoD/director often... <ul style="list-style-type: none"> • Ignores another person's rights (CommStyle_Agg1) • Monopolises conversations (CommStyle_Agg2) 	Dasgupta et al. (2012)
	Passive style	The HoD/director evades displaying their wants, feelings and feels hesitant in defending their own rights.	My HoD/director... <ul style="list-style-type: none"> • Let us other people take unfair advantage of him/her (CommStyle_Pass1) • Does not express his/her views or feelings (CommStyle_Pass2) 	
	Assertive style	The HoD/director acts in his best interest and without contradicting the rights of other employees he takes stand for himself.	My HoD/director... <ul style="list-style-type: none"> • Is able to recognise and express his good points (CommStyle_Ass1)* • Usually stands up for his/her own rights and lets other people do the same (CommStyle_Ass2) 	
Communication behaviour	Communication quality	It refers to the quality content of the information transmission.	I feel that the communication in my organisation is... <ul style="list-style-type: none"> • Timely (CommQual1) • Accurate (CommQual2) • Adequate (CommQual3) • Complete (CommQual4)* • Credible (CommQual5) 	Mohr and Spekman (1994)

Notes: * Items were deleted before conducting EFA.

** Items were deleted during EFA.

Table 2 Conceptualisation of the OCHE (continued)

<i>Factor</i>	<i>Sub-factors</i>	<i>Description</i>	<i>Items</i>	<i>Reference</i>
Communication behaviour	Communication atmosphere	It refers to the environment of communication in the organisation. It includes various aspects such as supportive communication (affirmative and encouraging interactions among people), communication responsiveness (the degree to which HoD/director listens to employees and answer the problems rose by them), cultural communication (allows new employees to socialise and acculturate), openness (feel comfortable to speak, express opinions) and trust.	<ul style="list-style-type: none"> • Extent I trust my HoD. (CommAtm1) • Extent I trust my fellow faculty members (CommAtm2) • Faculty members give emotional and moral support to the HoD (CommAtm3) • The HoD gets behind faculty when they are doing things about which they are not confident (CommAtm4) • Extent, your HoD, does his best to get an answer to your question (CommAtm5) • Faculty members tell new faculty stories about people or past events in the institute (CommAtm6) • The HoD is actively involved in the induction of new faculty (CommAtm7) • Faculty members inform new faculty about the institute's mission (CommAtm8) • A family atmosphere is emphasised in your institute (CommAtm9) • Extent your institute encourages differences of opinion (CommAtm10)** • There is an atmosphere where you feel easy to express your opinions (CommAtm1)** 	Goldhaber et al. (1977), De Nobile (2013), Penley and Hawkins (1985), De Nobile et al. (2013), Yamaguchi (2017)

Notes: *Items were deleted before conducting EFA.

**Items were deleted during EFA.

Table 2 Conceptualisation of the OCHE (continued)

<i>Factor</i>	<i>Sub-factors</i>	<i>Description</i>	<i>Items</i>	<i>Reference</i>
Communication behaviour	Participation in communication	It is the degree to which employees engross mutually in planning and goal setting.	<p>My organisation ...</p> <ul style="list-style-type: none"> • Values my advice and suggestions (CommPart1) • Encourages me to participate in goal setting and decision making (CommPart2) • Encourages to take part in the planning activities in my job (CommPart3) 	Mohr and Spekman, (1994)
Communication barriers	Gatekeeping	It refers to the obstacles that come in the way of effective communication.	<ul style="list-style-type: none"> • In order to share ideas/information with top-management, I have to go through my HoD/director (CommBarr1) • In my organisation, there tend to be one or two people who control important information (CommBarr2) • Employees at a higher level often seem hesitant to communicate news about the organisation to lower level employees (CommBarr3)** • There are too many 'gatekeepers' in my organisation that hinder the flow of important information (CommBarr4) 	PeoplePulse (2018)
Media effectiveness		It is the effectiveness of the medium of communication at the workplace.	<p>The following modes of communicating organisational news are effective.</p> <ul style="list-style-type: none"> • E-mail (Medeff1) • Written (memos/reports) (Medeff2) • Verbal/face-to-face (Medeff3) 	PeoplePulse (2018)

Notes: * Items were deleted before conducting EFA.

