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PSYCHOMETRIC PROPERTIES OF WOMEN'S LEADERSHIP ATTRIBUTES AS DECISION-MAKERS INSTRUMENT BASED ON THE RASCH MODEL

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ABSTRACT

This study aimed to develop a valid instrument to measure the leadership attributes of women as decision-makers, focusing on public servants in government ministries in Malaysia. The study analyzed the reliability and validity of instruments using the Rasch measurement model. Leadership attributes were assessed based on three main constructs: leadership self-efficacy, leadership traits, and leadership skills. Questionnaires were distributed to 376 randomly selected female public servants in 23 ministries in Malaysia and aspects such as the item and person reliability, the separation between items and respondents, the polarity of items, item fit, local independence, and unidimensionality were assessed. The results demonstrated that 71 items were useful to measure the three constructs. Future research should cross-examine the developed instrument across groups in government-linked companies in Malaysia and the private sectors.

Keywords

Women's leadership, personality traits, item response theory, psychometrics.

Introduction

Although women's involvement in the employment sector has increased, especially in Organisation for Economic Co-operation and Development (OECD) countries, the percentage of working women is lower than men (OECD, 2020). Globally, the gap between men's and women's involvement in the employment sector is decreasing owing to an increasing number of women pursuing higher education (OECD, 2020). Empowering women, particularly in the economic sector, increases productivity, promotes economic diversification, and reduces the income gap, leading to national development (International Monetary Fund, 2018). This contributes to closing the gender gap in employment in the economic sector, which relates to the United Nations Sustainable Development Goals 2030 of achieving gender equality and strengthening women (OECD, 2016). There is a growing number of women in top management and decision-making positions; however, men continue to outnumber women in leadership positions (Hryniewicz & Vianna, 2018; Naemah, Mohd Ismail, & Bushrah, 2014).

Leadership is often associated with masculine stereotypes and characteristics (Faizan, Nair & Haque, 2018; Koenig, Eagly, Mitchell, & Ristikari, 2011). As these traits determine the potential capability of females in leadership roles, an investigation of current female decision-makers' traits are necessary. In addition, the diverse views and opinions from scholars further confirm that this study should be conducted to understand the correct criteria or characteristics that female decision-makers should possess.

Additionally, an empirical study is needed to measure the characteristics or traits of average female leaders in the Malaysian context. This is because existing instruments such as the Leader Attributes Inventory (LAI) by Moss, Lambrecht, Jensrud and Finch (1994) and the Leadership Trait Questionnaire (LTQ) by Northouse (2009) are not suitable to measure the leadership attributes of female decision-makers. The LAI instrument was built to measure the leadership performance amongst leaders of vocational education, whereas the LTQ instrument measures common leadership traits, thus making it unsuitable to measure the traits of female decision-makers. Hence, it is necessary to come up with an instrument that measures the leadership attributes of female decision-makers in the Malaysian context, considering its norms, religions, and cultures. The dissimilarities in factors such as culture and background could affect the responses and analysis of an instrument; thus, the latter must

consider the cultural and background factors of the research respondents (Gregory, 2015).

To construct an instrument that meets the psychometric assessment characteristics, the Rasch model was chosen to assess the leadership attributes of female decision-makers. The model introduced by Georg Rasch in 1960 is often referred to as the Item Response Theory Model or one parameter IRT (Bond & Fox, 2015). The Rasch model has been chosen as the collected data are inter-dimensional and the sample size is small. The analysis using the Rasch model will assist researchers in ensuring that the produced instrument measures the correct variables by dropping unrelated items (Singer, 2016). This is a crucial step in assessing the instrument validity and ensure that the results are accurate, useful, and easy to interpret. In addition, the Rasch Model does not require normally distributed data, making it suitable for this study, as it does not involve inferential statistical analyses.

This study aimed to determine the validity and reliability of items in the constructed instrument; the observed validity is based on suitability, polarity, local independence, and unidimensionality, whereas the observed reliability is based on reliabilities of the items and individual measurement.

