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Construct Validity and Reliability of Creativity and Innovation in Public Sector: A Rasch Measurement Model Approach for Pilot Study

Saharah Sapiyi[1], Nur Riza Mohd Suradi[2], Zainol Mustafa[3]

[1,2,3] *Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Malaysia*
[2]nrms@ukm.edu.my

Abstract

A pilot study is imperative to test the questionnaire items, confirm and check the research instrument's reliability to obtain the best items. This pilot research aimed to test the reliability of the developed public sector instrument and identify its weakness. The instrument was purposefully designed to recognise the factors that affect creativity and innovation in the Malaysian public sector and their influence on government agencies' performance. The instrument included 90 items and was distributed to 120 civil servants from several ministries mostly located in Putrajaya and Kuala Lumpur, Malaysia. The goal of this instrument was to measure five study constructs: individual creativity (IC), team creativity (TC), organisational innovation (OI), innovation processes (IP), and organisational performance (OP). The method employed to analyse the validity and reliability of the items and respondents in this study was derived from the Rasch Measurement Model Approach, which is far more valid and well-grounded than only relying on Cronbach's Alpha output produced. The Winsteps version 3.73 was used to verify the items' functionality in aspects such as the item's reliability and separation of the item-respondent, polarity item, item fit in measuring constructs, item difficulty level, the respondent's ability, and the standardised residual correlations. It also enabled the removal of items based on polarity items' statistics and the item's suitability. At the end of the analysis, it was established that there was a total of 9 items that were discarded because they did not meet the inspection criteria specified per the Rasch Model. A total of 81 items were recorded on the final instrument that could be used to measure the five constructs.

Keywords: Creativity and Innovation, Public Sector, Validity, Reliability, Rasch Measurement Model Approach

1. INTRODUCTION

The phase of innovation embraces of two chief activities: creativity and innovation. Creativity entails creating fresh, serviceable ideas, and it includes translating these ideas into new products and processes (Sarooghi, Libaers & Burkemper, 2015). Amabile and Pratt (2016) defined creativity as the production of novel and beneficial concepts by an individual or small group of individuals working together, whilst according to Damanpour and Schneider (2009), innovation is the successful execution of creative ideas within an organisation (Chaubey and Sahoo, 2019). Public sector performance can be improved through innovation (World Bank, 2018), contributing potentially to economic growth (Currall et al., 2014). The private sector's victory in assuming creativity and innovation in their business can be an example to the public sector. The instruments employed in this study were individual creativity (IC), team creativity (TC), organisational innovation (OI), innovation processes (IP), and organisational performance (OP). By gauging IC, TC, OI, IP, and OP, this study can help accomplish the goals and enhance the Malaysian public sector's performance. Hence, this pilot study was attended to ensure that the questionnaire instrument had good validity and reliability. The researcher then analysed the validity and reliability of the questionnaire instrument using the Rasch Model method. The items could be thoroughly monitored and examined using the Rasch Model approach rather than merely relying on Cronbach's Alpha. Through this approach, the researchers conducted several analyses, including the inspection and verification of each item's functionality.

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2. DATA ANALYSIS BASED ON THE RASCH MEASUREMENT MODEL

There were many diagnostic methods applied by researchers in the Rasch Measurement Model. The intention was to verify and evaluate the validity and reliability of the constructed questionnaire instrument. Among them were to;

a. Test the reliability and the index of item and respondent separation;
b. Identify the polarity item that measures the constructs;
c. Examine the suitability of the item instrument (item fit);
d. Determine the item difficulty level and the ability of the respondents; and
e. Determine the standardised residual correlations

This pilot study was administered using a quantitative method by distributing the creativity and innovation questionnaire to selected respondents. A sum of 120 government servants from individual ministries in Putrajaya and Kuala Lumpur, Malaysia took part in the pilot study survey. All the 120 government officials elected had directly joined the creativity and innovation team at least once, along with their services. These pilot study's outcomes would then be evaluated following the Rasch Measurement Model method using Winsteps version
3.68.2. The item designed consisted of 90 items, comprising five principal constructs; IC, TC, OI, IP and OP.

3. RESULTS AND FINDINGS

Following the Rasch Measurement Model approach, the researchers attended a test on the functionality of the item in terms of (i) the item reliability and the separation of item-respondents; (ii) identify the polarity items that measure the constructs of the study based on the value of the Point Measurement Correlation or value analysis of PTMEA CORR; (iii) the suitability (fit) item that measures the constructs of the study; (iv) the map of item- respondent difficulty level in this study and (v) the standardised residual correlations. The description and explanation for each item tested on the functionality are as follows.

3.1 Reliability and Item Separation

Reliability quantifies a measuring instrument's accuracy and stability in measuring a concept in a study (W.Creswell, John, 2018). In the Rasch Model, reliability is estimated both for person and item (Bond & Fox, 2015). Based on the Rasch Measurement Model approach, the value of Cronbach's Alpha (α) that its reliability can be accepted is between 0.71 – 0.99, where this value is at its best (71% - 99%) as described in Table 1 (Bond & Fox, 2007).

