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Likert's 4-Management System Instrument Psychometric Properties - University Management -Malaysia

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ABSTRACT

This current study revitalizes the spirit of research in the field of management, especially an education setting, by using Rasch analysis and Confirmatory Factor Analysis (CFA) to determine the reliability of Likert's management 4-system to measure organizational leadership style. Likert's instrument was tested on academic staff at five public universities in Malaysia to determine their perceptions of the management style used by administrators at their institutions. The instrument was tested from 2014 to 2016, with 1114 faculty members in various disciplines participating. Results indicated that the item and person reliability were (0.99 & 0.87) and the item and person separation indexes were (12.08 & 2.62). All items for management styles yielded infit MNSQ values that ranged from 0.66 to 1.44, and outfit MNSQ values of 0.68 to 1.47 respectively. CFA was run and checked for four indexes for item goodness of fit through AMOS software. The results show good reliabilities, and the items fit the model. Therefore, it can be said that the instrument in Likert's 4-system scale can be used to measure trust and communication and to describe the characteristics of that organization, while also measuring productivity. The research also sheds new light on Likert's management 4-system instrument for use in an educational setting in nations with evolving knowledge-age economies to examine university leadership effectiveness

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and characteristics and to develop methods to align the objectives of leaders and managers with those of academics.

Keywords: Higher education administration, Likert 4-management system, Malaysia public universities, organizational behavior, Rasch analysis

INTRODUCTION

Higher education researchers have attempted to study campus cultures, beginning in the 1960s, by examining the student population. Later, in the early 1970s, work was conducted on colleges as culture and the role of belief and loyalty in their organizations. More recent research has focused on academic populations, leadership, and the system of higher education as a culture. Because college administrators may recognize their organization's culture only when severe conflicts occur, they often find themselves working in a heightened state of crisis management, instead of working in an atmosphere of reasoned reflection and consensual change (Tierney, 1988). Research in higher education, then, has moved toward proactive leadership, defining managerial techniques, based on strategic planning, marketing, and management control.

For two decades, the issue of management styles has topped every organizational agenda. Researchers are examining the extent to which there is a relationship between management style in the educational sector and decision-making in relation to organizational development. To streamline the arguments and itemize the points, these issues are related to organizational leadership behaviors and characteristics. Thus, management styles are seen as the ways in which a leader or manager oversees the organization, the style(s) that he or she applies in the process, and the impacts of management styles on decisions and operations of the educational institution.

Studies on management in an organization have indicated that the styles of managers have a significant effect on the organization's efficiency (Luthans et al., 2008; Vahedi & Asadi, 2013). The dominant style that a manager uses to coordinate organizational affairs will affect how they will complete the tasks of their office. The style will also impact their relationship with and cooperation from colleagues and subordinates. Hence, or it can be said that the manager's behavior style and style of interaction with the workers play a big role in the success of the manager and the organization. Likert's management style theory and studies suggested that, in an organization, there should be mutual cooperation between a manager and subordinates and should not be a one-way relationship (Vahedi & Asadi, 2013).

The management style of educational leaders is an especially important issue in nations like Malaysia. With the country aimed at becoming a regional education hub, mountainous pressure has been put on Malaysia's educational higher institutions to make changes in the way they operate and are managed. They have been pressured

to be dynamic and progressive regarding methods of teaching, teaching technologies, and instructions (Mohamad et al., 2017). Furthermore, the government and business sectors expect universities to produce the highly skilled human capital that will serve as the nucleus of an evolved knowledge-based economy. This was emphasized in the Tenth Malaysia Plan 2011-2015 and further emphasized in the Eleventh Malaysia Plan 2016-2020 (MPRC, 2015).

The higher education institutions (HEI) in Malaysia operate under the jurisdiction of the Ministry of Higher Education (MOHE). It is a centralized system and the education sector always receives the biggest slice of the national development budget, which shows how Malaysia is committed to achieving its educational dream. To centralize university operations, Vice-Chancellors, Rectors, or Presidents are appointed by the MOHE. The appointments are between two and four years, depending on the particular university system of leadership (StudyMalaysia, 2015).

There is no one definition for leadership but leadership style can be defined as a leader behavior that used to influence people within a given context. Leadership styles are varied and change according to situation and institution. The changes in leadership styles affect the role of a manager and management (Hays, 2012). Management operates under the leadership, and the university that uses new and effective leadership styles tends to run smoothly and foster innovative management (Sart, 2014).

Sirat et al. (2012)'s study of university leadership contended that there is a crisis in the appointment of Vice-Chancellors to run higher education institutions (HEI), as there is no system that will ensure the appointment of talented and respected scholars to lead the public universities in Malaysia. They argued that the centralized appointment of Vice-Chancellors was not in line with the provision in the Universities and University Colleges Act 1971, which gives university freedom, autonomy, and independence. As a result of this, universities could be managed arbitrarily or led by a politician that did not have a very strong background in running higher institutions. Thus, different leadership or management styles is inevitable in this kind of situation.

