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PSYCHOMETRIC EVALUATION OF PURCHASE INTENTION AND ACTUAL PURCHASE BEHAVIOUR TOWARDS HALAL BAKERY PRODUCTS USING RASCH ANALYSIS

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ABSTRACT

Although bakery products are a hit among Malaysian consumers, questions still arise on the halal seal of the ingredients used. Therefore, producing halal bakery products can be an option to fulfill the needs of consumers. To further explore the intention and to examine their purchase behaviour, the theory of planned behaviour (TPB) was applied. Hence, this study examined the psychometric properties of an instrument used to determine both purchase intention and the actual purchase behaviour of halal bakery products among Muslim and non-Muslim consumers. The questionnaire was distributed to 70 respondents who had purchased bakery products at any bakery shops in Klang, Selangor. The data were subjected to Rasch analysis using Bond & Fox (2nd Version) software program for fit statistics, response category performance, unidimensionality, and a Wright map. The different item functioning (DIF) analysis was employed to detect bias between Muslim and non-Muslim consumers. The results indicated that all items that fit the Rasch model were unidimensional. However, one item was regarded as a difficult item, while three items had a religious bias. In conclusion, the instrument was valid and reliable to be used for Muslim and non-Muslim consumers.

Key words: Halal bakery, Rasch analysis, theory of planned behaviour, muslim and non-muslim consumers

INTRODUCTION

Halal is defined as permitted, permissible, and lawful (Hfaadmin, 2016). Contrary to halal is "haram" (non-halal), which means "forbidden and unlawful" in Islamic law (Mathew, Abdullah & Ismail, 2014). Halal food is not only symbolic towards the adherence to Islamic law, but it also reflects cleanliness and health (Ambali & Bakar, 2013). Hence, the demand for the halal food industry has escalated (Ismail *et al*., 2018).

Malaysia is a pioneer in initiating the halal food industry and has the highest number of halal products produced in the world (Khalek, 2018). These halal products do not only focus on consumer goods, but they also encompass various types of food, including baked goods. Although many studies related to halal food consumption have been conducted in Malaysia (Funke *et al*., 2009; Shah Alam & Mohamed Sayuti, 2011; Khalek, 2015; Khalek & Ismail, 2015; Haque *et al*., 2015; Arsil *et al*., 2018), only a handful have looked into the market acceptance towards halal bakery products among non-Muslim consumers (Mathew *et al.,* 2014). With that, this study assessed the factors that influenced the halal bakery products purchase intention among consumers based on the TPB (Ajzen, 1991; Aditami, 2016).

TPB is applicable in the investigation of factors that can influence a consumer's purchase intention towards halal products. According to the TPB, there are three elements of behavioural intention, which are conceptually independent. These are attitude, subjective norm, and perceived behavioural control that act as variables in examining consumers' intention in the market (Bone & Reid, 2013).

In the research field, a questionnaire must be validated by experts and subjected to a pilot study in order to evaluate its validity and reliability prior to the actual study. Hence, the Rasch analysis, which is a modern psychometric method in validating instrument (Gothwal *et al*., 2009; Lamoureux *et al*.,

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2009; Razak, Khairani & Thien, 2012; Guttersrud, Dalane & Pettersen, 2014), had been applied in this study. The application of Rasch model offers a transformation of an ordinal score into a linear, interval-level variable and should provide as a quality control where the data should fit Rasch model expectations (Tennant & Conaghan, 2007).

The components of Rasch analysis include fit statistic, threshold calibration, DIF, wright map, and principal components analysis of residuals (PCAR). First, the fit statistics was performed to ensure if the item suitability has a positive point-measure correlation (PTMEA Corr.). According to Linacre (2007), Infit and Outfit Mean Square (MNSQ) values greater than 0.5 and less than 1.5 are considered productive for measurement purposes. He added that the Z-standardized (ZSTD) values between -2.00 and 2.00 are an indicator that the raw data have reasonable predictability. Second, a threshold is defined as the person and location ability at which the probability of responding to one of two adjacent response categories reaches 0.50 (Wright and Linacre, 1992). The curve parameters showed that the succeeding order of the thresholds reflected successively more of the latent ability or attitude.