Table 1: Interpretation of Cronbach Alpha's Reliability Score

The Score of Cronbach's Alpha	Reliability
0.9 - 1.0	Very good and effective with a high level of consistency
0.7 – 0.8	Good and is acceptable
0.6 – 0.7	Acceptable
<0.6	The item needs refinement
<0.5	The item needs to be discarded

The statistical analysis utilising the Rasch Measurement Model approach was used to assess the individual items' reliability, concerning the reliability value and the value of the item separation. The

analysis determined that the reliability value obtained based on Cronbach's Alpha (α) value was 0.96, as shown in Table 2. The value received recorded that the instruments used were outstanding and practical, with a high consistency level. Thus, it could be used in the intended sample of the study.

Table 2: The Reliability Score (Cronbach's Alpha) for Pilot Study

PERSON RAW SCORE-TO-MEASURE CORRELATION	1.00
CRONBACH's ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY	0.96

The complete instrument's analysis was also performed by studying the items and respondents' reliability and separation values. Based on Table 3, the item's reliability value was 0.96, which indicated that it was perfect and effective with a high level of consistency (Bond & Fox, 2015). Meanwhile, the value of item separation was 4.82. As suggested by Linacre (2012), the value that shows a good index separation is a value that is greater or more than 2.0.

Table 3: Reliability and Item Separation Value for the Entire Construct Instruments: Pilot Study

INPUT: 120 PERSONS 90 ITEMS MEASURED: 120 PERSONS 90 ITEMS 764 CATS 3.68.2

SUMMARY OF 120 MEASURED PERSONS

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	467.0	88.9	.24	.09	1.12	-.4	1.17	-.3
S.D.	61.6	2.8	.55	.01	1.27	3.7	1.30	3.9
MAX.	636.0	90.0	1.47	.11	9.90	9.9	9.90	9.9
MIN.	267.0	80.0	-1.25	.03	.24	-7.4	.23	-7.4

REAL RMSE	.11	ADJ.SD	.54	SEPARATION 4.82	PERSON RELIABILITY .96
MODEL RMSE	.09	ADJ.SD	.54	SEPARATION 5.70	PERSON RELIABILITY .97

S.E. OF PERSON MEAN = .05

VALID RESPONSES: 98.8%

PERSON RAW SCORE-TO-MEASURE CORRELATION = .97 (approximate due to missing data)
CRONBACH ALPHA (KR-20) PERSON RAW SCORE RELIABILITY = .96 (approximate due to missing data)

Based on table 4, the respondents' reliability value was 0.93, and the respondent's separation value was 3.64. It recorded that the respondents' reliability was excellent and effective at a high degree of consistency (Bond and Fox, 2015). The respondent's established separation value was 3.64, which is more than 2.0 is considered acceptable (Linacre, 2012).

Table 4: Reliability and Respondent Separation Value for the Entire Construct Instruments: Pilot Study

SUMMARY OF 90 MEASURED ITEMS

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	622.6	118.6	.00	.08	1.00	-.2	1.23	.1

| S.D. 75.8 4.0 .34 .01 .39 2.5 1.39 3.2 |
| MAX. 796.0 120.0 1.34 .11 2.18 7.0 9.90 9.9 |
| MIN. 373.0 105.0 -.75 .02 .57 -3.5 .56 -3.6 |
| REAL RMSE .09 ADJ.SD .32 SEPARATION 3.64 ITEM RELIABILITY .93 |
|MODEL RMSE .08 ADJ.SD .32 SEPARATION 3.88 ITEM RELIABILITY .94 |
| S.E. OF ITEM MEAN = .04 |

UMEAN=.000 USCALE=1.000
ITEM RAW SCORE-TO-MEASURE CORRELATION = -.25 (approximate due to missing data)
10673 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 30720.43 with 9880 d.f. p=.0000

3.2 Polarity Item by PTMEA CORR Value

The Point Measurement Correlation or value analysis of PTMEA CORR was performed to define the sample's polarity items to test how far the defined constructs would achieve its objective. In the PTMEA CORR portion, if the value is positive (+), it signifies that the individual item will achieve its aim of measuring the construct it needs to scale (Bond & Fox, 2007). In comparison, if the value is negative (-), the defined item does not calculate the construct to be assessed. The item must be revised or discarded because it does not address the question or too complicated for the respondents to answer. The two items in the PRMEA CORR section, which were items V118_A and KINDIV2, had negative PTMEA CORR values, which implied the revision or discarding of the items. Thus, based on the result, two items in the questionnaire were discarded from 90 items. The other items displayed positive PTMEA CORR values, which indicated that the items computed the constructs to be measured (Bond & Fox, 2007).