Using an instrument developed from Likert's 4-management system could play an important role in improving the quality of education in Malaysia, and nations like it, and help faculty and staff become more effective in performing their roles. Such a study could serve as a benchmark in matching the perceptions of administrators with those of faculty and staff. In this manner, more effective ways of improving the Malaysian tertiary educational system could be developed. Reintroducing Likert's 4-management system of management style instrument would demonstrate its reliability and validity as a way to gather the information that would readjust leadership roles in Malaysia and beyond.

Numerous studies have confirmed the effect of management or managerial styles on organizational performance and the productivity of employees (Meyer, 2007). This is especially true of the Likert

participative management style, which has been shown to improve the working lives of employees and the effectiveness of the organization. According to Kim (2002), management styles can promote job satisfaction (Olmedo-Cifuentes & Martínez-León, 2014). That can stimulate intrinsic motivation, productivity, and creativity, allow initiatives and reduce conflicts among groups, and reduce staff turnover by Pérez and Velde (2005) cited in Olmedo-Cifuentes and Martínez-León (2014).

In light of its importance, it is worthwhile to study organization leadership as excellent management results in excellent decisions and the formulation of good policies. Consequently, management style in all settings, including that of educational institutions, helps determine workers' job satisfaction. Positive actions or styles of management promote employee accomplishment, which benefits the individual and organization, and are critical in sustaining work values that reduce the likelihood of turnover. Unfortunately, the management style is a variable that is frequently ignored in shaping employee attitudes in higher education but is crucial to understanding why individuals remain at or leave universities (Taplin & Winterton, 2007).

Since the 1960s, Rensis Likert's management systems have been considered the theories of leadership that best explain the dynamism of an organization and its characteristics (BusinessBalls.com, 2019). Likert has contributed to the field of human relations in the organization and in determining organizational characteristics as well as system. His four-management system has remained useful until today, and the instrument is still the best way to measure and identify the organization's management and leadership style.

When it comes to the reliability of Likert's management styles, most studies have used Cronbach's alpha to measure internal consistency or reliability, without considering that external factors, such as the length of the scale, which normally affect this measure. Very little research has used factor analysis, the process by which the values of observed data are expressed as functions of a number of possible causes to determine which of those are the most likely to affect the outcome. Therefore, Rasch analysis, in which the total score summarizes completely a person's standing on a variable, is one of the most powerful statistical methods to help determine content, construct, and criterion validity.

Using Rasch analysis to re-determine the reliability of Likert's management system instrument could decide the contribution of the items, in addition to the total reliability of the scale. Rasch helps in knowing item reliability and person reliability. In determining the reliability and validity of Likert's management 4-management system, this current study also use the Confirmatory Factor Analysis (CFA) under the Structural Equation Model (SEM). CFA assists in gauging the reliability of items by considering model-fit indexes. Through CFA, the research could determine Composite Reliability, Discriminant and

Average Variance Extracted (AVE) to measure convergent validity.

Rasch was used in this study for construct validity and to ensure that the Likert instrument had met the fundamental requirement of accurate measurement in terms of item polarity, fit statistics, and the hierarchy of the item or precision of the measurement by looking into item infit and outfit. Item infit provides service that item response theory (IRT) has provided as infit in Rasch investigates the pattern of how a person responds to items while outfit investigates a person's item difficulty. Item response theory serves a similar purpose by analyzing the responses of latent items or manifestations for further instrument development and accuracy.

According to Wright (2009), "The diagnostic information provided by item infit is similar to that provided by conventional item biserial correlations and item response theory (IRT) item discriminations". Therefore, item fitness can be achieved without considering or looking at the response theory (IRT).

Furthermore, this study combined Rasch and CFA. Rasch Measurement Theory is reported to be valuable at the item-level, possessing a specific objectivity property to obtain consistent estimations independently of the parameters that are related to latent traits from the items as in CFA (Blanchin et al., 2019). Both Rasch and CFA were used in this study, as Rasch is considered to be unidimensional and because this study aims to achieve the psychometric properties of each factor or dimension by seeing items loading well under their respective constructs while ensuring items are naturally unidimensional. By combining Rasch and CFA, this research should identify similarity dimensional models by providing the best fit and showing comparable representations of latent variables correlations or relationships. Therefore, Likert's instrument is treated as unidimensional.

New reliability metrics are needed to test the Likert management system instrument, as Likert himself recognized that it was difficult to obtaining factors corresponding exactly to the proposed dimensions (Likert, 1967). Likert argued that the ideal or actual scores might not yield clearer factors within a single organization. Thus, Rensis Likert presumed, after much testing, that there might be a problem in the items loading under their respective constructs. Moreover, he claimed that the scores or values obtained from the factor loading of each factor might not be sufficiently high or reliable to factorize.