** Items were deleted during EFA.

The first dimension named as communication structure consists of upward, downward, horizontal and informal communications as sub-dimensions. Though this dimension has been called by various academicians by different names such as information sent (Goldhaber et al., 1977), information received (Goldhaber et al., 1977), information flow (Abu Bakar and Mustaffa, 2013), communication flow (Peoplepulse, 2018), etc. but here the authors have named it as communication structure as it is considering the flow of communication from all the directions and levels in the organisation. The second dimension is communication style which refers to “the way one verbally, non-verbally and para-verbally interact to signal how literal meaning should be taken, interpreted, filtered or understood” (Norton, 1983). It has been further segregated into three styles which are aggressive, passive and assertive styles. Aggressive supervisor focuses on protecting their position and authority whereas passive supervisor is not able to deliver the complete meaning of their message to their subordinates leading to delays and rework (Newbold, 1997). An assertive manager can help in creating a shared understanding and thus aid in the completion of the goals (Lwehabura and Matovelo, 2000). Indeed, the assertive managers have the capability and the confidence to challenge uncertainty and misapprehension (Newbold, 1997). The third dimension is communication behaviour which is central to organisational success (Mohr and Nevin, 1990). It captures the usefulness of the information exchanged with the help of three sub-dimensions: communication quality, participation, and communication atmosphere. Here message characteristics and quality of communication dimensions of OC have been merged to form communication quality. For sustaining the close relationship between employees of the organisation honest and accurate information are essential to carry quality communication (MacNeil, 1981). The requirement of participation in stipulating roles and duties propels when one employee’s action affects the capability of the other employee to compete efficiently. Communication climate has been renamed into communication atmosphere which is created by merging openness, trust, supportive communication, communication responsiveness, cultural communication as all these sub-factors together represent the milieu of the organisation. The fourth dimension is communication barriers which act as a hindrance in the way of effective communication. It is formed through certain gatekeepers such as control over critical information, the hesitant attitude of employees, etc. Lastly, the fifth dimension is media effectiveness which is created by renaming channels of information, modalities, media sources, rich media, etc. This dimension concentrates on the effectiveness of various mediums of communication.

3 Scale development and validation process

The established recommendations for scale construction (Churchill, 1979; Nunnally and Bernstein, 1994; Hinkin, 1995; De Vellis, 2011) were followed in the present study, to develop a scale for measuring OC in the education sector. After generating the initial pool of items, we carried out the processes of item reduction, scale refinement and validation.

3.1 Study 1: item generation and initial purification

The initial item generation process started with identifying the most important dimensions of OC. After reviewing the most widely used OC scales (see Table 1), we adopted 12 dimensions categorised under five major factors namely communication structure (CommStruc), communication style (CommStyle), communication behaviour (CommBeh), communication barriers (Comm_Barr) and media effectiveness (MedEff) as the primary dimensions for developing OCHE (see Table 2).

By using extant literature, we developed an initial pool of 95 items encompassing the above mentioned dimensions. To purify the initial set, we conducted in-depth interviews with a convenience sample of 11 academicians whose areas of specialisation were organisational behaviour, OC, and human resource development. The sample included five females and six males with average age 38 years and average work experience 12 years. All the 11 participants evaluated each item for content and face validity. The participants were asked to place the items into 12 sub-dimensions which were categorised under five main dimensions based on the definitions presented in Table 2. Each participant rated all the items using a five-point scale ranging from 1 (very bad fit) to 5 (very good fit). Scores for each item were averaged, and the items with an average score less than three were dropped. Additionally, based on the participants' feedback, six items were reworded to enhance the face validity. This process shortened the initial pool to 66 items. To further increase the content and face validity, another convenience sample of 28 academicians selected from a reputed University in Delhi (mean age = 33 years; 48% females) was selected. The participants were given the short descriptions of all the 12 sub-dimensions and were asked to assign each of the 66 items to one of the sub-dimensions. The items that were assigned to their respective a priori sub-dimension by at least 60% of the participants were retained. It resulted in a list of 44 items as described in Table 2.