Table 5: Point Measure Correlation (PMEA CORR) Value

INPUT: 120 PERSONS 90 ITEMS MEASURED: 120 PERSONS 90 ITEMS 764 CATS 3.68.2
PERSON: REAL SEP.: 4.82 REL.: .96 ... ITEM: REAL SEP.: 3.64 REL.: .93

ITEM STATISTICS: CORRELATION ORDER

ENTRY NUMBER	TOTAL SCORE	MODEL COUNT	MEASURE	S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	DISPLACE	ITEM	G
90	373	107	.31	.09	2.18	6.4	2.31	7.0	-.39	.50	22.4	34.1	.00	V118_A	0
1	523	120	.25	.07	2.09	6.9	2.89	9.9	-.10	.56	16.7	29.0	.00	KINDIV2	0
83	411	107	.27	.08	1.91	5.7	2.00	6.1	.00	.56	22.4	30.1	.00	KINDIV6R	0
89	431	105	.02	.08	1.76	4.7	1.83	5.0	.03	.55	22.9	31.5	.00	V117_A	0
86	473	108	.05	.07	2.15	7.0	3.03	9.9	.04	.62	20.4	25.7	.00	V114_A	0

18	796	120	1.34	.02	1.79	1.4	9.90	9.9	.09	.30	40.0	37.2	.02	KPASU24 0
87	401	105	.25	.08	1.69	4.4	1.73	4.6	.13	.56	16.2	30.9	.00	KINDIV45 0
7	601	120	.59	.08	1.60	4.1	1.63	4.3	.15	.54	28.3	32.6	.00	KINDIV12 0
8	600	120	.56	.08	1.49	3.3	1.49	3.2	.15	.51	35.8	35.4	.00	KINDIV13 0
88	405	105	.22	.09	1.43	2.7	1.39	2.4	.19	.51	31.4	37.2	.00	KINDIV47 0
6	645	120	.25	.08	1.41	2.2	1.56	2.9	.20	.50	35.8	38.1	.00	KINDIV10 0
81	569	110	-.28	.07	1.72	4.5	2.15	5.8	.21	.57	26.4	26.4	.00	KINDIV1R 0
15	680	120	-.62	.11	1.18	1.2	1.28	1.8	.26	.41	55.8	44.9	.00	KINDIV20 0
38	658	120	1.31	.02	1.84	1.5	9.90	9.9	.28	.33	40.8	32.9	.02	KORGN44 0
85	503	109	-.19	.08	1.47	3.2	1.49	3.4	.28	.56	27.5	31.1	.00	V113_A 0
4	559	120	.49	.07	1.47	3.3	1.58	3.9	.29	.56	26.7	30.0	.00	KINDIV7 0
2	653	120	-.30	.09	1.23	1.6	1.23	1.5	.29	.46	32.5	39.8	.00	KINDIV4 0
82	599	109	-.54	.07	1.45	3.0	1.90	4.5	.30	.54	31.2	29.1	.00	KINDIV3R 0
84	601	108	-.56	.07	1.49	3.0	1.95	4.4	.30	.54	26.9	30.8	.00	KINDIV8R 0
10	618	120	.34	.09	1.23	1.8	1.25	1.9	.31	.49	36.7	37.2	.00	KINDIV15 0
9	601	120	-.36	.09	1.26	1.8	1.24	1.7	.32	.49	37.5	37.4	.00	KINDIV14 0
5	647	120	-.51	.09	1.16	1.3	1.23	1.8	.32	.46	38.3	38.4	.00	KINDIV9 0
11	653	120	.05	.09	1.19	1.4	1.15	1.1	.33	.47	40.8	39.5	.00	KINDIV16 0
13	687	120	-.55	.11	1.05	.5	1.04	.4	.36	.41	47.5	43.0	.00	KINDIV18 0
14	692	120	-.75	.11	1.03	.3	1.03	.3	.38	.40	50.0	43.5	.00	KINDIV19 0
3	657	120	-.54	.09	1.08	.5	1.06	.4	.39	.46	37.5	40.7	.00	KINDIV5 0
20	686	120	-.31	.08	1.16	1.3	1.16	1.3	.41	.52	40.8	33.7	.00	KPASU26 0
12	660	120	-.43	.10	1.00	.0	1.00	.0	.43	.43	44.2	41.6	.00	KINDIV17 0
40	599	120	.07	.08	1.13	1.0	1.14	1.0	.44	.53	44.2	34.9	.00	KORGN48 0
16	685	120	.10	.10	.96	-.2	.95	-.3	.48	.43	46.7	40.9	.00	KINDIV22 0
23	729	120	-.42	.09	.98	-.1	.99	-.1	.49	.47	42.5	38.8	.00	KPASU29 0