Literature Review

Leadership Attributes of Women in Decision-Making Positions

Previous studies on leadership have led to the emergence of the concepts and principles related to leadership, such as its definition and the formation of leaders (Northouse, 2018). Leadership is often defined according to the focus or perspective of the study conducted, demonstrating the complexity of the leadership construct (Northouse, 2018). Northouse (2018) defined leadership based on five dimensions: (i) a leader's characteristics or traits, (ii) natural talents, (iii) skills or competencies that can be learned or formed, (iv) behavior, and (v) relationships or communication with followers. However, Zaccaro, LaPort, and Jose (2013) identified two categories of leadership traits: distal or basic attributes resulting from a combination of cognitive ability, personality, motives or values, and tacit knowledge and proximal attributes, referring to the readiness to react according to the situation, which is crucial for leaders. In this study, leadership attributes consist of leadership self-efficacy, traits, and skills.

Leadership Self-Efficacy

The LSE indicates an individual's confidence or trust in their ability to fulfill responsibilities as a leader. Ng, Ang, and Chan (2008) indicated that personality traits were correlated with LSE and it mediated personality traits with the leader's effectiveness. Bobbio and Manganelli Rattazzi (2009) stated that leadership self-efficacy could be measured through six dimensions: (i) initiating and leading changes, (ii) selecting effective followers and distributing responsibilities, (iii) building and managing interpersonal relationships within groups, (iv) demonstrating awareness and self-confidence, (v) motivating members in the organization, and (vi) obtaining consensus from group members. This model found that leadership self-efficacy differed between genders, with men having higher self-efficacy (Bobbio & Manganelli Rattazzi, 2009). This study measured four aspects of LSE: motivating members in the organization, showing confidence and self-awareness, building synergies, and initiating changes.

Leadership Traits

Stereotypes regarding women's personality are among the factors limiting the selection of women for leadership positions (Vial and Napier, 2018). Some researchers argue that to be a leader, women must have stereotypically masculine personality traits, such as assertiveness, independence, and dominance, and minimize stereotypically feminine traits, such as being shy, soft-spoken, loving, and naïve, which hinder them in leading an organization (Bala Subramanian, Irudayaraj & George, 2016; Eagly & Heilman, 2016; Gupta, Han, Mortal, Silveri & Turban, 2018; Vial, Napier & Brescoll 2016). Muteswa (2016) argued that quality leaders should have characteristics such as confidence, ability to communicate their vision

and values, honesty, transparency, high integrity, and humility. Zaccaro (2007) provided a list of 62 different individual traits that influence leadership effectiveness. Griffiths, Roberts & Price (2019) argued that women in leadership positions lack assertiveness, ambition, credibility, and the ability of making assessments or considerations.

Leadership Skills

Leadership skills are important in ensuring an effective leadership (Katz, 1955). The literature suggests that women are often underestimated in terms of their skills and abilities (Allan, 2011). A survey conducted among professional women showed that leadership development programs are required to improve leadership skills, such as decision-making, critical thinking, human resource management, project management, interpersonal relationships or social interaction, and talent management (KPMG, 2015). Amaratunga, Haigh, Ginige & Thurairajah (2008) identified leadership skills such as communication, listening, time management, and teamwork as being important for women managers for their career development. Katz (1955) argued that leadership skills can be developed and honed through training. Therefore, he created a skills model and listed three basic skills that improve leadership effectiveness: technical, people, and conceptual skills, in which technical skills require leaders to master the technical aspects, such as computer skills, and to be knowledgeable and skilled in their field (Katz, 1955). Furthermore, Katz (1955) believed that the two most important skills for leaders at the decision-making level are human or interpersonal and conceptual skills. Gardner (2011) defined interpersonal skills as the ability to understand others, which helps in interacting, collaborating, guiding, and managing communication.

Conceptual skills require leaders to be able to generate new ideas and be smart thinkers, namely, being able to think creatively and critically to find a solution for problems (Katz, 1955).