3.2 Study 2: scale refinement

For further refinement of the scale, a questionnaire-based survey consisting of 44 items was undertaken with the faculty members working with various HEIs in Delhi – National Capital Region (NCR), using convenience sampling. Apart from the 44 items of OC, the questionnaire also included six items of JS (Tsui et al., 1992) to check the convergent validity and 17 items of social desirability (SDS-17; Stober, 2001), to test the influence of social desirability on the OCHE. The items of OC and JS were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) whereas the items of social desirability had a dichotomous response format (0 = true and 1 = false). The questionnaire also included the items related to demographic characteristics of the respondents (namely gender, age, education, designation, and tenure).

From 700 distributed questionnaires, 581 responses were received, indicating a response rate of 83%. After removing unviable responses, we chose 576 usable cases as the final sample. 67% of the respondents were females, and 33% were males; 73% of

respondents were postgraduate, and 27% were PhD holders. As for the designation of the respondents, 13% were lecturers, 17% were senior lecturers, 29% were assistant professors, 23% were associate professors, and 18% were professors. The average age of the respondents was 31 years, and the average tenure of the respondents in their respective organisation was 3.5 years. Using a cross-validation approach (Murphy, 1983, 1984), the sample was randomly divided into two sub-samples: sub-sample 1 (derivation sample) and sub-sample 2 (calibration sample). The derivation sample consisting of 294 responses was used for scale exploring the underlying factor structure by conducting exploratory factor analysis (EFA) and reliability analysis. The calibration sample composed of 282 cases was used for confirming the dimensionality by performing confirmatory factor analysis (CFA).

Before conducting EFA, we first calculated the item correlations with their respective category mean. Two items having low correlations were dropped (De Vellis, 2011). Then, we performed item discrimination analysis (De Vellis and Dancer, 1991) by splitting the cases into high-score and low-score groups according to the total score of 42 items. Independent sample t-test was used to test the significance of the difference in the mean scores of each item between the two groups. Two items with insignificant critical ratios were deleted which indicated that those items were not able to differentiate the responses between the two groups. Finally, to explore the dimensionality of the factor structure, we conducted EFA on the remaining 40 items. Principal component analysis (PCA) was employed to extract the factors with oblique rotation (Promax) method. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.828, indicating the relevance of sample size (Hair et al., 2006). The items that were having cross loadings or factor loadings less than 0.4 were deleted (Hair et al., 2006). It resulted in 37 items. Kaiser's eigenvalue-greater-than-one rule (Kaiser, 1960) and parallel analysis (Horn, 1965) were used to determine the number of factors to be retained. Eight factors were found to have their actual eigenvalues to be higher than their random order eigenvalues. Hence eight factors with 37 items were retained, which captured 68.63% of the total variance. These factors were labelled as: 'communication sent', 'communication received', 'communication style', 'communication quality', 'participation in communication', 'communication atmosphere', 'communication barriers', and 'media effectiveness'. Table 3 indicates the factor loadings of the 37 items on their retained factors. As can be observed from Table 3, the majority of the items loaded properly on their expected factors. However, the items of 'downward communication', 'horizontal communication' and 'informal communication' loaded together. Hence we labelled this factor as 'communication received', and we labelled 'upward communication' as 'communication sent'. Similarly the items of 'passive communication style', 'aggressive communication style' and 'assertive communication style' loaded together. We labelled this factor as 'communication style'. The internal consistency of the factors was assessed using Cronbach's alpha (see Table 4). The overall scale, as well as all the eight factors, demonstrated a high level of internal consistency with Cronbach's alpha greater than 0.70 (Nunnally and Bernstein, 1994).