	25	721	120	-.40	.09	.99	-.1	.99	.0	.50	.49	37.5	35.0	.00	KPASU31 0
	17	714	120	-.39	.09	1.04	.3	.98	-.1	.51	.50	44.2	37.0	.00	KPASU23 0
	21	702	120	-.34	.09	1.00	.0	.97	-.2	.51	.50	45.8	36.7	.00	KPASU27 0
	31	683	120	-.35	.07	1.12	.9	1.09	.7	.52	.55	41.7	32.0	.00	KPASU37 0
	39	600	120	.26	.08	1.01	.1	.98	-.1	.54	.54	41.7	34.4	.00	KORGN46 0
	19	717	120	.08	.10	.90	-.8	.93	-.5	.54	.47	37.5	37.2	.00	KPASU25 0
	32	709	120	-.36	.09	.95	-.3	.93	-.5	.55	.50	41.7	34.7	.00	KPASU38 0
	22	718	120	-.16	.09	.93	-.5	.92	-.6	.55	.49	43.3	36.5	.00	KPASU28 0
	26	737	120	-.17	.10	.89	-.9	.91	-.7	.55	.45	41.7	40.9	.00	KPASU32 0
	24	727	120	.12	.09	.88	-1.0	.89	-.9	.57	.47	39.2	38.1	.00	KPASU30 0
	30	722	120	-.41	.09	.89	-.8	.89	-.8	.57	.48	45.8	36.4	.00	KPASU36 0
	64	587	120	.09	.07	.94	-.4	.96	-.3	.59	.55	32.5	32.7	.00	PRESTASI 0
	28	730	120	-.10	.10	.84	-1.5	.87	-1.1	.60	.47	44.2	35.3	.00	KPASU34 0
	27	730	120	-.41	.10	.85	-1.3	.85	-1.2	.60	.47	44.2	39.3	.00	KPASU33 0
	33	655	120	.07	.08	.82	-1.3	.89	-.8	.60	.50	40.8	35.8	.00	KORGN39 0
	65	563	120	.13	.08	.90	-.7	.90	-.7	.61	.55	36.7	35.4	.00	V91_A 0
	29	731	120	-.09	.10	.81	-1.7	.83	-1.5	.61	.47	43.3	35.7	.00	KPASU35 0
	34	566	120	.42	.07	.89	-.9	.91	-.7	.63	.56	31.7	30.0	.00	KORGN40 0
	56	603	120	.03	.08	.84	-1.1	.79	-1.5	.64	.51	47.5	36.8	.00	V82_A 0
	46	622	120	.13	.08	.79	-1.5	.89	-.7	.65	.52	45.8	34.8	.00	INOVASI1 0
	67	576	120	.13	.07	.90	-.7	.93	-.5	.65	.60	41.7	30.3	.00	V93_A 0
	66	564	120	.09	.07	.86	-1.1	.88	-.9	.66	.58	40.0	32.4	.00	V92_A 0
	35	599	120	.32	.08	.77	-1.8	.80	-1.5	.66	.53	39.2	33.7	.00	KORGN41 0
	48	568	120	.11	.08	.81	-1.5	.81	-1.5	.67	.55	38.3	33.7	.00	INOVASI3 0
	59	576	120	.30	.07	.80	-1.5	.86	-1.0	.67	.55	39.2	33.3	.00	V85_A 0
	37	617	120	.13	.09	.73	-2.0	.73	-2.0	.68	.50	47.5	38.4	.00	KORGN43 0

63	606	120	.11	.07	.79	-1.5	.82	-1.3	.68	.56	43.3	31.9		.00	V89_A	0
53	605	120	-.05	.08	.76	-1.8	.76	-1.8	.68	.50	48.3	37.3		.00	INOVASI9	0
60	585	120	.26	.08	.77	-1.7	.81	-1.4	.69	.54	41.7	33.5		.00	V86_A	0
71	630	120	.05	.09	.70	-2.0	.69	-2.1	.69	.48	47.5	40.1		.00	V97_A	0
74	635	120	.04	.09	.69	-2.0	.67	-2.2	.69	.47	51.7	42.1		.00	V100_A	0
73	636	120	.04	.09	.69	-2.1	.68	-2.2	.69	.48	48.3	41.4		.00	V99_A	0
49	638	120	-.06	.08	.74	-2.0	.77	-1.8	.69	.51	44.2	34.5		.00	INOVASI5	0
41	618	120	.24	.08	.72	-2.0	.77	-1.7	.69	.53	42.5	33.5		.00	KORGN49	0
42	649	120	.14	.09	.68	-2.1	.71	-2.0	.70	.50	49.2	36.6		.00	KORGN50	0
36	627	120	.21	.08	.69	-2.4	.74	-2.1	.70	.52	45.0	34.0		.00	KORGN42	0
43	635	120	.16	.09	.68	-2.2	.71	-2.1	.71	.50	46.7	36.0		.00	KORGN51	0
47	609	120	.09	.08	.71	-2.2	.71	-2.1	.71	.51	47.5	36.1		.00	INOVASI2	0
75	634	120	.00	.09	.67	-2.2	.64	-2.5	.71	.48	50.8	41.9		.00	V101_A	0
68	603	120	-.07	.08	.72	-2.3	.73	-2.2	.72	.53	45.8	34.5		.00	V94_A	0
69	644	120	-.08	.09	.67	-2.3	.65	-2.6	.72	.47	51.7	41.9		.00	V95_A	0
72	638	120	.00	.09	.66	-2.5	.64	-2.7	.73	.50	52.5	38.1		.00	V98_A	0
62	626	120	-.12	.08	.69	-2.4	.69	-2.4	.73	.51	49.2	36.4		.00	V88_A	0
55	591	120	.08	.08	.69	-2.4	.69	-2.4	.73	.52	48.3	36.2		.00	V81_A	0
77	628	120	.00	.08	.68	-2.3	.68	-2.3	.73	.52	42.5	36.3		.00	V103_A	0
45	654	120	.07	.08	.64	-2.5	.67	-2.5	.73	.51	51.7	34.9		.00	KORGN53	0
78	639	120	-.13	.08	.67	-2.4	.65	-2.6	.73	.53	45.8	37.3		.00	V104_A	0
52	617	120	-.07	.09	.68	-2.3	.66	-2.5	.74	.49	49.2	39.7		.00	INOVASI8	0
80	621	120	-.03	.08	.68	-2.4	.67	-2.4	.74	.54	45.8	35.9		.00	V106_A	0
79	625	120	-.03	.08	.68	-2.4	.68	-2.4	.74	.55	43.3	34.8		.00	V105_A	0
70	638	120	-.07	.09	.66	-2.6	.64	-2.8	.74	.48	47.5	38.5		.00	V96_A	0
51	624	120	.08	.08	.64	-2.6	.64	-2.5	.75	.51	51.7	38.1		.00	INOVASI7	0