Next, the Different Item Functioning (DIF) testing was conducted to determine if different groups within the sample (such as age, sex, religion and education), regardless of equal levels of functioning, responded differently to individual items (Lamoureux *et al*., 2009). There are two types of DIF; uniform and non-uniform DIF. Teresi, Kleinman & Ocepek (2000) mentioned that uniform DIF indicates a consistent systematic difference in their responses to an item, across the whole range of the attribute being measured. Conversely, the non-uniform DIF refers to a situation where there are differences between the groups (differences that vary across levels of the attribute). Next, the Wright map is used to ensure the level of difficulty of the items within the acceptable range as it reflects a respondent's ability to respond to each item.

Finally, the Rasch model is a unidimensional measurement model with the assumption that when the items are combined together, they will form a unidimensional scale (Tennant & Conaghan, 2007). The unidimensionality of the Rasch analysis is presented as the Principal component analysis (PCAR). The PCAR explains variance and provides estimations for people and items (Linacre, 2012). Hence, this research intends to examine the psychometric properties of an instrument used to determine purchase intention and the actual purchase behaviour of halal bakery products among Muslim and non-Muslim consumers.

MATERIALS AND METHODS

A 41-item questionnaire was developed based on various sources, namely Mathew *et al*. (2014), Wee *et al*. (2014), Aditami (2016) and Aiza and Mokhtar (2017). This questionnaire was comprised of four variables; TPB attributes, halal certification, purchase intention, and the actual purchase behaviour. The TPB attributes consist of attitude, subjective norms, and perceived behavioural control. The items for attitude (6 items), subjective norms (7 items), perceived behavioural control (10 items), and purchase intention (5 items) were adapted from Mathew *et al*. (2014) and Aditami (2016). Next, the items for the actual purchase behaviour (6 items) were adapted from Wee *et al.* (2014), while the halal certification items (7 items) were adapted from Aiza and Mokhtar (2017). Section A consisted of close-ended items that focused on the demographic profiles of the respondents, whereas Sections B until E measured the responses using the four-point Likert scale: (1) Strongly Disagree (SD), (2) Disagree (D), (3) Agree (A), and (4) Strongly Agree (SA). The middle category was omitted so as not to distort the data. This is because the inclusion of the middle category in the form of "unsure" or 'neither/nor" or "neutral" may not provide a meaningful measure to the data (Bradley *et al*., 2017). The instrument was then distributed among consumers who purchased bakery products at Bukit Tinggi, Klang, Selangor.

The demographic profile of the respondents was analysed using SPSS (version 16) and are described using mean, standard deviation (SD), frequency, and percentage. The remaining data were analysed using Bond & Fox (2nd edition) software program. The data were subjected to threshold calibration, person and fit statistics, unidimensionality, DIF and Wright map.

RESULTS AND DISCUSSION

A total of 70 consumers who purchased bakery products responded to the instrument. However, during screening, 7 instruments were discarded due to missing data and only 63 instruments were accepted as usable data (90%). Most of the participating respondents were females (n = 34, 54%) aged between 26 and 30 years old (n = 16, 25.4%). More than half of the respondents were Muslims (n= 41, 65.1%) with tertiary education (n = 22, 34.9%).

The item and person summary statistic indicated that item reliability and person reliability indices exceeded 0.90 that are 0.94 and 0.97, respectively.

All items had positive PTMEA Corr. values with the MNSQ value exceeding 0.5 and less than 1.5, alongside the ZSTD values between -2.00 and 2.00 hence fit the Rasch measurement model. Any item with an MNSQ value exceeding the range of 0.5 to 1.5 is a misfit to the model (Linacre, 2006). Similarly, there was no evidence of disordered thresholds between the 4-category response scales. Therefore, the proposed response scale was retained.

The DIF analysis was tested for Muslim and non-Muslim respondents. As shown in Table 1, there is evidence of bias due to religion. A few items scored a DIF value greater than 0.5 with t values less than 2.00; indicating acceptance of the respondents. However, items 21, 40, and 41 were considered non-Muslim biased where the DIF size and t values exceeded the values of 0.5 and ± 2.00, respectively. Item 21; "I believe that halal bakery products are safe in terms of the source", is related to the perceived behavioural control with a DIF size of 1.42 and a t =2.60. Next, items 40; "Muslim consumers should look for halal certification before they purchase any bakery products", and 41; "I trust only the Malaysian Department of Islamic Development (JAKIM) halal certification", are related to halal certification with DIF sizes of 1.13 (t value = 2.10) and 1.30 (t value 2.44), respectively.