Table 4 Internal consistency

<i>Factor</i>	<i>No. of Items</i>	<i>Cronbach's alpha</i>
CommSent	3	0.938
CommRcvd	7	0.847
CommStyle	5	0.825
CommQual	4	0.801
PartComm	3	0.881
CommAtm	9	0.902
CommBarr	3	0.811
MedEff	3	0.803
Overall scale	37	0.926

3.3 Study 3: confirmation of factor structure

To confirm the factorial structure of the OCHE, CFA was performed using the calibration sample of 282 cases. CFA was applied using IBM AMOS 21.0. Before conducting CFA, we confirmed the normality of all the items by using skewness-kurtosis approach (Hair et al., 2010; Byrne, 2012). The maximum likelihood criterion was used to estimate the confirmatory measurement model. First, we conducted the first order CFA with all 37 items categorised under eight factors. The fit indices of this initial model [$\chi^2 = 1,345.71$; $df = 599$; $\chi^2/df = 2.247$; confirmatory fit index (CFI) = 0.890; Tucker-Lewis index (TLI) = 0.904; root mean residual (RMR) = 0.065; root mean square error of approximation (RMSEA) = 0.065] did not meet the acceptable thresholds (Hu and Bentler, 1999). Considerations of the model improvement criteria such as standardised regression weights, modification indices, and standardised covariance matrix (Anderson and Gerbing, 1988; Byrne, 2012; Black et al., 2006), suggested reducing the scale to 33 items. The low factor loadings of four items (CommStruc_DC1, CommStruc_HC1, CommAtm7, and CommStyle_Pass1) indicated the elimination of these items. Moreover, the high modification index in the pair of residual covariance of CommAtm1 and CommAtm2 indicated the addition of this covariance. The improved model indicated a good fit with $\chi^2 = 982.122$; $df = 466$; $\chi^2/df = 2.108$; CFI = 0.914; TLI = 0.903; RMR = 0.063; RMSEA = 0.063.

Next, we undertook a series of CFA to compare four first order models: model 1.1 denotes that the 33 items load on eight factors (CommRcvd, CommSent, CommStyle, CommQual, PartComm, CommAtm, CommBeh, and MedEff); model 1.2 refers to the merger of CommSent and CommRcvd as one factor, thereby resulting in seven factors; model 1.3 refers to the consolidation of CommQual, PartComm, and CommAtm in one factor thus resulting in six factors; and model 1.4 refers to the merger of CommSent and CommRcvd as one factor and CommQual, PartComm and CommAtm as one factor, thereby resulting in five factors. The model fit indices (Table 5) indicated that the eight-factor first order model generated a good fit to the data.

To examine whether the eight factors are sub-factors of higher order factors, we performed second-order CFA. The proposed second-order model of OC consisted of five main factors namely CommStruc, CommStyle, CommBeh, CommBarr, and MedEff, wherein CommStruc had two sub-factors namely CommRcvd and CommSent; and

CommBeh had three sub-factors namely CommQual, PartComm, and CommAtm. We compared eight-second order models with options of eight and seven factors: model 2.1 having all eight factors categorised under five main factors; model 2.2 with MedEff deleted; model 2.3 with CommBarr deleted; model 2.4 with CommBeh deleted; model 2.5 with CommStyle deleted; model 2.6 with CommStruc deleted. The results (see Table 6) indicated that the seven-factor second order model without MedEff, generated the best model fit ($\chi^2 = 749.881$; $df = 393$; $\chi^2/df = 1.908$; CFI = 0.932; TLI = 0.925; RMR = 0.066; RMSEA = 0.057). Hence, we decided to retain this model of seven factors with 30 items.