The Instrument for Measuring Leadership Attributes Among Women Decision-Makers

This instrument measured three constructs. First, LSE referred to the individual's confidence and trust in behaving like a leader and carrying out their responsibilities as the head of the organization. Second, leadership traits referred to the integration of personal characteristics describing an individual's effectiveness in leading the organization, regardless of the situation and circumstances (Zaccaro, 2007; Zaccaro, Kemp & Bader, 2004). Third, leadership skills were related to the knowledge of applying leadership skills and techniques in determining an effective organizational leadership (Katz, 1955).

The document analysis method was used to identify the construct of leadership attributes that should be possessed by female leaders as decision-makers. According to Best and Kahn (1998), the document analysis is the most useful tool in collecting information in qualitative research; it is also the best tool to obtain data because it provides key information in explaining something (Yin, 1994). Besides, the researchers also carried out interviews to obtain qualitative data. The researchers interviewed seven leadership experts individually and the interview went on until it reached data saturation (Strauss and Corbin, 1998). The experts were government officers who hold top-level positions in ministries and organizations. In terms of the analysis, the Atlas-Ti software was used to ease the process of thematic analysis on the data obtained from the interviews.

The thematic analysis was selected as it has the power to describe and categorize the opinions gained through discussion. After the thematic analysis, three main constructs were extracted, and 102 items were developed. The items were tested for their content validity, reliability, and item testing using the Rasch model through the Winsteps 3.71 software during the pilot study. The reliability of the instrument was 0.92, which is good (Bond & Fox, 2015). Table 1 shows the item numbers used in this study after going through a pilot study and refining the items. This instrument comprised 71 items and used a 4-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree, for the leadership self-efficacy and leadership traits constructs, and

was 1 = very unskilled, 2 = less skilled, 3 = very skilled, and 4 = very skilled for the leadership skills construct).

Table 1. Number of Items by Construct

Section	Construct	Sub-Construct	Item No.	Total
Section A	Leadership Self-Efficacy	Motivating group members	1-4	4
		Building synergy	5-7	3
		Showing self-awareness and confidence	8-13	6
		Leading to change	14-17	4
Section B	Leadership Traits	Influence	18- 22	5
		Charisma	23-26	4
		Proactiveness	27-29	3
		Assertiveness	30-33	4
		Vision	34-39	6
		Integrity	40-43	4
		Fairness	44-46	3
		Risk-taking	47-50	4
Section C	Leadership Skills	Technical skills	51-55	5
		Interpersonal skills	56-66	11
		Conceptual skills	67-71	5
	Total			71

Methodology

A quantitative study was conducted in the Federal Territory of Putrajaya. For this study, 2002 female public officers of Grade 48 and above were surveyed. The survey was then conducted on 380 participants, but four participants were excluded after being identified as outliers, leaving a sample of 373 respondents. The survey was managed through an online medium during the Covid-19 pandemic and was administered around three weeks in July 2020.

Data analysis and Discussion

The main objective of the study was to determine whether, based on the Rasch analysis, the Women Leadership Attribute as Decision-Maker Scale item measurement has good psychometric properties in the context of Malaysian female public officers. The Rasch testing reports the primary assumptions such as item polarity, item fit, the test of unidimensionality, local independence, reliability index, and separation index. The strength of an item is also reported through graphic analysis, such as the Wright Map.

Item Polarity

The examination of the polarities item is intended to test the extent to which the developed construct achieves its goals and the relationship among the developed items of the Item polarity was determined based on the PTMEA CORR point size correlation coefficient. Good item polarity values are above 0.3 logit value and have a positive value (Bond & Fox, 2015). According to Nunnally and Bernstein (1994), the item relaxes if the PTMEA CORR value is less than 0.30. As shown in Table 2, all PTMEA CORR values were above 0.30, ranging from 0.54 to 0.75. Thus, it can be concluded that the items can contribute to the measurement of leadership attributes in women