Hence, it is expected that researchers who use this Likert's management styles instrument should find inconsistency and cross-loading of items from one factor mentioned above to another. This is a major drawback for the instrument and the development of theory. In this study, the inconsistency of items and factors to get item fitness and high factor loading had led to the deletion of most items when applying Rasch measurement. Therefore, Principal Component Analysis (PCA) was used in this study prior to applying the Rasch Model to examine whether the items loaded

under their respective factors. In doing this, the research aims to achieve the following objectives:

1. To determine standard internal consistency reliability for the Likert management system theory instrument through CFA.
2. To determine goodness-fit covariance between Likert's factors for inter-correlatedness and construct validity through PCA and CFA.
3. To examine the psychometric properties of Likert's 4-management system instrument, using Rasch analysis, by looking at the item and person's reliability index and separation index.

Likert 4-Management Style System

Rensis Likert was an American social scientist and psychologist. Likert contributed tremendously to the field of psychology by developing scales measuring attitudes. He also introduced a 4-system for styles of management in the field of organizational psychology. System 1 was the Exploitative-authoritative Style, System 2 was the Benevolent-authoritative Style, System 3 was the Consultative Style, and System 4 was the Participative Style. This theory of management styles initially was applied to the business sector, but later was expanded to educational institutions to measure organizational management behavior. Likert's 4-management system theory has helped in measuring basic areas in management, such as trust and communication between administrators and employees (Dininni, 2011). This current study offers a contribution to Likert's work and to the field of management, especially in the educational setting. It revitalizes the spirit of research in this area by reintroducing Likert's 4-system theory for general application, as well as to measure the university leadership style.

System 1: Exploitative-authoritative Style/System

The individual using this kind of management style does not exhibit trust in subordinates. Communication and decisions always come in the form of top-down commands. The manager is not interested in incorporating the opinions of subordinates in decisions. Employees are motivated to work by means of fear, threats, and punishment. This style of management does not consider the human aspects of employees. An entity using this style typically has low productivity (Fisk et al., 2012; Gonos & Gallo, 2013).

System 2: Benevolent-authoritative Style/System

In the benevolent style, the manager allows minimal participation of the employees, but he/she makes the decisions. Top-down is the nature of communication between management and employees (Jalilizadeh et al., 2013). Authoritarianism is still found in this system. Although management exercises strict control, it uses rewards to spur motivation (Gonos & Gallo, 2013). System 2 is believed to have more elements of benevolence than System 1. Although

Likert reported finding increments in production in organizations using System 2, top management does not see the human component as an asset (Fisk et al., 2012).

System 3: Consultative Style/System

Managers who use this style trust subordinates to a certain extent. They accept ideas and opinions but retain total control of general policies and decisions (Gonos & Gallo, 2013). The system provides positive motivations for worker performance, allows free communication, but sometimes introduces punishment (Marshall, 2012). This system allows interaction between staff and management, but decisions are based on what the management is willing to accept from staff participation (Jalilizadeh et al., 2013).

System 4: Participative Style/System

Likert strongly recommended that institutions employ this style (Marshall, 2012). The staff has maximum participation and freedom and is fully trusted by the management. Staff or employees are equal to management in decision implementation (Jalilizadeh et al., 2013). A System 4 environment, according to Likert, is "participative" and gives high autonomy to staff and a high level of participation in decision-making. According to Antošová (2011), cited by Gonos and Gallo (2013), Likert believed that any organization using this system had the potential to be effective, successful, and productive.

METHODS

Likert's Profile of Organizational Characteristics (POC)

The Profile of Organizational Characteristics (POC) was a new version of the management system developed and modified by Likert and Likert (1976) to measure the perception of management styles by nurses in their work units. In this profile, the four management systems have been compared with one another on the basis of certain organizational variables:

- Leadership processes
- Motivational forces
- Communication process
- Interaction-influence process
- Decision-making process
- Goal-setting or ordering
- Control processes

The variables above are the seven process variables, later developed by Likert and his colleagues, that were operationalized to determine where an organization falls within the broader model (Pershing & Austin, 2015). According to Management Study Guide, these seven variables were used to compare one management system with another on the basis of certain organizational variables. Based on these variables, Likert distributed a questionnaire to workers who belonged to different organizations and managerial positions. The results indicated that the units or departments that employed System 1 and 2 management practices were less productive, while the units or departments that employed System 3 and 4 management practices tended to be most productive (Juneja, 2015).

The study measured the perception of nurses of the current and ideal future practices of their management (Nassar et al., 2011). However, the authors conducted item and construct reliability using only Cronbach Alpha Coefficient, without using factor analysis to check whether the items theoretically loaded under their respective constructs. The instrument that was used to measure Likert management systems had three versions. The initial version had 16 items, while the second had 19 items, and a third had 20 items. The latest version, however, has 19 items with 3 more added to the original 16 (Table 1).