Based on the responses, the DIF analysis corroborated that the items in the questionnaire subscales were valid for this study with only minor evidence of biased items. Although the existence of DIF does not necessarily imply a bias in the items (Wright and Stone, 1999), all the listed items must be studied further in order to determine the existence of religious bias. Despite the non-Muslim item bias towards halal status and safety of food, a study conducted by Yang (2017) showed that safety is one of the factors that significantly contribute to the purchase behaviour amongst non-Muslim consumers in Malaysia. Similarly, non-Muslims were also shown to have a positive attitude and acceptance towards halal food (Golnaz *et al.,* 2010; Mathew *et al*., 2014; Nastasha, 2015). In addition, halal certification was also reported to influence their purchase behaviour (Aziz & Chok, 2010).

The PCAR indicates that the variance by the measure was comparable based on the empirical calculation (72.30%) and by the model (72.60%), which exceeded the minimum point of 40.0%, as required in the Rasch measurement model (Bond & Fox, 2013). Furthermore, the unexplained variance depicted by the first contrast was 2.7%, which is below the recommended cut-off of 5%, and therefore, dismissing multidimensionality. The findings confirmed the internal construct validity and the unidimensionality of the TPB instruments.

The Wright map displays the distribution of person (on the left side of the map) based on their ability from the most-able (bottom-most) to the least able (top-most) in endorsing items based on the 4 options provided in the Likert scale (Figure 1). It also displays the items based on the difficulty levels. Item BHC 7 "I trust only the Malaysian Department of Islamic Development (JAKIM) halal certification" was the most difficult item as only 19% of the respondents were able to endorse it, while item BHC 4 "Muslim consumers should buy halal bakery product that has halal certification" was regarded as the easiest item. Based on Figure 1, all items posed suited the respondents' ability to respond with. Furthermore, as the mean logit of person (+2.50) was higher than that of the item

Table 1. Different item functioning by religion

Person	OBSV		BASELINE		DIF	DIF	DIF	DIF	DIF	Item	Name
CLASS	COUNT	AVE	EXP	MEA	SCORE	MEA	SIZE	S.E.	t	Number	
IM	36	2.61	2.63	-0.57	-0.01	-0.5	0.07	0.36	0.18	1	BATT1
IM	36	2.67	2.64	-0.65	0.02	-0.76	-0.11	0.37	-0.3	2	BATT2
IM	36	2.69	2.66	-0.74	0.03	-0.91	-0.16	0.38	-0.43	3	BATT3
IM	36	2.42	2.39	0.39	0.02	0.3	-0.09	0.32	-0.27	4	BATT4
IM	36	2.36	2.39	0.39	-0.03	0.51	0.12	0.32	0.37	5	BATT5
IM	36	2.58	2.63	-0.57	-0.04	-0.38	0.19	0.35	0.54	6	BATT6
IM	36	2.28	2.27	0.82	0	0.8	-0.01	0.31	-0.04	7	BSN1
IM	36	2.47	2.47	0.09	0	0.09	0	0.33	0	8	BSN2
IM	36	2.5	2.49	0.01	0.01	-0.03	-0.03	0.33	-0.1	9	BSN3
IM	36	2.42	2.37	0.46	0.04	0.3	-0.16	0.32	-0.5	10	BSN4
IM	36	2.53	2.43	0.24	0.1	-0.14	-0.38	0.34	-1.11	11	BSN5
IM	36	2.44	2.33	0.6	0.11	0.19	-0.41	0.33	-1.26	12	BSN6
IM	36	2.22	2.25	0.89	-0.03	1	0.11	0.31	0.35	13	BSN7
IM	36	2.56	2.61	-0.48	-0.05	-0.26	0.22	0.34	0.65	14	BPBC1
IM	36	2.69	2.64	-0.65	0.05	-0.91	-0.25	0.38	-0.66	15	BPBC2
IM	36	2.56	2.55	-0.23	0.01	-0.26	-0.03	0.34	-0.08	16	BPBC3
IM	36	2.44	2.49	0.01	-0.05	0.19	0.18	0.33	0.56	17	BPBC4
IM	36	2.42	2.43	0.24	-0.02	0.3	0.06	0.32	0.19	18	BPBC5

Table 1 continued...