58	616	120	-.10	.08	.67	-2.7	.67	-2.7	.75	.53	50.0	34.4	.00	V84_A	0
76	623	120	.00	.08	.64	-2.6	.64	-2.6	.75	.52	46.7	38.2	.00	V102_A	0
44	643	120	-.03	.08	.63	-2.9	.63	-2.9	.76	.54	48.3	34.6	.00	KORGN52	0
54	599	120	.07	.08	.63	-2.8	.63	-2.9	.77	.51	51.7	36.9	.00	V80_A	0
61	619	120	-.07	.08	.63	-3.1	.62	-3.1	.78	.51	45.0	35.3	.00	V87_A	0
50	633	120	-.05	.08	.59	-3.1	.58	-3.2	.79	.51	52.5	37.6	.00	INOVASI6	0
57	617	120	.00	.08	.57	-3.5	.56	-3.6	.81	.52	52.5	34.8	.00	V83_A	0
MEAN	622.6	118.6	.00	.08	1.00	-.2	1.23	.1			41.3	35.8			
S.D.	75.8	4.0	.34	.01	.39	2.5	1.39	3.2			8.6	3.7			

3.3 Item Fit in Measuring the Constructs

Item fit is decided by Mean Square (MNSQ) infit and outfit. Bond and Fox (2015) pointed out that the MNSQ infit and outfit should be in the range of value 0.60 to 1.40 to guarantee the items are suitable for measuring constructs. Nevertheless, the outfit index MNSQ is more significant in advance compared to infit MNSQ to determine the congruity of items measuring a construct. If the MNSQ infit or outfit values more than 1.40 logits, it indicates a confusing item. If the MNSQ value is less than 0.60 logit, it suggests that respondents assume the item is too easy (Linacre, 2012). The infit and outfit MNSQ value should also be within -2.00 to +2.00 (Bond and Fox, 2015).

If this requirement is not met, the object should be either corrected or dismissed. Table 5 shows the misfit order featuring 17 items having the largest MNSQ and two items of value resulting from the smallest MNSQ item analysis statistics: misfit order. Seventeen items that exceeded the value of 1.40 in column outfit MNSQ were KPASU24, KORGN44, V114_A, KINDIV2, V118_A, KINDIV1R, KINDIV6R, KINDIV8R, KINDIV3R, V117_A, KINDIV45, KINDIV12, KINDIV7, KINDIV10, KINDIV13, V113_A, and KINDIV47. At the same
time, INOVASI6 and V83_A were items below 0.60. Based on Table 6, 19 items were not in the specified range, and the items should be revised.

Table 6: Item Fit Based on MNSQ Value

INPUT: 120 PERSONS 90 ITEMS MEASURED: 120 PERSONS 90 ITEMS 764 CATS 3.68.2

PERSON: REAL SEP.: 4.82 REL.: .96 ... ITEM: REAL SEP.: 3.64 REL.: .93 ITEM STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	MODEL COUNT	MEASURE	S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	EXACT MATCH EXP.	OBS%	EXP%	DISPLACE	ITEM	G
18	796	120	1.34	.02	1.79	1.4	9.90	9.9	A .09	.30	40.0	37.2	.02	KPASU24	0
38	658	120	1.31	.02	1.84	1.5	9.90	9.9	B .28	.33	40.8	32.9	.02	KORGN44	0
86	473	108	.05	.07	2.15	7.0	3.03	9.9	C .04	.62	20.4	25.7	.00	V114_A	0