Table 2. Item polarity

Item	Total score	Measure	Model SE	PTMEA	
				Corr	Exp
EM1	1275	0.40	0.12	0.53	0.67
ES7	1394	-1.70	0.15	0.56	0.57
TR49	1349	-0.81	0.13	0.56	0.63
ES6	1400	-1.83	0.15	0.56	0.56
TT33	1220	1.17	0.12	0.57	0.68
TP20	1112	2.50	0.11	0.58	0.69
TA27	1375	-1.30	0.14	0.59	0.60
ED11	1348	-0.79	0.13	0.59	0.63
EM3	1348	-0.79	0.13	0.59	0.63
EC16	1178	1.71	0.11	0.59	0.68
TT31	1320	-0.31	0.13	0.59	0.65
KID62	1324	-0.38	0.13	0.60	0.65
KT54	1260	0.62	0.12	0.60	0.67
KKI68	1290	0.17	0.12	0.60	0.67
TR50	1341	-0.67	0.13	0.60	0.64
TP21	1104	2.60	0.11	0.61	0.69
KID63	1180	1.69	0.11	0.61	0.68
TD46	1361	-1.03	0.14	0.62	0.62
TT43	1389	-1.59	0.14	0.62	0.58
EM2	1347	-0.78	0.13	0.62	0.63
KKI69	1278	0.36	0.12	0.62	0.67
TD45	1363	-1.07	0.14	0.62	0.62
KIK59	1327	-0.43	0.13	0.63	0.65
TB36	1369	-1.19	0.14	0.63	0.61
EK10	1242	0.88	0.12	0.63	0.68
EK9	1243	0.86	0.12	0.63	0.68
EM4	1316	-0.24	0.14	0.63	0.66
TR48	1314	-0.21	0.13	0.64	0.66
TR47	1275	0.40	0.14	0.64	0.67
TT30	1290	0.17	0.12	0.64	0.67
ES5	1310	-0.14	0.12	0.65	0.66
KT53	1349	-0.81	0.13	0.65	0.63
TB35	1362	-1.05	0.14	0.65	0.62
TD44	1363	-1.07	0.14	0.65	0.62
TA28	1307	-0.10	0.13	0.65	0.66
TB34	1284	0.27	0.12	0.66	0.67
KT51	1351	-0.85	0.14	0.66	0.63
KT52	1365	-1.11	0.14	0.66	0.62
ED13	1299	0.03	0.13	0.67	0.66
TT32	1178	1.71	0.11	0.67	0.68

EC14	1375	-1.30	0.14	0.67	0.60
EC17	1361	-1.03	0.14	0.67	0.62
EK8	1358	-0.98	0.14	0.68	0.62
KIK60	1196	1.49	0.11	0.68	0.68
ED12	1353	-0.89	0.14	0.68	0.63
TP19	1187	1.60	0.11	0.68	0.68
KID65	1356	-0.94	0.14	0.68	0.63
KT55	1280	0.33	0.12	0.68	0.67
KID66	1349	-0.81	0.13	0.69	0.63
T142	1285	0.25	0.12	0.69	0.67
TK24	1255	0.69	0.12	0.69	0.67
TK23	1254	0.71	0.12	0.69	0.67
KID64	1303	-0.03	0.13	0.69	0.66
KKI70	1265	0.55	0.12	0.70	0.67
TP22	1317	-0.26	0.13	0.70	0.66
TK26	1286	0.23	0.12	0.70	0.67
KIK56	1282	0.30	0.12	0.71	0.67
KIK57	1271	0.46	0.12	0.71	0.67
TB39	1337	-0.60	0.13	0.71	0.64
EC15	1337	-0.60	0.13	0.71	0.64
KIK58	1236	0.96	0.12	0.71	0.68
KKI71	1186	1.61	0.11	0.71	0.68
KIK61	1288	0.20	0.12	0.72	0.67
KKI67	1286	0.23	0.12	0.72	0.67
TA29	1290	0.17	0.12	0.72	0.67
TP18	1288	0.20	0.12	0.73	0.67
TI40	1245	0.83	0.12	0.73	0.68
TK25	1308	-0.11	0.13	0.74	0.66
TI41	1269	0.49	0.12	0.74	0.67
TB37	1279	0.34	0.12	0.75	0.67
TB38	1262	0.59	0.12	0.76	0.67
MEAN	1296.4	0.00	0.13		
S.D	63.6	0.97	0.01		