IM	36	2.61	2.55	-0.23	0.06	-0.5	-0.27	0.36	-0.76	19	BPBC6
IM	36	2.5	2.53	-0.15	-0.03	-0.03	0.12	0.33	0.37	20	BPBC7
IM	36	2.39	2.53	-0.15	-0.14	0.4	0.55	0.32	1.72	21	BPBC8
IM	36	2.5	2.51	-0.07	-0.01	-0.03	0.04	0.33	0.13	22	BPBC9
IM	36	2.56	2.57	-0.31	-0.01	-0.26	0.06	0.34	0.16	23	BPBC10
IM	36	2.56	2.57	-0.31	-0.01	-0.26	0.06	0.34	0.16	24	BPI1
IM	36	2.53	2.53	-0.15	0	-0.14	0.01	0.34	0.03	25	BPI2
IM	36	2.64	2.57	-0.31	0.07	-0.63	-0.32	0.36	-0.88	26	BPI3
IM	36	2.56	2.49	0.01	0.06	-0.26	-0.26	0.34	-0.77	27	BPI4
IM	36	2.64	2.59	-0.39	0.05	-0.63	-0.24	0.36	-0.65	28	BPI5
IM	36	2.56	2.53	-0.15	0.03	-0.26	-0.11	0.34	-0.31	29	BAB1
IM	36	2.5	2.51	-0.07	-0.01	-0.03	0.04	0.33	0.13	30	BAB2
IM	36	2.42	2.45	0.16	-0.04	0.3	0.14	0.32	0.42	31	BAB3
IM	36	2.36	2.43	0.24	-0.07	0.51	0.27	0.32	0.84	32	BAB4
IM	36	2.58	2.57	-0.31	0.01	-0.38	-0.06	0.35	-0.19	33	BAB5
IM	36	2.5	2.45	0.16	0.05	-0.03	-0.19	0.33	-0.56	34	BAB6
IM	36	2.56	2.53	-0.15	0.03	-0.26	-0.11	0.34	-0.31	35	BHC1
IM	36	2.64	2.59	-0.39	0.05	-0.63	-0.24	0.36	-0.65	36	BHC2
IM	36	2.56	2.53	-0.15	0.03	-0.26	-0.11	0.34	-0.31	37	BHC3
IM	36	2.72	2.79	-1.45	-0.07	-1.06	0.4	0.39	1.01	38	BHC4
IM	36	2.39	2.33	0.6	0.06	0.4	-0.2	0.32	-0.63	39	BHC5
IM	36	2.42	2.53	-0.15	-0.11	0.3	0.45	0.32	1.38	40	BHC6
IM	36	1.28	1.39	3.48	-0.11	3.76	0.29	0.27	1.06	41	BHC7
NM	11	1.73	1.68	-0.57	0.05	-0.71	-0.15	0.52	-0.29	1	BATT1
NM	11	1.64	1.71	-0.65	-0.07	-0.44	0.21	0.52	0.4	2	BATT2
NM	11	1.64	1.74	-0.74	-0.1	-0.44	0.3	0.52	0.58	3	BATT3
NM	11	1.27	1.35	0.39	-0.07	0.59	0.21	0.5	0.41	4	BATT4
NM	11	1.45	1.35	0.39	0.11	0.08	-0.31	0.51	-0.6	5	BATT5
NM	11	1.82	1.68	-0.57	0.14	-0.99	-0.43	0.53	-0.8	6	BATT6
NM	11	1.18	1.19	0.82	-0.01	0.85	0.03	0.51	0.06	7	BSN1
NM	11	1.45	1.45	0.09	0	0.08	-0.01	0.51	-0.01	8	BSN2
NM	11	1.45	1.48	0.01	-0.02	0.08	0.07	0.51	0.14	9	BSN3
NM	11	1.18	1.32	0.46	-0.14	0.85	0.39	0.51	0.77	10	BSN4
NM	11	1.09	1.4	0.24	-0.31	1.1	0.87	0.51	1.71	11	BSN5
