

ASSESSING PSYCHOMETRIC OF MALAYSIAN VERSION OF SCHOOL LEADERS TRANSFORMATIONAL LEADERSHIP INSTRUMENT (Penilaian Psikometrik Instrumen Kepimpinan Transformasi Pemimpin Sekolah Versi Malaysia)

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ABSTRACT

The purpose of the study is to analyse the psychometric properties of a survey questionnaire, Malaysian Version of School Leaders Transformational Leadership Instrument (MvTL) using Rasch Measurement Model aided by Winstep software Version 3.73. The questionnaire was administered on 109 school teachers from Melaka. The data were analysed to examine the items functional accordingly from the aspect of items fit in measuring constructs, items polarity, unidimensionality, local independence and the reliability and separation of item and respondent. The Rasch analysis showed satisfying psychometric properties of MvTL after removal of some misfitting items. Fit statistic evaluation discovered that a sum of 5 items were out of range and leaving only 20 items remaining that are appropriate to measure the four constructs of the transformational leadership among school leaders in the MvTL. Further analysis with the remaining 20 items revealed that each PTMEA Corr is in positive values and met the assumptions of unidimensionality and local independence. Reliability and separation index were also within acceptable range. As for future research, it is recommended that different studies should be organized by using a bigger scope and various samples to generate a much better, detailed and comprehensive information which can be represented more extensively.

Keywords: school leader; psychometric; Rasch measurement model; transformational leadership; instrument

ABSTRAK

Kajian ini bertujuan untuk menganalisis ciri psikometrik bagi instrumen soal selidik, Instrumen Kepimpinan Transformasional Pemimpin Sekolah (MvTL) Versi Malaysia dengan menggunakan Model Pengukuran Rasch melalui perisian Winstep Versi 3.73. Soal selidik telah ditadbir kepada 109 orang guru sekolah dari Negeri Melaka. Data dianalisis untuk menentukan sama ada item-item berfungsi dengan sewajarnya mengikut aspek kesesuaian item dalam konstruk pengukuran, kekutuban item, unidimensi, kebebasan setempat dan kebolehpercayaan serta pemisahan item dan responden. Analisis Rasch menunjukkan ciri psikometrik MvTL yang memuaskan selepas beberapa item yang tidak sesuai digugurkan. Penilaian statistik kesesuaian item mendapati sejumlah 5 item berada di luar julat yang ditetapkan dan hanya 20 item sahaja yang didapati sesuai untuk mengukur empat konstruk kepimpinan transformasi dalam kalangan pemimpin sekolah dalam MvTL. Analisis lanjut terhadap baki 20 item menunjukkan bahawa setiap PTMEA Corr berada dalam nilai positif dan memenuhi andaian unidimensi dan kebebasan setempat. Indeks kebolehpercayaan dan pemisahan juga berada dalam julat yang boleh diterima. Bagi penyelidikan masa hadapan, kajian yang berbeza dicadangkan untuk dilaksanakan dengan menggunakan skop yang lebih besar dengan melibatkan kepelbagaian sampel untuk menghasilkan maklumat yang lebih baik, terperinci dan komprehensif agar diwakili dengan lebih meluas.

Kata kunci: pemimpin sekolah; psikometrik; model pengukuran Rasch; kepimpinan transformasi; instrumen

1. Introduction

Transformational leadership is a concept of leadership introduced by Burns in 1978 in his book, *Leadership*. The concept of leadership that Burns presented at that time was about the ideal relationship between leaders and subordinates. This concept was later developed in more detail by Bass (1985) by introducing the theory of transformational leadership that has been the basis of many theoretical orientations for various studies on transformational leadership over the next decade. Studies on this style of leadership have continued to evolve and have become one of the important paradigms of new leadership styles (Bryman 1992). Studies on this style of leadership have not only been widely practiced in areas such as management and psychology but have also grown and gained a place in different disciplines such as health, education, industry and engineering (Antonakis 2018). This growth and popularity may have been contributed by the focus on this style of leadership, especially on the internal and individual motivations (subordinates) that appear to meet the needs and desires of the current situation (Bass & Riggio 2006).