Table 5 Results for first-order CFA

<i>Fit index</i>	<i>Model 1.1</i>	<i>Model 1.2</i>	<i>Model 1.3</i>	<i>Model 1.4</i>
χ^2	982.122	1,621.207	2,151.732	2,790.188
df	466	473	479	5.765
χ^2/df	2.108	3.427	4.492	485
CFI	0.914	0.80	0.721	0.616
TLI	0.903	0.786	0.693	0.581
RMR	0.063	0.092	0.161	0.174
RMSEA	0.063	0.093	0.111	0.130

3.4 Study 4: construct validation

In this study, we intended to check the discriminant validity, convergent validity and nomological validity of the OCHE. To check the nomological validity of the scale, we hypothesised a positive correlation between OC and JS (Giri and Kumar, 2010; Kumar and Giri, 2009; Carriere and Bourque, 2009). We used the six-item scale for measuring JS developed by Tsui et al. (1992). We also intended to check the influence of social desirability on the proposed scale of organisation communication, for which we employed the 17-item scale for measuring social desirability (SDS-17; Stober, 2001).

The recommendations of Anderson and Gerbing (1988) were followed to test the validity and reliability of the dimensions of the OCHE. Firstly, the dimensionality of the scale was assessed by comparing the unidimensional one-factor model with the proposed seven-factor second order structure. The proposed second-order structure of the scale exhibited a significantly better fit ($\chi^2 = 749.881$; $df = 393$; $\chi^2/df = 1.908$; CFI = 0.932; TLI = 0.925; RMR = 0.066; RMSEA = 0.057) than the unidimensional model ($\chi^2 = 4835.301$; $df = 494$; $\chi^2/df = 9.788$; CFI = 0.276; TLI = 0.226; RMR = 0.210; RMSEA = 0.177).

3.4.1 Discriminant and convergent validities

Next, we determined the discriminant and convergent validities of the proposed scale and evaluated the reliabilities of various dimensions. The discriminant validity was assessed by investigating the correlation estimates among the seven factors of the construct. All the correlation estimates were less than the threshold value of 0.85 (Kline, 2005) suggesting discriminant validity (see Table 7). Further, all factors had the squared root of AVE higher than their inter-correlation estimates with other corresponding constructs indicating sufficient discriminant validity (see Table 7).

Table 6 Results for second order CFA

<i>Model</i>	<i>Factors</i>	χ^2 (<i>df</i>)	χ^2 / <i>df</i>	<i>CFI</i>	<i>TLI</i>	<i>RMR</i>	<i>RMSEA</i>	<i>Improvement over the proposed model</i>
2.1	All eight factors categorised into five main factors	1,001.984 (479)	2.092	0.913	0.904	0.070	0.062	...
2.2	Seven factors categorised under four main factors (without CommBarr)	829.196 (393)	2.110	0.920	0.911	0.070	0.063	No
2.3	Seven factors categorised under four main factors (without MedEff)	749.881 (393)	1.908	0.932	0.925	0.066	0.057	Yes
2.4	Five factors categorised into four main factors (without CommBeh)	349.224 (127)	2.750	0.929	0.914	0.079	0.079	No
2.5	Seven factors categorised under four main factors (without CommStyle)	700.666	1.920 (365)	0.936	0.929	0.064	0.065	Yes
2.6	Six factors categorised under four main factors (without CommStruc)	583.176 (265)	2.201	0.926	0.916	0.061	0.065	No

Table 7 Discriminant validity

	<i>CommSent</i>	<i>CommRevd</i>	<i>CommStyle</i>	<i>CommQual</i>	<i>PariComm</i>	<i>CommAtm</i>	<i>CommBarr</i>
<i>CommSent</i>	0.908						
<i>CommRevd</i>	0.390	0.767					
<i>CommStyle</i>	0.248	0.226	0.757				
<i>CommQual</i>	0.262	0.397	0.570	0.763			
<i>PariComm</i>	0.132	0.248	0.240	0.505	0.866		
<i>CommAtm</i>	0.052	0.09	0.064	0.136	0.125	0.775	
<i>CommBarr</i>	0.280	0.266	0.458	0.379	0.173	0.100	0.830

Note: Factor correlation matrix with squared roots of AVE on the diagonal.