Item Fit

One of the assumptions of the Rasch Model is the item fit to make sure that the item fits with the data (Wright & Masters, 1982). Table 3 depicts the MNSQ values of *infit* and *outfit* ranging from 0.77-1.13 logits. The *infit* MNSQ value ranges from 0.77 to 1.33 logits, whereas the *outfit* MNSQ value ranges from 0.63 to 1.48 logits. This complies with the acceptable range set by Bambang and Wahyu (2014); Boone, Staver, and Melissa (2014) that is within 0.5 logits to 1.5 logits. The compatibility of items through MNSQ infit and MNSQ outfits within that range is suitable for polytomous data, indicating that all items are well-matched with the Rasch model and are productive in measuring respondents' leadership attributes and not confusing the respondents. In addition, the value of the appropriate statistical value that is uniform Zstd infit and Zstd outfit should be within the range of -2 to +2 (Bond & Fox, 2015). However, if the

values of the MNSQ outfit and infit are acceptable, the Zstd index can be ignored (Linacre, 2012).

Table 3. Fit statistics of measurement items.

Entry Number	Infit		Outfit		
	MNSQ	ZSTD	MNSQ	ZSTD	Item
50	1.13	1.5	1.48	2.1	TR50
49	1.26	2.9	1.45	1.9	TR49
33	1.44	5.2	1.45	4.1	TT33
63	1.42	5.1	1.44	4.5	KID63
1	1.37	4.2	1.42	3.0	EM1
20	1.30	3.8	1.37	4.1	TP20
3	1.11	1.3	1.37	1.6	EM3
7	1.00	0.0	1.34	1.2	ES7
11	1.12	1.4	1.30	1.3	ED11
68	1.29	3.3	1.26	1.8	KKI68
54	1.06	0.8	1.27	2.2	KT54
10	1.24	2.9	1.23	2.0	EK10
21	1.19	2.4	1.23	2.7	TP21
48	1.09	1.1	1.22	1.3	TR48
31	1.12	1.4	1.19	1.1	TT31
62	1.17	2.0	1.07	0.5	KID62
69	1.16	2.0	1.09	0.7	KKI69
42	0.96	-0.5	1.15	1.1	TI42
16	1.09	1.3	1.15	1.7	EC16
28	1.09	1.1	1.14	0.9	TA28
9	1.13	1.7	1.08	0.8	EK9
27	1.13	1.5	1.06	0.3	TA27
2	1.01	0.2	1.11	0.6	EM2
59	1.11	1.3	0.96	-0.2	KIK59
5	1.10	1.2	0.95	-0.3	ES5
4	1.08	1.0	0.96	-0.2	EM4
52	0.77	-2.9	0.99	0.1	KT52
	BETTER FITTING OMITTED				
55	0.83	-2.2	0.92	-0.6	KT55
64	0.91	-1.1	0.79	-1.5	KID64
38	0.91	-1.2	0.81	-1.7	TB38
41	0.91	-1.2	0.79	-1.8	TI41
36	0.90	-1.2	0.89	-0.4	TB36
24	0.89	-1.5	0.90	-0.9	TK24
29	0.89	-1.3	0.80	-1.5	TA29
43	0.89	-1.3	0.78	-0.8	TI43
58	0.88	-1.6	0.83	-1.7	KIK58
51	0.87	-1.6	0.80	-0.9	KT51
8	0.79	-2.6	0.86	-0.5	EK8
35	0.86	-1.7	0.80	-0.8	TB35
44	0.85	-1.9	0.76	-1.0	TD44

67	0.84	-2.1	0.72	-2.3	KKI67
26	0.83	-2.3	0.75	-1.9	TK26
18	0.82	-2.3	0.72	-2.2	TP18
17	0.81	-2.3	0.67	-1.5	EC17
66	0.81	-2.4	0.63	-1.9	KID66
22	0.81	-2.5	0.78	-1.4	TP22
25	0.80	-2.6	0.69	-2.2	TK25
14	0.80	-2.5	0.60	-1.8	EC14
12	0.79	-2.7	0.66	-1.7	ED12
39	0.73	-3.5	0.79	-1.1	TB39
65	0.78	-2.8	0.67	-1.6	KID65
56	0.78	-2.9	0.69	-2.6	KIK56
61	0.77	-3.1	0.70	-2.4	KIK61
15	0.77	-3.0	0.63	-2.2	EC15