In general, the theory of transformational leadership presented by Bass (1985) is about leadership styles that focus more on building relationships between subordinate and leaders and creating change with an emphasis on values. This style of leadership according to Bass (1985) is an adaptive and idealized leadership style with the involvement of exceptional leaders in terms of emotional, values, ethics, standards, and long-term goals that enable subordinates to achieve higher achievement through the transformation attitudes, beliefs, values, and behaviors of subordinate (Mokhber & Vakilbashi 2015; To *et al.* 2015). This leadership style also enables for positive change in the organization with each member of the organization's own leaders and subordinates taking care of their own interests and acting solely in the best interests of the organization (Gandolfi 2012; Northouse 2016; Odumeru & Ifeanyi 2013). Through this transformational leadership theory, leaders are seen as individuals who are able to identify needed change, create a vision to guide organizational change through inspiration, and implement those changes in a subordinate capacity (Odumeru & Ifeanyi 2013).

In terms of effectiveness, this transformational leadership style is seen as an effective leadership as it has a variety of functions that can have a positive impact especially on overall organizational effectiveness (Ghasabeh *et al.* 2015). This leadership style works to enhance the motivation, morale, and performance of subordinate work in particular and organizational performance in general through various mechanisms such as linking subordinate identities and identities with projects and collective identities, arousing excitement and enthusiasm for transformation, enhancing effective learning orientation in organizations through the development of subordinate intellectuals, exemplifying and inspiring the subordinates, challenging and providing subordinates the opportunity to play a greater role in their tasks, as well as understanding the strengths and weaknesses of the subordinates, enabling leaders to take action to enhance their performance for the good of the organization (Aydin *et al.* 2013; Bass & Riggio 2006; Wang *et al.* 2011).

However, despite been recognised as effective leadership style, only a few of studies have reviewed the psychometric properties of the instruments measuring this leadership style (Hemsworth *et al.* 2013). Within Malaysian educational settings, there have been no studies examining the psychometric properties of related instrument. Thus, more research is needed to expand the knowledge about the psychometric properties of the transformational leadership scale especially in educational contexts. It will be necessary to study the validity and reliability to ensure and sustain the precision of the instrument from some imperfection and error. Therefore, this study will attempt to examining the psychometric properties of

Malaysian Version of School Leaders Transformational Leadership Instrument (MvTL) using Rasch Measurement Model.

2. Methodology

This study used a survey technique with a set of questionnaires (MvTL) adapted from previous research namely Habib and Zaimah (2012), and Jyoti and Bhau (2016). This adapted questionnaire comprising 25 items of five-point rating scale reflecting to four main constructs, specifically individualised consideration, intellectual stimulation, inspirational motivation, and idealised influence (Bass 1985). MvTL was used to assess the four constructs which contain individualised consideration – IC (8 items), intellectual stimulation – IS (5 items), inspirational motivation – IM (6 items) and idealised influence – II (6 items). Items are quantitatively examined using WINSTEPS version 3.73 to assess the suitability of items.

MvTL was administered to a total of 109 teachers from several government schools in Melaka. 59 teachers are from government primary school, while 50 more others are from government secondary school. Rationale for the selection of teachers from Melaka was because of the known heterogeneity of backgrounds among teachers in this state. Moreover, teachers in Melaka also have a relatively large number of teachers from national primary schools and national secondary schools to be selected as a study sample. The questionnaire was administered to the teacher involved in groups by the researcher himself. Respondents were given 15 minutes to answer the questionnaire before being collected by the researcher. Eventually, no single questionnaire was rejected as a result of incomplete and invalid responses. Respondents for this research consisted of 61 (55.9%) females and 48 (44.1%) males.