	1	523	120	.25	.07	2.09	6.9	2.89	9.9	D-.10	.56	16.7 29.0	.00 KINDIV2 0
	90	373	107	.31	.09	2.18	6.4	2.31	7.0	E-.39	.50	22.4 34.1	.00 V118_A 0
	81	569	110	-.28	.07	1.72	4.5	2.15	5.8	F .21	.57	26.4 26.4	.00 KINDIV1R 0
	83	411	107	.27	.08	1.91	5.7	2.00	6.1	G .00	.56	22.4 30.1	.00 KINDIV6R 0
	84	601	108	-.56	.07	1.49	3.0	1.95	4.4	H .30	.54	26.9 30.8	.00 KINDIV8R 0
	82	599	109	-.54	.07	1.45	3.0	1.90	4.5	I .30	.54	31.2 29.1	.00 KINDIV3R 0
	89	431	105	.02	.08	1.76	4.7	1.83	5.0	J .03	.55	22.9 31.5	.00 V117_A 0
	87	401	105	.25	.08	1.69	4.4	1.73	4.6	K .13	.56	16.2 30.9	.00 KINDIV45 0
	7	601	120	.59	.08	1.60	4.1	1.63	4.3	L .15	.54	28.3 32.6	.00 KINDIV12 0
	4	559	120	.49	.07	1.47	3.3	1.58	3.9	M .29	.56	26.7 30.0	.00 KINDIV7 0
	6	645	120	.25	.08	1.41	2.2	1.56	2.9	N .20	.50	35.8 38.1	.00 KINDIV10 0
	8	600	120	.56	.08	1.49	3.3	1.49	3.2	O .15	.51	35.8 35.4	.00 KINDIV13 0
	85	503	109	-.19	.08	1.47	3.2	1.49	3.4	P .28	.56	27.5 31.1	.00 V113_A 0
	88	405	105	.22	.09	1.43	2.7	1.39	2.4	Q .19	.51	31.4 37.2	.00 KINDIV47 0
	15	680	120	-.62	.11	1.18	1.2	1.28	1.8	R .26	.41	55.8 44.9	.00 KINDIV20 0
	9	601	120	-.36	.09	1.26	1.8	1.24	1.7	S .32	.49	37.5 37.4	.00 KINDIV14 0
	10	618	120	.34	.09	1.23	1.8	1.25	1.9	T .31	.49	36.7 37.2	.00 KINDIV15 0
	2	653	120	-.30	.09	1.23	1.6	1.23	1.5	U .29	.46	32.5 39.8	.00 KINDIV4 0
	5	647	120	-.51	.09	1.16	1.3	1.23	1.8	V .32	.46	38.3 38.4	.00 KINDIV9 0
	11	653	120	.05	.09	1.19	1.4	1.15	1.1	W .33	.47	40.8 39.5	.00 KINDIV16 0
	20	686	120	-.31	.08	1.16	1.3	1.16	1.3	X .41	.52	40.8 33.7	.00 KPASU26 0
	40	599	120	.07	.08	1.13	1.0	1.14	1.0	Y .44	.53	44.2 34.9	.00 KORGN48 0
	31	683	120	-.35	.07	1.12	.9	1.09	.7	Z .52	.55	41.7 32.0	.00 KPASU37 0
	BETTER FITTING OMITTED										+----------+----------+		
	49	638	120	-.06	.08	.74	-2.0	.77	-1.8	.69	.51	44.2 34.5	.00 INOVASI5 0
	41	618	120	.24	.08	.72	-2.0	.77	-1.7	.69	.53	42.5 33.5	.00 KORGN49 0
	36	627	120	.21	.08	.69	-2.4	.74	-2.1	.70	.52	45.0 34.0	.00 KORGN42 0
	68	603	120	-.07	.08	.72	-2.3	.73	-2.2	.72	.53	45.8 34.5	.00 V94_A 0
	42	649	120	.14	.09	.68	-2.1	.71	-2.0	z .70	.50	49.2 36.6	.00 KORGN50 0
	47	609	120	.09	.08	.71	-2.2	.71	-2.1	y .71	.51	47.5 36.1	.00 INOVASI2 0
	43	635	120	.16	.09	.68	-2.2	.71	-2.1	x .71	.50	46.7 36.0	.00 KORGN51 0
	71	630	120	.05	.09	.70	-2.0	.69	-2.1	w .69	.48	47.5 40.1	.00 V97_A 0
	74	635	120	.04	.09	.69	-2.0	.67	-2.2	v .69	.47	51.7 42.1	.00 V100_A 0
	62	626	120	-.12	.08	.69	-2.4	.69	-2.4	u .73	.51	49.2 36.4	.00 V88_A 0
	73	636	120	.04	.09	.69	-2.1	.68	-2.2	t .69	.48	48.3 41.4	.00 V99_A 0
	55	591	120	.08	.08	.69	-2.4	.69	-2.4	s .73	.52	48.3 36.2	.00 V81_A 0
	80	621	120	-.03	.08	.68	-2.4	.67	-2.4	r .74	.54	45.8 35.9	.00 V106_A 0
	79	625	120	-.03	.08	.68	-2.4	.68	-2.4	q .74	.55	43.3 34.8	.00 V105_A 0
	52	617	120	-.07	.09	.68	-2.3	.66	-2.5	p .74	.49	49.2 39.7	.00 INOVASI8 0
	77	628	120	.00	.08	.68	-2.3	.68	-2.3	o .73	.52	42.5 36.3	.00 V103_A 0
	78	639	120	-.13	.08	.67	-2.4	.65	-2.6	n .73	.53	45.8 37.3	.00 V104_A 0
	58	616	120	-.10	.08	.67	-2.7	.67	-2.7	m .75	.53	50.0 34.4	.00 V84_A 0
	69	644	120	-.08	.09	.67	-2.3	.65	-2.6	l .72	.47	51.7 41.9	.00 V95_A 0
	75	634	120	.00	.09	.67	-2.2	.64	-2.5	k .71	.48	50.8 41.9	.00 V101_A 0
	45	654	120	.07	.08	.64	-2.5	.67	-2.5	j .73	.51	51.7 34.9	.00 KORGN53 0
	70	638	120	-.07	.09	.66	-2.6	.64	-2.8	i .74	.48	47.5 38.5	.00 V96_A 0
	72	638	120	.00	.09	.66	-2.5	.64	-2.7	h .73	.50	52.5 38.1	.00 V98_A 0
	51	624	120	.08	.08	.64	-2.6	.64	-2.5	g .75	.51	51.7 38.1	.00 INOVASI7 0
	76	623	120	.00	.08	.64	-2.6	.64	-2.6	f .75	.52	46.7 38.2	.00 V102_A 0