Table 1

Items in scale

Factor	Number	Question
Leadership	1	How much confidence and trust does management show in staff?
	2	How free do staff feel to talk to management about their job?
	3	How often are staff's ideas sought and used constructively?
Motivation	4	How often are rewards and involvement used as motivational tools with staff?
	5	Where is responsibility felt for achieving organizational goals?
	6	How much cooperative teamwork exists?
	7	How much does your involvement in decision-making contribute to your motivation?
Communication	8	What is the usual direction of information flow?
	9	How is downward communication from management accepted?
	10	How accurately do you communicate with management?
	11	How well does management know the problems faced by staff?
Decision making	12	At what level are decisions made?
	13	Are staff involved in decisions related to their work?
	14	What does the decision-making process contribute to motivation?
Goal setting	15	How are organizational goals established?
	16	How much covert resistance is there to the goal of implementing evidence-based practices?

Table 1 *(Continued)*

Factor	Number	Question
Control	17	How concentrated are oversight and quality control functions?
	18	Is there an informal group resisting the formal organization?
	19	For what are productivity and performance data used?

Source: Likert (1967)

FINDINGS

The Process of Redeveloping 4-Management System

Participant. Likert's instrument was tested on full-time university academic staff in Malaysia to determine their perceptions of the management style of their institutions. The instrument was tested from 2014 to 2016 at five Malaysian public universities, three of which are research universities. The five held the top places in the nation's ranking system. Participants were 1114 academic staff from various faculties and departments of the five institutions. They were academic staff, but some of them holding or formerly held leadership posts, such as the head of the department, coordinator, deputy dean, acting deputy dean, and head of the division. They were professors, associate professors, senior lecturers or assistant professors, and lecturers, with more than five years of teaching experience.

Instrument. The study used the 19-item version. The items represent Likert's 4-management style system, which are: 1) the exploitative/authoritative management style, 2) the benevolent/authoritative management style, 3) the consultative management style, and 4) the participative management style. In measuring and comparing Likert's 4-style system, involvement in leadership, motivation, communication, decision-making, goal setting, and control were used to examine the degree of management participation. Leadership comprised three items, motivation four items, communication four items, decision making three items, control with three items, and goal setting with two items (See Table 1).

The initial four-point scales for each Likert management construct were maintained and the reliability and validity were examined. Reliability and validity were tested by computing rho of Jöreskog, also known as McDonald's omega. Jöreskog's rho, or McDonald's omega, indicates the relationship between the variance explained by a factor and the total amount of variance to be explained by that factor (Schweizer, 2011; Stone et al., 2015). It can be determined using standardized coefficients obtained from a CFA/EFA bifactor solution.

Table 2 shows that McDonald's omega or Jöreskog's rho demonstrated excellent

Table 2
Jöreskog's (Omega) and Rho vc (AVE)

Factor	Joreskog rho (Omega)	Rho vc (AVE)
Leadership	0.918	0.557
Communication	0.910	0.535
Decision-making	0.920	0.563
Motivation	0.912	0.541
Control	0.901	0.511
Goal	0.910	0.564

results in terms of reliability. In this test, reliability measures above 0.80 are considered very good, and the table shows that the reliability of the factors ranged from 0.901 to 0.920.

Moreover, this study used Average Variance Extracted (AVE) to assess convergent validity to determine the construct validity of latent variables. The rule of thumb is that the amount of variance should be >0.5. Table 2 shows that the amount of variance of each Likert's latent variable was slightly above 0.5, which indicates that the construct was fairly explained and extracted. The researchers ran CFA and checked four indexes for item goodness of fit through AMOS software. The results show good reliabilities, and the items fit the model with RMR = 0.031, AGFI = 0.908, CFA = 0.916 and RMSEA = 0.063. To determine the major reliability of items under each construct, Rasch Models were applied to establish the instrument's Item reliability and Person's reliability using Winsteps version 3.64. Joreskog rho (Omega) is considered as one of the families of internal consistency reliability coefficients. It comes or can be determined through CFA parameter estimates.

The validity of items in the Rasch Model was assessed using two sets of general guidelines (Bond & Fox, 2001). First, validity was examined by evaluating the extent of the measurement of all items in a single construct or variable. This is indicated by item polarity (Table 3) and item fit statistics. Second, validity was examined by item order that looked for consistency between empirical item order and the theoretical for item development. Results are indicated by an Item Reliability Index and Item Separation Index. Thus, results are indicated by two indexes namely: Item Reliability Index and Item Separation Index.