3. Results and Discussions

3.1. Fit statistics

The Rasch Model's Fit statistics measuring how well the items fit the model's expectations through the infit and outfit Mean Square (MNSQ) and ZSTD. According to Fisher (2007), the acceptable range for the infit and outfit of MNSQ is between 0.77 and 1.30 to confirm that the items are proper for measuring the constructs. If the infit or outfit MNSQ value is higher above the range, then it can be said that the item was confusing, while if the value is lower than below range, it indicates that the item is too easily anticipated by the respondents (Linacre 2016). For the ZSTD, the value should be within -2 to +2 (Bond & Fox 2015; Linacre 2016). However, if the outfit and infit MNSQ are accepted, the ZSTD index can be ignored (Linacre 2016). In Rasch Fit statistic, if the condition is not met, then the item will be considered problematic and should be removed or having refined. Table 1 shows all the item fit statistics.

Based on Table 1, analysis found that five items aren't within the acceptable range and have to be considered to refined or removed. Two items surpass the value of 1.30 namely IC6 and IC8, while another three made a value less than 0.77 that is IC2, IM1 and II2. As a result from this diagnosis, all five items were dropped after taking into consideration at the needs of researchers and expert opinions. All these items will be excluded from other diagnosis in Winsteps and thus, there will be only 20 items for further analysis.

Table 1: Item Fit

Item	Total score	Logits	S. E	INFIT		OUTFIT	
				<i>MNSQ</i>	<i>ZSTD</i>	<i>MNSQ</i>	<i>ZSTD</i>
IC1	416	0.14	0.17	1.07	0.50	1.16	1.00
IC2	419	0.05	0.17	0.75	-1.70	0.69	-2.10
IC3	414	0.20	0.17	0.93	-0.40	0.94	-0.30
IC4	398	0.64	0.16	1.15	1.00	1.25	1.50
IC5	390	0.84	0.16	0.81	-1.30	0.84	-1.00
IC6	435	-0.45	0.18	1.43	2.50	1.39	2.10
IC7	431	-0.32	0.18	0.81	-1.20	0.84	-1.00
IC8	409	0.34	0.17	1.42	2.50	1.37	2.10
IS1	419	0.05	0.17	0.87	-0.80	0.93	-0.40
IS2	416	0.14	0.17	0.82	-1.20	0.82	-1.10
IS3	418	0.08	0.17	1.10	0.70	1.18	1.10
IS4	425	-0.13	0.18	0.90	-0.60	0.83	-1.00
IS5	406	0.42	0.17	1.12	0.80	1.14	0.90
IM1	430	-0.29	0.18	0.78	-1.50	0.73	-1.80
IM2	420	0.02	0.17	1.13	0.90	1.13	0.90
IM3	427	-0.19	0.18	0.83	-1.10	0.86	-0.80
IM4	419	0.05	0.17	1.14	0.90	1.04	0.30
IM5	404	0.48	0.16	0.99	0.00	1.14	0.90
IM6	419	0.05	0.17	1.11	0.80	0.99	0.00
II1	437	-0.51	0.18	1.14	0.90	1.04	0.30
II2	430	-0.29	0.18	0.71	-2.00	0.66	-2.30
II3	436	-0.48	0.18	0.90	-0.60	0.82	-1.00
II4	447	-0.85	0.19	1.10	0.70	0.96	-0.10
II5	435	-0.45	0.18	1.08	0.60	1.06	0.40
II6	405	0.45	0.16	0.83	-1.10	0.89	-0.70

3.2. Item polarity

Item polarity is defined by examine the Point Measure Correlation (CORR PTMEA) to test the extent to which the construction of constructs to achieve its goal. If the correlation coefficient is positive, it shows the capability of the item to measure the constructs is valid (Linacre 2002). While in the other hand, if the value of PTMEA CORR is negative or ‘nearly zero’, it shows that the relationships between response item and the construct are contradict and not consistent (Bond & Fox 2015; Linacre 2002). According to Wu and Adams (2007), the acceptable value of PTMEA CORR is positive and above 0.30. Therefore, if there are any items that do not fulfil these criteria, then it should be refined or removed because it shows the item is not point and address to the question or may be too hard or confusing for the respondent to answer. Table 2 shows all 20 items PTMEA CORR value.