	44	643	120	-.03	.08	.63	-2.9	.63	-2.9	e	.76	.54	48.3	34.6	.00	KORGN52	0
	54	599	120	.07	.08	.63	-2.8	.63	-2.9	d	.77	.51	51.7	36.9	.00	V80_A	0
	61	619	120	-.07	.08	.63	-3.1	.62	-3.1	c	.78	.51	45.0	35.3	.00	V87_A	0
	50	633	120	-.05	.08	.59	-3.1	.58	-3.2	b	.79	.51	52.5	37.6	.00	INOVASI6	0
	57	617	120	.00	.08	.57	-3.5	.56	-3.6	a	.81	.52	52.5	34.8	.00	V83_A	0
MEAN	622.6	118.6	.00	.08	1.00	-.2	1.23	.1					41.3	35.8			
S.D.	75.8	4.0	.34	.01	.39	2.5	1.39	3.2					8.6	3.7			

3.4 Item Difficulty and Respondent's Ability

Figure 1 presents the item difficulty and the distribution of respondents over all the logit scale. Item difficulty ranged from -0.75 to +1.34 logit. The respondents' ability was estimated from -1.25 to +1.47, which was marginally higher than the measure of item difficulty. The map dramatically eased the researcher to discover where most items were distributed, essentially to examine if this was parallel with the respondent spread.