To evaluate the convergent validity, we examined the factor loadings of individual items. All the items had significant standardised regression weights with their specified constructs with p values < 0.0001 (Anderson and Gerbing, 1988; Hair et al., 2010). All the factor loadings were more than 0.70 which was above the threshold value of 0.50 (Hair et al., 2010). This ensured the convergent validity.

To ensure the scale reliability, we examined the factor loadings, CR and AVE values of all the factors. As shown in Table 8, all items loaded significantly and highly on their respective factors. Moreover the CR values of all factors exceeded the recommended cut-off value 0.70 (Nunnally and Bernstein, 1994; Hair et al., 2010), and the AVE values of all the factors surpassed the cut-off value of 0.50 (Hair et al., 2010), indicating that the items reliably represented their respective constructs.

Table 8 Factor loadings, AVE, and CR values

<i>Factor</i>	<i>Sub-factor</i>	<i>Item</i>	<i>Standardised factor loading</i>	<i>AVE</i>	<i>CR</i>	<i>Cronbach's alpha</i>			
CommStruc	CommSent	CommStruc_UC1	0.952	0.824	0.933	0.933			
		CommStruc_UC2	0.898						
		CommStruc_UC3	0.873						
	CommRcvd	CommStruc_IC	0.89				0.588	0.876	0.874
		CommStruc_HC2	0.725						
		CommStruc_DC2	0.725						
		CommStruc_DC4	0.744						
CommStyle	...	CommStyle_Ass1	0.761	0.574	0.843	0.843			
		CommStyle_Ass2	0.750						
		CommStyle_Agg2	0.753						
		CommStyle_Pass2	0.767						
CommBeh	CommQual	CommQual1	0.779	0.582	0.847	0.814			
		CommQual3	0.778						
		CommQual5	0.747						
	PartComm	CommPart1	0.848	0.751	0.899	0.894			
		CommPart2	0.981						
		CommPart3	0.757						
	CommAtm	CommAtm	CommAtm1	0.732	0.601	0.923	0.917		
			CommAtm3	0.726					
			CommAtm4	0.832					
			CommAtm5	0.821					
			CommAtm6	0.789					
			CommAtm8	0.775					
CommBarr	...	CommBarr1	0.77	0.689	0.868	0.899			
		CommBarr2	0.812						
		CommBarr4	0.903						

3.4.2 *Nomological validity*

The literature suggests that OC is closely related to JS (Giri and Kumar, 2010; Kumar and Giri, 2009; Carriere and Bourque, 2009). Hence, various dimensions of OCHE were expected to demonstrate significant relationships with JS. To confirm this, we tested these relationships by treating OC as the second-order factor construct. We examined the Pearson's correlation coefficients between the four factors of the OCHE and JS. As expected, JS was found to be significantly positively correlated with CommStruc ($r = 0.533$, $p < 0.01$), CommStyle ($r = 0.463$, $p < 0.01$), and CommBeh ($r = 0.624$, $p < 0.01$); and significantly negatively correlated with CommBarr ($r = -0.271$, $p < 0.01$). We also examined the influence of various dimensions of OCHE on JS. The results indicated that the variance explained by four factors of OCHE in JS was statistically significant ($R^2 = 47.1\%$, $F = 58.761$, $p < 0.01$). Specifically, JS was found to be significantly positively influenced by CommBeh ($\beta = 0.348$, $p < 0.01$), followed by CommStruc ($\beta = 0.249$, $p < 0.01$) and CommStyle ($\beta = 0.171$, $p < 0.01$); whereas CommBarr had a significant negative influence on JS ($\beta = -0.184$, $p < 0.01$).