Based on Table 2, diagnosis shows that all the PTMEA CORR is within positive values and above 0.30 as suggested. This indicates that all 20 items remaining in MVTL are going in the same direction with the construct, able to measure the constructs and does not conflict with each construct that being measured.

Table 2: Point Measure Correlation Value

Item	PTMEA	
	<i>Corr.</i>	<i>Exp.</i>
IC1	0.59	0.65
IC3	0.67	0.65
IC4	0.64	0.66
IC5	0.70	0.67
IC7	0.65	0.63
IS1	0.69	0.64
IS2	0.73	0.65
IS3	0.62	0.64
IS4	0.65	0.64
IS5	0.60	0.66
IM2	0.58	0.64
IM3	0.68	0.63
IM4	0.69	0.64
IM5	0.65	0.66
IM6	0.65	0.64
II1	0.61	0.62
II3	0.66	0.62
II4	0.60	0.61
II5	0.53	0.63
II6	0.63	0.66

3.3. Unidimensionality

Assessing unidimensionality is essential to ensure MVTL is measuring the intended objectives. Rasch analysis applies the Principle Component Analysis (PCA) of the residuals which measures the extent to which the diversity of the instruments measures what should be measured. The result of the PCA analysis can be seen in Table 3.

Table 3: Standardized Residuals of the instrument

		Empirical	Modeled	
Total raw variance in observations	35.9	100.0%		100.0%
Raw variance explained by measures	15.9	44.3%		44.3%
Raw variance explained by persons	10.9	30.4%		30.4%
Raw variance explained by items	5.0	13.9%		13.9%
Raw unexplained variance (total)	20.0	55.7%	100.0%	55.7%
Unexplained variance in 1st contrast	3.1	8.7%	15.7%	
Unexplained variance in 2nd contrast	2.2	6.1%	11.0%	
Unexplained variance in 3rd contrast	2.0	5.6%	10.1%	
Unexplained variance in 4th contrast	1.5	4.3%	7.6%	
Unexplained variance in 5th contrast	1.3	3.7%	6.6%	

As a result, Table 3 shows that the observed raw variance is 44.3% and approximates the expected model at 44.3%. This variance explained by the measures was way above 40%, therefore indicates a strong principal measurement dimension (Bond & Fox 2015). The level of noise measured, or the variance which was not explained in the first contrast shows a 8.7% value which is less than 15% and thus, considered to be very good and sufficient (Fisher 2007). The Eigenvalues of 3.1 also indicates that there is no significant second dimension in the item (Linacre 2016).

Taken together, the PCA of the Rasch Model residual results indicated that the underlying items in the MvTL are meets the unidimensionality assumption and assessing a

unidimensional measurement model. This strongly suggest that MvTL would be able measure what it was intended to measure effectively.

3.4. Local independence

The value of local freedom can give a valuable information about the dependencies of the items in the instruments. A good item is not dependent on each other. To checks the value of local independence using Rasch, Standardized Residual Correlation test should be performed to verify if any pair of items are confusing and overlapping with each other. The range that meets minimum requirements is a correlation value of less than 0.7 (Linacre 2016). But, if the value is below than 0.30, than it is consider to be better (Balsamo *et al.* 2014). The results of the Standardized Residual Correlation test can be seen in Table 4 below.