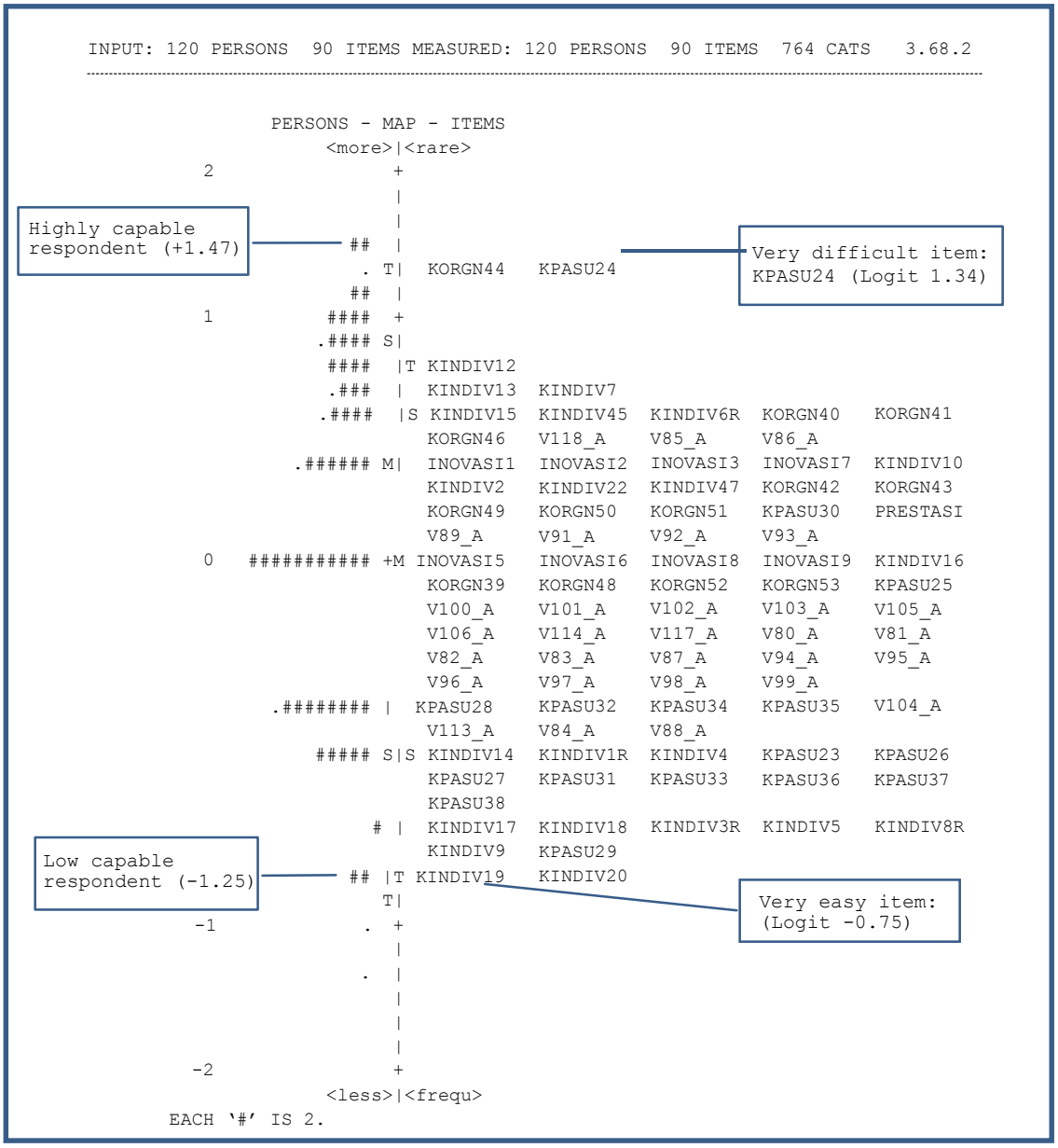

Figure 1: Item Map of Creativity and Innovation in the Public Sector

3.5 Standardised Residual Correlations

Linacre (2012) asserted that the value of 0.7 and above is a good correlation since it symbolises that the constructed items are not singular and interdependent with other items. In this study, individual creativity, team creativity, organisational innovation, innovation processes and organisational performance items were evaluated to identify whether items depended on other items. Nevertheless, if two items' correlation value was more than 0.7, a high correlation value was indicated, and only one item was needed for measuring. Based on the analysis attended as in Table 7, 10 pairs of items displayed a value above 0.7. For construct measurement, only one item was chosen.

Table 7: Analysis of Standardised Residual Correlations

INPUT: 120 PERSONS 90 ITEMS MEASURED: 120 PERSONS 90 ITEMS 764 CATS 3.68.2

LARGEST STANDARDISED RESIDUAL CORRELATIONS USED TO IDENTIFY DEPENDENT ITEMS

RESIDUL CORRELN	ENTRY NUMBER	ITEM	ENTRY NUMBER	ITEM
.94	76	V102_A	77	V103_A
.93	28	KPASU34	29	KPASU35
.92	79	V105_A	80	V106_A
.90	76	V102_A	80	V106_A
.88	77	V103_A	80	V106_A
.88	13	KINDIV18	14	KINDIV19
.88	61	V87_A	62	V88_A
.87	26	KPASU32	27	KPASU33
.87	77	V103_A	79	V105_A
.85	42	KORGN50	43	KORGN51

4. DISCUSSIONS AND CONCLUSION

Following data analysis, each item was revised following the standard index and the criteria to fulfil the validity and reliability requirements of the Rasch measurement model. Based on the findings, nine items did not meet the criteria of analysis and should be discarded. Nonetheless, 19 items were sufficiently refined according to study context and weight. The comprehensive description of related items is shown in Table 8.

Table 8: The Summary of Items Dropped and Retained

Constructs	**Retained Item**	**Total Items Retained**	**Item Dropped**	**Total Item Dropped**
Individual Creativity	V109_A, V110_A, KINDIV4, KINDIV5, V111_A, KINDIV7, V112_A, KINDIV9, KINDIV10, V113_A, KINDIV12, KINDIV13, KINDIV14, KINDIV15, KINDIV16, KINDIV17, KINDIV18, KINDIV19, KINDIV20, V114_A	20	KINDIV2 KINDIV19	2
Team Creativity	KPASU23, KPASU24, KPASU25, KPASU26, KPASU27, KPASU28, KPASU29, KPASU30, KPASU31, KPASU33, KPASU34, KPASU36, KPASU37, KPASU38	14	KPASU32, KPASU35	2

Organisational Innovation	KORGN39, KORGN40, KORGN41, KORGN42, KORGN43, KORGN44,	14	KORGN50	1
	V115_A, KORGN46, V116_A, KORGN48, KORGN49, KORGN51, KORGN52, KORGN53			
Innovation	V70_A, V71_A, V72_A,	18	V88_A,	2
Processes	V117_A, V74_A, V75_A,		V118_A	
	V76_A, V77_A, V78_A, ,			
	V80_A, V81_A, V82_A,			
	V83_A, V84_A, V85_A,			
	V86_A, V87_A, V89_A			
Organisational	V90_A, V91_A, V92_A,	15	V102_A,	2
Performance	V93_A, V94_A, V95_A,		V105_A,	
	V96_A, V97_A, V98_A,			
	V99_A, V100_A, V101_A,			
	V103_A, V104_A,			
	V106_A			
	Total	81		9

Ergo, based on this analysis, an instrument's validity and reliability are quintessential features to consider when developing a novel study instrument. Overall, from this analysis, nine items dropped were questionable items on validity and reliability. Accordingly, based on the validity and reliability test conducted on this instrument, this instrument is relevant for other researchers' future studies. The completion of this research assisted researchers formed an exceptional public sector instrument. Employing this instrument would help the Innovation Coordinator measure the level of creativity and innovation in public sector organisations. For the public sector in Malaysia, this instrument would let agencies appreciate their creativity and innovation levels in their organisation. Besides, they could design and administer creativity and innovation action plans to achieve a higher innovation culture level.

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