The above analyses show that the proposed scale demonstrates sufficient reliability, discriminant and convergent validity and nomological validity.

3.4.3 *Social desirability*

In behavioural research social desirability response bias is common where respondents tend to answer in a favourable or socially acceptable manner (Lavrakas, 2008). To check the influence of social desirability on the proposed scale, we used the 17-item social desirability measure SDS-17, developed by Stober (2001). The correlation coefficient between SDS-17 between and the 30-item proposed scale of OC was found to be 0.29 ($p < 0.01$). Though the correlation was significant, its low magnitude suggested that social desirability was not a concern for the proposed measure.

3.5 *Study 5: cross-validation*

As suggested by various researchers (Hair et al., 2006; Thompson, 1999; Vandenberg and Lance, 2000), a newly developed scale should be cross-validated with a different sample to ensure the replicability and generalisability of the measure. Hence an additional study was performed with faculty members working with HEIs, using convenience sampling. A self-administered questionnaire consisting of 30 items categorised under seven retained factors of OC along with six items of JS and other demographic variables (namely gender, age, education, designation, and tenure) was distributed to 400 respondents. We acquired 302 valid responses indicating a response rate of 75.5%. Among the respondents, 69% were females; 62% were postgraduate and 38% were PhD holders; 11% were lecturers, 19% were senior lecturers, 32% were assistant professors, 22% were associate professors, and 16% were professors. The average age and average tenure of the respondents were 33 years 3.9 years, respectively.

CFA was performed with this additional data to test the fit of OCHE. The results indicated good model fit with $\chi^2 = 880.752$; $df = 393$; $\chi^2/df = 2.241$; CFI = 0.913; TLI = 0.904; RMR = 0.067; RMSEA = 0.064.

For cross-validating the sample, we conducted an analysis of measurement equivalence (Byrne, 2012; Vandenberg and Lance, 2000) across the two samples: the

previous calibration sample consisting of 282 cases and the validation sample consisting of 302 cases. We conducted two-group CFA to examine the measurement invariance. The results of the model fit for the two-group freely estimated baseline model (see Table 9) confirmed configural invariance across the two samples ($\chi^2 = 1,709.950$; $df = 786$; $\chi^2/df = 2.175$; CFI = 0.916; TLI = 0.907; RMR = 0.068; RMSEA = 0.044).

Table 9 Results of cross validity

<i>Fit index</i>	<i>Freely estimated model</i>	<i>Constrained model</i>
χ^2	1,709.950	1,711.167
df	786	822
χ^2/df	2.175	2.081
CFI	0.916	0.919
TLI	0.907	0.915
RMR	0.068	0.068
RMSEA	0.044	0.043
$\Delta\chi^2$		1.217**
Δdf		36
ΔCFI		0.003

Note: ** $p < 0.01$.

Next, we examined the metric invariance of the scale, by constraining the factor loadings to be equal across two samples. The results (see Table 9) indicated that the model was invariant across the two samples with $\Delta\chi^2 = 1.217$, $p = 0.000$ and $\Delta CFI = 0.003$ which was less than the 0.01 cut-off point recommended by Cheung and Rensvold (2002). By above analyses, we can warrant the cross-validity of the proposed scale.

4 Discussion

The present study has developed and tested a multi-dimensional scale for measuring OCHE. The proposed scale has demonstrated excellent reliability and validity.

The empirical results indicate that the OCHE scale consists of four main dimensions namely communication structure, communication style, communication behaviour, and communication barriers; wherein communication structure consists of two sub-dimensions viz. communication sent and communication received; and communication behaviour consists of three sub-dimensions namely communication quality, participation in communication, and communication atmosphere. It is worth noting that the OCHE scale showed improved results without including media effectiveness ($\chi^2 = 749.881$; $df = 393$; $\chi^2/df = 1.908$; CFI = 0.932; TLI = 0.925; RMR = 0.066; RMSEA = 0.057) as compared to the one with the inclusion of media effectiveness ($\chi^2 = 1,001.984$; $df = 479$; $\chi^2/df = 2.092$; CFI = 0.913; TLI = 0.904; RMR = 0.070; RMSEA = 0.062). Hence, it can be concluded that media effectiveness has not emerged as a key dimension of OC in the context of the higher education sector. This can be attributed to the fact that the faculty members in HEIs are not much concerned with the modalities of communication, rather they pay more attention to the behavioural and structural aspects of communication.