Table 4: Local Independence

Correlation	Item - Construct	Item - Construct
0.43	IC1 – Individualised Consideration	IC3 – Individualised Consideration
0.42	IC3 – Individualised Consideration	IC4 – Individualised Consideration
0.42	IC5 – Individualised Consideration	IS5 – Intellectual Stimulation
0.40	II5 – Idealised Influence	II6 – Idealised Influence
0.39	IS2 – Intellectual Stimulation	IS3 – Intellectual Stimulation
0.38	IC3 – Individualised Consideration	IS5 – Intellectual Stimulation
-0.40	IC4 – Individualised Consideration	II4 – Idealised Influence
-0.35	IM4 – Inspirational Motivation	II4 – Idealised Influence
-0.34	IM4 – Inspirational Motivation	II5 – Idealised Influence
-0.33	IC5 – Individualised Consideration	IM5 – Inspirational Motivation

Based on the result, it can be said that MvTL items are fulfil the assumption of local independence. The findings show that the items in this instrument are not confusing and do not overlap with each other with the highest correlation value is just about 0.43 between IC1 and IC3. However, there are six pairs with acceptable correlation value that should be given an attention. From the results, it shows that these six pairs which are from different construct do have some correlation. Therefore, it should be check manually whether both pair are confusing or linking to each other.

3.5. Reliability and separation index

Rasch analysis produces reliability and separation index for both items and individual. Individual separation index reveals the number of strata capabilities identified in the sample group, while the item separation index shows the separation of item difficulty level. According to Bond and Fox (2015) and Linacre (2016), the value of both item and individual separation index should be above 2 to be treated as good. While for the reliability, the minimum acceptable value of the index is above 0.66 (Fisher 2007). Table 5 and 6 shows the details about the reliability and separation index for both the person and items.

The findings reveal that the individual separation index is 3.61 and the item separation index is 2.08 which is considered as good. Technically, this result shows that the respondents can be categories into four strata of ability and the item can be classified into two groups of difficulties. For the reliability index, it is found that the person reliability value is quite decent at 0.93, while the reliability index for the items achieved an acceptable value at 0.81. Both values indicate that the person and item in this research are good and do have reliability.

Table 5: Summary of person statistics

	Raw Score	Count	Measure	Model Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	96.4	25.0	1.80	0.40	0.99	-0.4	0.99	-0.4
Standard Deviation	12.6	0.0	1.85	0.22	0.73	2.1	0.74	2.2
Max	125.0	25.0	8.45	1.83	3.69	4.7	3.65	4.6
Min	51.0	25.0	-2.12	0.24	0.04	-5.3	0.04	-5.4
Real RMSE	0.49	True SD	1.79	Separation	3.61	Person Reliability		0.93
Model RMSE	0.46	True SD	1.80	Separation	3.93	Person Reliability		0.94

Person Raw Score-To-Measure Correlation = .96
Cronbach Alpha (KR-20) Person Raw Score Reliability = .98

Table 6: Summary of item statistics

	Raw Score	Count	Measure	Model Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	419.1	109.0	0.03	0.17	0.99	0.0	0.99	0.0
Standard Deviation	13.8	0.0	0.41	0.01	0.13	0.9	0.14	0.8
Max	447.0	109.0	0.84	0.19	1.15	1.0	1.25	1.5
Min	390.0	109.0	-0.85	0.16	0.81	-1.3	0.82	-1.1
Real RMSE	0.18	True SD	0.37	Separation	2.08	Item Reliability		0.81
Model RMSE	0.17	True SD	0.37	Separation	2.16	Item Reliability		0.82

UMean = 0.000 UScale = 1.000
Item Raw Score-To-Measure Correlation = -1.000

4. Conclusion

Overall, this study had shown the strength of the Rasch measurement model which is established on the Item Response Theory in assessing the psychometric properties of MvTL. Different diagnosis procedures were applied to assess the psychometric properties of the MvTL. With the examination through Rasch analysis, it was discovered that 5 out of 25 items were unfit, leaving only 20 items remaining in the MvTL. Further analysis with the remaining items had found that the validity and reliability of the instrument are acceptable for measuring the transformational leadership of school leaders. Additionally, the result did show that the instrument has also fulfilled other psychometric properties required for an acceptable instrument. These indicate that MvTL is an indeed instrument that can be used to measure the level of transformational leadership among school leaders in Malaysia. As for future research, it is recommended that different studies should be organized by using a bigger scope and various samples to generate a much better, detailed, and comprehensive information which can be represented more extensively.

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