Table 4 shows the calibration of the estimates of the 19 items of management style. Item Polarity is given by identification Point Measure Correlation (PTMEA CORR), which has a range of -1 to +1. The acceptable range for the PTMEA CORR fit statistic is 0.30 and above, and the directionality of items is indicated by positive values. These values indicate a better construct validity (Linacre, 2006; Wright & Stone, 1999). All

Table 3

Item polarity

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	ITEM
10	3121	1114	-.69	.04	1.03	.7	1.02	.6	.44	.56	60.5	53.0	M10
18	3072	1114	-.59	.04	1.35	7.9	1.34	7.6	.49	.56	48.2	52.8	M18
4	2484	1114	.50	.04	1.04	1.0	1.05	1.1	.50	.56	53.0	51.1	M4
16	2718	1114	.07	.04	.93	-1.9	.93	-1.7	.51	.57	56.2	51.2	M16
5	2644	1114	.20	.04	1.44	9.8	1.47	9.9	.51	.57	43.6	51.1	M5
17	2789	1114	-.06	.04	1.18	4.3	1.18	4.2	.52	.57	49.0	51.5	M17
19	3148	1114	-.74	.04	1.06	1.6	1.11	2.6	.53	.56	51.0	53.2	M19
7	2894	1114	-.26	.04	.94	-1.6	.97	-.6	.55	.56	56.2	52.0	M7
3	2629	1114	.23	.04	.85	-4.1	.84	-4.1	.58	.57	57.2	51.1	M3
1	2952	1114	-.37	.04	.66	-9.7	.68	-8.9	.58	.56	63.8	52.3	M1
12	2083	1114	1.28	.05	1.23	5.4	1.17	3.7	.58	.54	43.5	53.0	M12
13	2621	1114	.25	.04	.70	-8.5	.71	-8.1	.60	.57	62.0	51.1	M13
2	2649	1114	.20	.04	.89	-2.9	.90	-2.5	.60	.57	54.6	51.1	M2
11	2356	1114	.74	.04	1.01	.4	1.00	.1	.61	.56	54.2	51.2	M11
14	2768	1114	-.02	.04	.82	-5.0	.81	-5.1	.61	.57	61.5	51.2	M14
15	2451	1114	.56	.04	1.00	.0	.98	-.4	.62	.56	53.2	51.3	M15
9	3268	1114	-.98	.04	.96	-1.1	.94	-1.3	.62	.55	55.4	54.1	M9
6	2973	1114	-.41	.04	.86	-3.8	.85	-3.8	.63	.56	57.1	52.3	M6
8	2703	1114	.10	.04	1.04	1.0	1.04	1.0	.63	.57	53.5	51.2	M8
MEAN	2753.8	1114.0	.00	.04	1.00	-.3	1.00	-.3			54.4	51.9	
S.D.	289.9	.0	.55	.00	.19	4.9	.19	4.6			5.5	.9	

Tablet 4

Item fit statistics

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	ITEM
5	2644	1114	.20	.04	1.44	9.8	1.47	9.9	A .51	.57	43.6	51.1	M5
18	3072	1114	-.59	.04	1.35	7.9	1.34	7.6	B .49	.56	48.2	52.8	M18
12	2083	1114	1.28	.05	1.23	5.4	1.17	3.7	C .58	.54	43.5	53.0	M12
17	2789	1114	-.06	.04	1.18	4.3	1.18	4.2	D .52	.57	49.0	51.5	M17
19	3148	1114	-.74	.04	1.06	1.6	1.11	2.6	E .53	.56	51.0	53.2	M19
4	2484	1114	.50	.04	1.04	1.0	1.05	1.1	F .50	.56	53.0	51.1	M4
8	2703	1114	.10	.04	1.04	1.0	1.04	1.0	G .63	.57	53.5	51.2	M8
10	3121	1114	-.69	.04	1.03	.7	1.02	.6	H .44	.56	60.5	53.0	M10
11	2356	1114	.74	.04	1.01	.4	1.00	.1	I .61	.56	54.2	51.2	M11
15	2451	1114	.56	.04	1.00	.0	.98	-.4	J .62	.56	53.2	51.3	M15
7	2894	1114	-.26	.04	.94	-1.6	.97	-.6	i .55	.56	56.2	52.0	M7
9	3268	1114	-.98	.04	.96	-1.1	.94	-1.3	h .62	.55	55.4	54.1	M9
16	2718	1114	.07	.04	.93	-1.9	.93	-1.7	g .51	.57	56.2	51.2	M16
2	2649	1114	.20	.04	.89	-2.9	.90	-2.5	f .60	.57	54.6	51.1	M2
6	2973	1114	-.41	.04	.86	-3.8	.85	-3.8	e .63	.56	57.1	52.3	M6
3	2629	1114	.23	.04	.85	-4.1	.84	-4.1	d .58	.57	57.2	51.1	M3
14	2768	1114	-.02	.04	.82	-5.0	.81	-5.1	c .61	.57	61.5	51.2	M14
13	2621	1114	.25	.04	.70	-8.5	.71	-8.1	b .60	.57	62.0	51.1	M13
1	2952	1114	-.37	.04	.66	-9.7	.68	-8.9	a .58	.56	63.8	52.3	M1
MEAN	2753.8	1114.0	.00	.04	1.00	-.3	1.00	-.3			54.4	51.9	
S.D.	289.9	.0	.55	.00	.19	4.9	.19	4.6			5.5	.9	