Unidimensionality

The ability of each item in the instrument to measure with a single ability is referred to as unidimensionality (Wright & Masters, 1982). The Principal Component Analysis of Residual was used to ensure that the items are unidimensional. Based on Table 4, The PCA procedure represented 50.2 percent of the raw variance explained by measures exceeds the model expectation of 50.1 percent. The result has almost fulfilled the instruments' uniformity of at least 40%, according to J. Conrad, M. Conrad, Dennis, Riley & Funk, (2011). Measured noise levels or variance that were not explained in the first contrast, yielded a value of 2.9%, were categorized as excellent, and were considerably lower than the maximum value of 15% (Eakman, 2012). The ratio of variance determined according to the size (50.9%) and variance of the first contrast component (2.9%) was 17.46:1, exceeding the minimum value of a 3:1 ratio (Conrad J. Conrad, M. Conrad, Mazza, Riley, Funk, Stein & Dennis, 2012). Therefore, items in this instrument fulfilled the unidimensionality assumptions in the Rasch model.

Table 4. Standardized residual variance (Eigenvalue unit).

			Empirical value		Modelled
Total raw variance in observations	=	142.6	100%		100.0%
Raw variance explained by measures	=	71.6	50.2%		50.1%
Raw variance explained by persons	=	42.8	30.0%		30.0%
Raw variance explained by items	=	28.8	20.2%		20.2%
Raw unexplained variance (total)	=	71.0	49.8%	100%	49.9%
Unexplained variance in 1st contrast	=	4.1	2.9%	5.8%	

Local Independence

The standardized residual correlation was analyzed to determine the occurrence of item overlap and ensure that the instrument is free from confusion and misguided objectives. According to Linacre (2011), a correlation between items above 0.70 is considered high, where respondents see a pair of related items as synonymous. Azrilah, Mohd Saidfudin & Azami (2013) stated that two approaches are available if such measurement occurs: refining the item to clarify the purpose of the question or removing the item based on the refining method in Item Fit. As shown in Table 5, the values were between 0.33 to 0.56 when items were matched with the standard residual correlation. This range met the local independence requirement of less than 0.70 (Linacre, 2012). In addition, the results indicated that there was no overlap between the detected items, and the items did not have similar characteristics.

Table 5. Item local independence.

Correlation	Item	Item
0.56	KID65	KID66
0.48	TI40	TI41
0.46	KIK57	KIK58
0.43	KT55	KIK56
0.41	TB37	TB38
0.38	KKI68	KKI69
0.36	TT32	KKI71
0.35	ES7	KT52
0.33	TK26	TB36

Reliability and Separation Index

Table 6 shows the values for the individual reliability and respondent separation index in the instrument. The results indicated that the reliability value for respondents was 0.97, whereas the individual separation index was 5.49. This indicated high reliability. Bond and Fox (2015) stated that reliability values exceeding 0.8 are good and acceptable. Individual separation index values higher than 2.0 are considered good according to the criteria of the Rasch model (Linacre, 2012). A good individual separation index indicates that there are five levels of ability and diversity in respondents' abilities in answering the questionnaires (Bond & Fox, 2007). The item reliability for this instrument was 0.98, as shown in Table 7. This indicated that the produced items had a high reliability value, as it exceeded 0.8 (Bond & Fox, 2015). The item separation index was 7.33, indicating a good value, as it was over 2.0 (Linacre, 2012). Cronbach's Alpha (KR-20) for instrument reliability was 0.98. This value showed that the instrument was reliable and in accordance with the specified sample. According to McMillan and Schumacher (2014), alpha values of 0.70 to 0.90 are acceptable ranges for research.