NM	11	0.91	1.27	0.6	-0.36	1.62	1.02	0.52	1.98	12	BSN6
NM	11	1.27	1.17	0.89	0.11	0.59	-0.3	0.5	-0.59	13	BSN7
NM	11	1.82	1.65	-0.48	0.17	-0.99	-0.51	0.53	-0.97	14	BPBC1
NM	11	1.55	1.71	-0.65	-0.16	-0.18	0.47	0.51	0.93	15	BPBC2
NM	11	1.55	1.56	-0.23	-0.02	-0.18	0.05	0.51	0.1	16	BPBC3
NM	11	1.64	1.48	0.01	0.16	-0.44	-0.45	0.52	-0.88	17	BPBC4
NM	11	1.45	1.4	0.24	0.06	0.08	-0.16	0.51	-0.31	18	BPBC5
NM	11	1.36	1.56	-0.23	-0.2	0.34	0.57	0.51	1.12	19	BPBC6
NM	11	1.64	1.53	-0.15	0.1	-0.44	-0.3	0.52	-0.57	20	BPBC7
NM	***11***	***2***	***1.53***	***-0.15***	***0.47***	***-1.57***	***-1.42***	***0.54***	***-2.6***	***21***	***BPBC8***
NM	11	1.55	1.51	-0.07	0.04	-0.18	-0.11	0.51	-0.22	22	BPBC9
NM	11	1.64	1.59	-0.31	0.05	-0.44	-0.13	0.52	-0.26	23	BPBC10
NM	11	1.64	1.59	-0.31	0.05	-0.44	-0.13	0.52	-0.26	24	BPI1
NM	11	1.55	1.53	-0.15	0.01	-0.18	-0.03	0.51	-0.06	25	BPI2
NM	11	1.36	1.59	-0.31	-0.23	0.34	0.65	0.51	1.28	26	BPI3
NM	11	1.27	1.48	0.01	-0.21	0.59	0.58	0.5	1.16	27	BPI4
NM	11	1.45	1.62	-0.39	-0.16	0.08	0.47	0.51	0.93	28	BPI5
NM	11	1.45	1.53	-0.15	-0.08	0.08	0.23	0.51	0.45	29	BAB1
NM	11	1.55	1.51	-0.07	0.04	-0.18	-0.11	0.51	-0.22	30	BAB2
NM	11	1.55	1.43	0.16	0.12	-0.18	-0.34	0.51	-0.67	31	BAB3
NM	11	1.64	1.4	0.24	0.24	-0.44	-0.68	0.52	-1.32	32	BAB4
NM	11	1.55	1.59	-0.31	-0.05	-0.18	0.13	0.51	0.26	33	BAB5
NM	11	1.27	1.43	0.16	-0.15	0.59	0.43	0.5	0.85	34	BAB6
NM	11	1.45	1.53	-0.15	-0.08	0.08	0.23	0.51	0.45	35	BHC1
NM	11	1.45	1.62	-0.39	-0.16	0.08	0.47	0.51	0.93	36	BHC2
NM	11	1.45	1.53	-0.15	-0.08	0.08	0.23	0.51	0.45	37	BHC3
NM	11	2.18	1.97	-1.45	0.22	-2.18	-0.73	0.56	-1.29	38	BHC4
NM	11	1.09	1.27	0.6	-0.18	1.1	0.5	0.51	0.98	39	BHC5
NM	***11***	***1.91***	***1.53***	***-0.15***	***0.37***	***-1.27***	***-1.13***	***0.54***	***-2.1***	***40***	***BHC6***
NM	***11***	***0.73***	***0.37***	***3.48***	***0.35***	***2.17***	***-1.3***	***0.53***	***-2.44***	***41***	***BHC7***