the items for management style had positive PTMEA CORR values (0.44 to 0.63), demonstrating that all items were working in the same direction on the construct being examined. This is in line with the rule of thumb in the Rasch analysis and supported by the results (Table 4). The results of the item fit can determine the set of instruments or items without dividing the findings into sub-topics.

The contribution of the items in the Rasch Model can determine how well an instrument meets the requirement is indicated by infit MNSQ and outfit MNSQ (Bond & Fox, 2001). The rule of thumb for item fit for measurement ranges in values in infit and outfit MNSQ of 0.50 to 1.50. Table 5 shows that the means of both outfit and infit mean-square were 1.00. This is a perfect value of the mean. All items for management styles yielded infit MNSQ values that ranged from 0.66 to 1.44, and outfit MNSQ values of 0.68 to 1.47 respectively. According to Bond and Fox (2001) and Linacre (2006), all items in this measurement looked acceptable according to the Rasch Model recommendations.

The reliability and separation indexes provide information on the extent to which the items in the scale are separated to define a continuum of increasing intensity of measurement. The item reliability index is an estimate of how well an item can discriminate among items of a measured variable and how the items that are administered are comparable with each other in terms of characteristics (Wright & Stone, 1999). Table 5 shows that 1114 respondents were measured on 19 items. The item and person reliability were (0.99 & 0.87) and the item and person separation indexes were (12.08 & 2.62). These two results indicated that the items-created variables were well spread out and acceptable in measurement analysis. The separation index indicated that the measures could be classified into 12 levels in hierarchy items.

Unidimensionality refers to the extent to which a measurement instrument measures at a time a single attribute or dimension of the examinees (Bond & Fox, 2001). The measurement will be meaningful when it has one dimension, but it is never perfect. In the Rasch Model, the assessment for the dimensionality of the measurement instrument is conducted usually through Principal Component Analysis (PCA). The PCA in the Rasch Model is conducted on the residuals and aims to explain variance and examination of Dimensionality Map (Linacre 2006). Unidimensionality of Management Style (Table 6) shows that the variance explained by measures was 38.3%. This indicated a good measurement dimension because the variance explained by the measurement was close to 40%. Moreover, the variance unexplained by the first construct in the residual was less than 10% (about 7.0%). The scores for the variance explained by measures and the unexplained variance in the first contrast was in line with the recommendation by Conrad et al. (2010). The proposed PCA of standard residual guidelines for unidimensionality.

Examination of the Item Map (Figure 1) and Item Measure (Table 7) shows that

Table 5

Reliability and separation indexes

MANAGMENT STYLES (ALL LECTURERS) Rasch.sav

PERSON	1114 INPUT	1114 MEASURED			INFIT		OUTFIT	
	TOTAL	COUNT	MEASURE	REALSE	IMNSQ	ZSTD	OMNSQ	ZSTD
MEAN	47.0	19.0	-.10	.37	1.00	-.1	1.00	-.2
S.D.	9.1	.0	1.06	.10	.49	1.6	.49	1.6
REAL RMSE	.38	TRUE SD	.99	SEPARATION	2.62	PERSON RELIABILITY		.87
ITEM	19 INPUT	19 MEASURED			INFIT		OUTFIT	
	TOTAL	COUNT	MEASURE	REALSE	IMNSQ	ZSTD	OMNSQ	ZSTD
MEAN	2753.8	1114.0	.00	.04	1.00	-.3	1.00	-.3
S.D.	289.9	.0	.55	.00	.19	4.9	.19	4.6
REAL RMSE	.05	TRUE SD	.54	SEPARATION	12.08	ITEM RELIABILITY		.99

Table 6

Unidimensionality of management style

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

	-- Empirical --		Modeled
Total raw variance in observations =	30.8	100.0%	100.0%
Raw variance explained by measures =	11.8	38.4%	38.3%
Raw variance explained by persons =	5.1	16.5%	16.4%
Raw Variance explained by items =	6.8	21.9%	21.8%
Raw unexplained variance (total) =	19.0	61.6% 100.0%	61.7%
Unexplned variance in 1st contrast =	2.2	7.0% 11.4%	
Unexplned variance in 2nd contrast =	1.8	5.7% 9.3%	
Unexplned variance in 3rd contrast =	1.4	4.6% 7.5%	
Unexplned variance in 4th contrast =	1.3	4.3% 6.9%	
Unexplned variance in 5th contrast =	1.2	3.9% 6.3%	