Table 6. Person reliability and separation index

	Total Score	Count	Measure	Model error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	Zstd
Mean	246.8	71.0	4.27	0.33	1.00	-0.1	0.98	-0.2
S.D	26.3	0.0	2.08	0.15	0.36	2.1	0.48	2.0
Max	283.0	71.0	8.84	1.02	2.86	7.1	4.39	6.5
Min	185.0	71.0	-0.02	0.23	0.19	-5.9	0.13	-6.1
Real RMSE 0.37		True SD 2.05		Separation	5.49	Person Reliability		0.97
Model RMSE 0.36		True SD 2.05		Separation	5.73	Person Reliability		0.97

S.E. oF Person MEAN = 0.11

CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .98

	Total Score	Count	Measure	Model error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	Zstd
Mean	1308.4	376.0	0.00	0.13	0.99	-0.2	0.98	-0.1
S.D	63.6	0.0	0.97	0.01	0.16	2.1	0.23	1.6
Max	1412.0	376.0	2.60	0.15	1.44	5.2	1.48	4.5
Min	1116.0	376.0	-1.83	0.11	0.73	-3.5	0.60	-2.7

Real RMSE	0.13	True SD	0.96	Separation	7.33	Item Reliability	0.98
Model RMSE	0.13	True SD	0.96				
S.E. oF Item MEAN = 0.12				Separation	7.54	Item Reliability	0.98

Table 7. Item reliability and separation index

Limitations and Directions for Further Research

This research has some limitations as it only involves respondents amongst female public servants working in the federal administrative capital of Putrajaya. In the future, such research should involve more female public servants to ensure that it has wider coverage. Furthermore, it could involve female leaders from public sectors and government-linked companies and not just female public servants. The diversity in research respondents' and samples' backgrounds will lead to the obtainment of a variety of female leadership attributes. This is important, as factors such as the working environment and the workplace culture require different female leadership attributes that suit the organization's environment, culture, and norms. Hence, we can explore more attributes of women as decision-makers by using a qualitative approach to obtain wider perspectives on the types of attributes.

Besides, this instrument was developed based on the context of Malaysian women's culture and background. Thus, this instrument needs to go through a validity retest when it is adapted and used in research projects in other countries. Since this research has used the Rasch model for the instrument validity process, other methods should be applied as well for the instrument validity process, such as the Exploratory Factor Analysis (EFA). Furthermore, a combination of Rasch, EFA, and Confirmatory Factor Analysis (CFA) could be used to get a more interesting and dynamic outcome from the analysis.

Practical Implications

There are several significant implications from the research findings for future endeavors. The important practical implication is that the items selected from this study can be used for self-evaluation and peer evaluation sessions for improvement purposes. Hopefully, these attributes can be listed and made available to guide policymakers, such as The Ministry of Women, Family, and Community Development to identify which construct should be empowered for women's self-development, especially during the evaluation or selection process for female employees to fill in decision-making positions. Furthermore, it is hoped that this instrument can also be used as one of the self-evaluation methods to measure leadership attributes of female decision-makers and gives an insight to certain parties, especially human development sectors to organize training and mentoring, specifically for female employees, such that they have great potential to fill in decision-maker positions in the future.

Conclusions

This paper aimed to determine whether, based on the Rasch model analysis, the constructed women leadership attributes as decision-maker item measurement has good psychometric properties in the context of Malaysian female servants. This study has shown that 71 items fulfill the psychometric properties with good validity and reliability. Previous studies on women's leadership abilities frequently assessed their traits or personalities (Eagly & Karau, 2002). Wille, Wiernik, Vergauwe, Vrijdags & Trbovic (2018) recommended an instrument to measure leadership personality traits. Therefore, the researchers developed a specific instrument, which consists of leadership self-efficacy, leadership traits, and leadership skills, to measure the leadership attributes of female decision-makers in Malaysia. It would be more interesting to assess women's leadership attributes patterns by investigating the profiles through demographic factors. This will offer more benefits to stakeholders or policy-makers to achieve 30% of women decision-makers policy. Although the

focus of the current study was on women leadership attributes instrument item measurement, the same method can be applied to investigate the criterion validity by highlighting the correlation score between women leadership attributes as decision-makers and any other established leadership attributes assessment scales.

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