The results also demonstrate that three of the OCHE dimensions namely communication structure, communication style, and communication behaviour have a significant positive influence on the JS of employees. These findings are in consistence with those of Giri and Kumar (2010), who indicated a positive relationship between OC and JS. The findings suggest that in the HEIs, faculty members expect a reasonably good communication style from their superiors, to remain satisfied with their jobs. They feel more satisfied if they find that their organisation maintains a good communication behaviour where communication occurs transparently and their opinions are also valued. Our findings also imply that too much of gatekeeping in the communication may cause frustration in the employees which may, in turn, lead to dissatisfaction.

4.1 Theoretical implications

The present study makes some important contributions to the OC literature. Firstly, most of the existing studies have focused on the antecedents and consequences of OC (Varona, 1996; Muchinsky, 1977; Mueller and Lee, 2002), using different scales for measuring OC. Hence the present study enriches the literature by focusing on the constituents of OC. Secondly, most of the research in the field of OC has been conducted in the developed countries whereas studies in this area in the context of developing countries are lacking (Varona, 1996; Abu Bakar et al., 2007; Nasrudin et al., 2006; Abu Bakar and Mustaffa, 2013). Moreover, the previous research has not paid much attention towards OC in higher education sector. Therefore the present study is worthwhile as it broadens the literature by adding the perspective of faculty members towards OCHE within the context of a developing country, i.e., India.

Previous research has also revealed that existing scales of OC lack in the measurement of specific concepts concerning the individual members of the organisation (Greenbaum et al., 1988). For example, many of the existing OC scales have measured directionality of communication but have not focused on the content of communication (Marett et al., 1975; Roberts and O'Reilly, 1974). Similarly, communication style and participation in communication are some of the other dimensions which constitute important aspects of OC (Greenbaum et al., 1988). Additionally, not all dimensions of the existing scales are applicable in the organisational context of developing countries (Varona, 1996; Abu Bakar et al., 2007; Nasrudin et al., 2006). Therefore, the proposed OCHE scale addresses this gap and significantly contributes to the literature by encompassing all those dimensions which fit in the context of HEIs.

4.2 Managerial implications

The proposed OCHE scale can serve as an indicative tool that enables the authorities and managers (directors, heads) of HEIs to monitor and manage the internal communication practices within their organisations. This scale helps in providing the most significant factors of OC which impact the overall internal communication of an organisation.

Our findings indicate that OCHE explains 47.1% variation in JS of the employees. This finding provides a direction of increasing employees' JS levels by improving the OC practices. The managers in HEIs should embrace high quality of communication structure, communication style, and communication behaviour in their organisations to succeed in nurturing their employees' JS. They should also maintain openness in

communication so that the employees feel free to put forward their opinions and suggestions.

5 Limitations and further research

Although the OCHE scaled developed in the present study followed a rigorous process, but the study still has few flaws. First, the test-retest reliability of the scale could not be examined due to the non-availability of some respondents at another point in time. Future studies could look into testing the same. Second, we used only JS as the criterion variable for testing the nomological validity of the OCHE scale. Future studies are encouraged to include other outcome variables such as communication satisfaction, organisational climate, and job performance. Third, we could not test any of the antecedent variables of OC in this study. Future research might explore the relationships of variables such as formal channels of communication, and organisation's authority structure with OC. Lastly, future studies might also work on testing the predictive validity and cross-cultural measurement invariance of the OCHE scale.

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