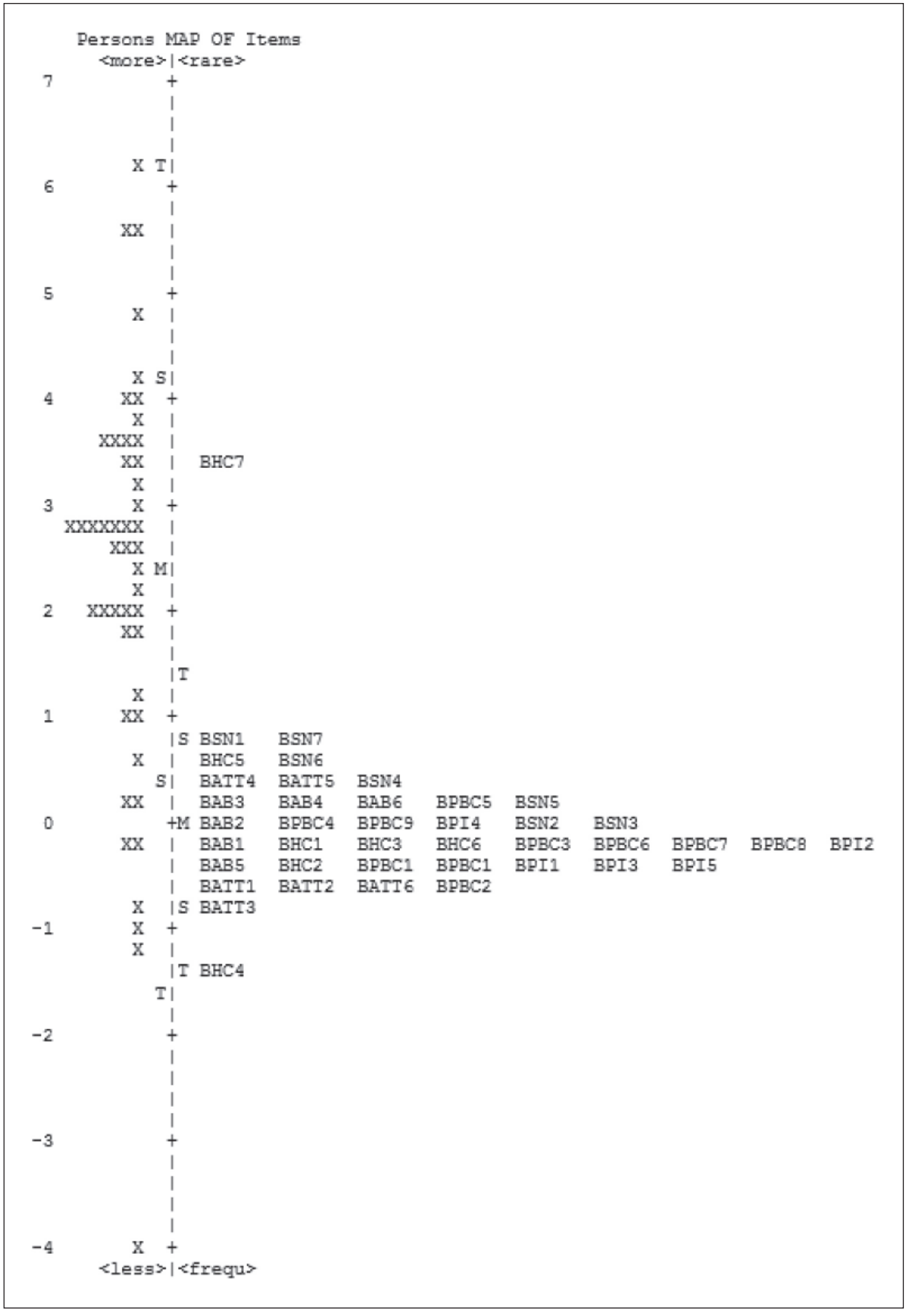

Fig. 1. Wright map for person and item.

(mean logit = 0.00), the questionnaire was considered easy by most of the respondents. It is, therefore, suggested that more items with higher logit measures than BHC 7 should be introduced. Similarly, more items are also needed to fill up the gap between BHC 7 and BSN 7.

CONCLUSION

In general, the findings of this study indicated that the 41-item questionnaire was valid and reliable. The item and person were shown to have high reliability and separation indices. All items appeared to fit the Rasch model with a good four-point Likert scale. The instrument was unidimensional. Most of the items exerted non-religious bias and therefore, could be used to conduct studies involving both Muslim and non-Muslim consumers. In conclusion, the Rasch measurement model can be used to effectively produce a valid and reliable instrument.

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