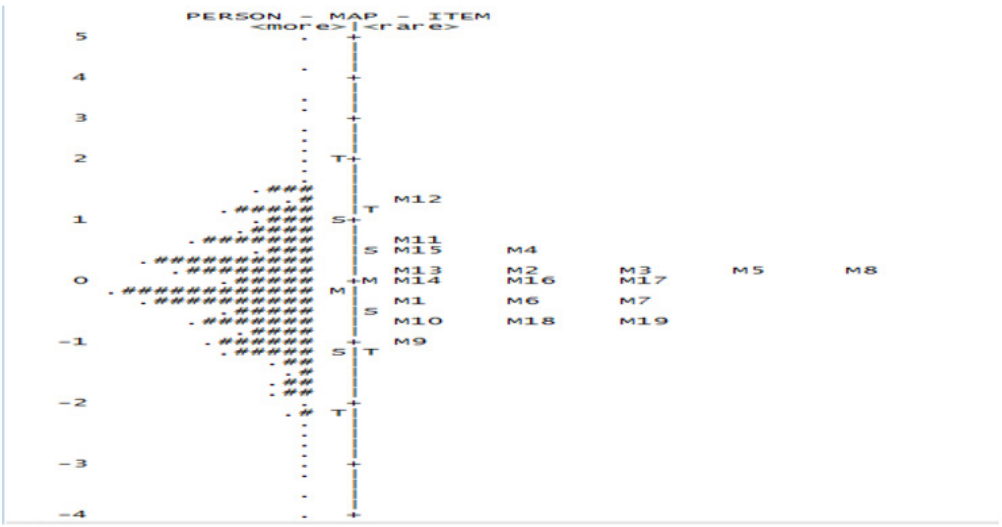

Figure 1. Item map

Table 7

Item measure

Item No	Scale Items	Item	(Code)	Measure
1	How much confidence and trust does management show in staff?	12	(M12)	1.28
2	How free do staff feel to talk to management about their job?	11	(M11)	0.74
3	How often are staff's ideas sought and used constructively?	15	(M15)	0.56
4	How often are rewards and involvement used as motivational tools with staff?	4	(M4)	0.50
5	Where is responsibility felt for achieving organizational goals?	13	(M13)	0.25
6	How much cooperative teamwork exists?	3	(M3)	0.23
7	How much does your involvement in decision-making contribute to your motivation?	5	(M5)	0.20
8	What is the usual direction of information flow?	2	(M2)	0.20
9	How is downward communication from management accepted?	8	(M8)	0.10
10	How accurately do you communicate with management?	16	(M16)	0.07

Table 7 *(Continued)*

Item No	Scale Items	Item	(Code)	Measure
11	How well does management know the problems faced by staff?	14	(M14)	-0.02
12	At what level are decisions made?	17	(M17)	-0.06
13	Are staff involved in decisions related to their work?	7	(M7)	-0.26
14	What does the decision-making process contribute to motivation?	1	(M1)	-0.37
15	How are organizational goals established?	6	(M6)	-0.41
16	How much covert resistance is there to the goal of implementing evidence-based practices?	18	(M18)	-0.59
17	How concentrated are oversight and quality control functions?	10	(M10)	-0.69
18	Is there an informal group resisting the formal organization?	19	(M19)	-0.74
19	For what are productivity and performance data used?	9	(M9)	-0.98

the most difficult item to endorse was Item number M12 (At what level are decisions made?), with the item measure on the logit scale of 1.28. The easiest item in the measurement to endorse was item number M9 (How is downward communication from management accepted?), with a logit scale of -0.98. This is an indication that, when it comes to university management decision-making, the respondents, who were university faculty, were reluctant to answer, finding such decision-making to be "top secret," perhaps even threatened, and were silent when questioned about the level at which decisions are made in their institution.

DISCUSSION AND CONCLUSION

This study shows very good reliability for the instrument of Likert's 4-system management scale, and the findings are summarized below:

The Rasch measurement performed here indicates very good reliability of Likert's Management Styles instrument. It shows great reliability of the Items and Persons. The Person's Separation shows that Person's reliability could yield similar results if given to three different groups. The item also could yield the same result, according to the Separation, if run twelve times.

The reliability and validity obtained through Rasch Model serve as an indication

of Likert's 4-management system fitness not only in the business sector but also in the educational sector.

The application of Rasch analysis in this study contributes to an understanding of the psychometric quality and properties of a scale for measuring Likert's organization management system, specifically management style in a university context. In terms of item reliability and construct validity, the findings of this study indicate that the scale is appropriate for use and could be utilized in measuring organizational management and characteristics in the context of Malaysian educational institutions. This suggests that the Likert 4-management system model could be applied to universities in nations that face the same pressure to produce the human capital needed in a 21st-century knowledge-based economy.

Since the psychometric properties of the Likert 4-management system instrument have yielded or reported acceptable reliability and validity, the instrument can be used and adapted to determine organizational management style in Malaysia and similar countries. Looking at CFA good-ness fit indexes, this research has achieved minimum index required by CFA and as a result, we can conclude that the model fits the data. This also achieved the minimum requirement for Rasch Analysis by looking at the Item Reliability Index and Item Separation Index.

This current study has shed new light on the ability of the instrument in Likert's 4- management system scale to measure trust and communication and to describe the characteristics of that organization, while also measuring productivity. The research also reveals that Likert's management 4-system instrument can be used in an educational setting to examine school or university leadership effectiveness and characteristics and to develop methods to align the objectives of leaders and managers with those of academics. Such alignment seems a necessary function of the growth and development of the Malaysian tertiary education system. Higher education in Malaysia has witnessed dramatic changes since the launching of the National Higher Education Strategic Plan in 2007. This plan proposed to develop human capital and make Malaysia a regional educational hub, calling for establishing research universities by reducing undergraduate intakes and increasing postgraduates. The goal was to revitalize the spirit of research and publication among students and lecturers at stated in the National Higher Education Action Plan, 2007-2010 (Ministry of Higher Education, 2007)

Leadership is among the pillars of this educational development plan. While leadership specifications in the plan addressed hard skills, metrics for judging the performance of the leaders, and the need for continuing education, the plan says very

little about soft skills inherent in leadership and management styles. Such skills are necessary to motivate faculty members to achieve their best and create what some describe as a "community of scholars."

This oversight is unfortunate because maintaining a successful educational institution requires a delicate balance between management and employees, particularly because faculty members typically view tertiary education as less top-down and more participatory in nature. In no small measure, faculty members are critical to the success of institutions of higher education (Cordeiro, 2010). Maintaining good relationships with faculty through good management accrues many benefits. Among those benefits are increased job satisfaction that, in turn, leads to greater institutional stability and higher retention (Froeschle & Sinkford, 2009). Such increased retention has resulted in substantial growth of productivity, in terms of teaching, research, and service, among faculty in Malaysia (Wong & Heng, 2009).

Managing educational institutions in periods of change, such as that of the present day, Malaysia, and other similar nations are subject to difficulties. As Easterby-Smith et al. (2004) noted, common barriers to success faced by educational organizations in turbulent times include inefficient leadership and leadership strategies, ineffective communication, unclear processes and procedures concerning specific and general goals, lack of involvement of all parties concerned or involved in change management, employee resistance, and improper or ineffective resource management. Thus, misaligned management practices damage the ability of the organization to move forward to achieve the desired goal (Allen, 1998).

Guiding an educational organization through the change process is about motivating employees to achieve organizational objectives, and maintaining regular, open communication. Accordingly, a major part of educational leadership is discovering innovative means to explain existing problems and allowing faculty the leeway to deal with situations (Allen, 1998; Bateman & Snell, 2007). A key element for successfully facilitating organizational change is the type of climate or culture being developed (Hall & Hord, 2001). This is because organizational culture comprises values, management style, organizational communication patterns, human resources, and context. The responsibility of management during a change process is to consult with and involve individuals, who are affected by the changes, and to direct and lead the process (Kotter & Cohen, 2005; Uys & Sieverts, 2001).

Unfortunately, studies have found that a schism often exists between university management and faculty (Times Higher Education, 2015). Some of the factors that create this schism are 1) the differing views of academics and administrators about work-life, 2) disregard for the opinions of

academics, 3) distrust by academics of the institution's senior management team, and 4) the perception among faculty members that they are unable to make their voices heard in their institution (Times Higher Education, 2015). These are among the issues that threaten to derail the continued development of higher education in Malaysia and other countries evolving into a knowledge-based economy.

To bridge the gap between administrators and faculty, universities must begin to study the alignment of each constituency's perspectives by utilizing different ways of thinking about management in the context of higher education. These could include leadership styles, like those outlined by Likert. Regardless of perspective, human elements in the educational management process are crucial to securing the successful implementation of any plan. Managing change is a multi-dimensional task that must consider various aspects of technology, culture, and leadership style. Handling such complex and interrelated issues requires suitable models by which the entire process of change management moves step by step towards achieving an objective in a systematic, sustainable manner (Ghavifekr et al., 2013).

It is clear that the objectives of educational reform, delineated by government policy, are laudable. However, the way in which they will be achieved remains critical to social stability (Campbell, 2011). Thus, it is necessary to match the management styles of educational administrators with the perceptions of the educators who must achieve these educational objectives. Likert's 4-style management instrument, which this study has shown to be valid and reliable in the Malaysian educational context, can be used in future benchmark and longitudinal research to enable nations and their universities to transition to 21st-century economies.

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