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Analyzing the Achievement of Micro and Small Business Management Knowledge of Item Fit and Person Fit Rasch Model

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ABSTRACT

In the context of successfully implementing knowledge management in micro and small businesses, which will impact business performance, a valid and reliable measurement instrument is needed. The purpose of this study is to measure the validity and reliability of knowledge management instruments, with the variables studied being motivation, sharing, and trust in sharing knowledge and skills possessed by micro and small business workers. This study employs a quantitative approach using a Rasch model. The identification of fit items and person fit is necessary to measure motivation to share and trust in sharing knowledge and skills, as determined through data analysis using WinStep Rasch software. The results of the data analysis indicated that all instrument preparation items were a good fit. Respondents, totaling 50 micro and small business actors, were identified as nine who were identified as person misfits. The implication of this study is the need to foster a conducive work environment that enables effective knowledge management and to share best practices that will add value in improving company performance

Keywords: knowledge management, item fit, person fit, rasch model

INTRODUCTION

The ability to manage knowledge well can provide significant advantages for micro and small businesses. However, many people do not yet understand the effectiveness of knowledge management. Therefore, competition in the business world today is becoming increasingly complex, and practical knowledge management is key to success. Knowledge management has the purpose of collecting, storing, managing, and sharing knowledge within an organization. Employees will be more productive because they can easily get the most up-to-date and relevant knowledge. Company leaders can make better and more informed decisions if they have access to practical knowledge management. Additionally, obtaining accurate information at the right time can help companies address diverse and complex business challenges. In an increasingly complex business world, creativity and adaptability are crucial for business success.

Knowledge management enables companies to provide their employees with a space to develop new ideas, share knowledge and skills, and adapt quickly to changes in their

business environment. (Idrees et al., 2023) Employee resource development programs can enhance a company's competitiveness by effectively managing the knowledge and skills possessed by its employees. Knowledge Management helps companies better identify, analyze, and manage risks, enabling improved collaboration among teams and departments within the organization. Businesses can create innovative and collaborative work environments by sharing knowledge and experience. Companies that can optimize their employees' knowledge have a better chance of creating superior products and services that meet customer needs. (Galeano-Ospino et al., 2021)

Additionally, knowledge management helps reduce losses caused by the loss of knowledge when employees move elsewhere or retire. By creating a solid knowledge base, small micro businesses can maintain the expertise and experience that has been built up over the years. This means that any small micro-venture can remain stable and sustainable despite changes in team members. (Alshebami, 2025) Furthermore, knowledge management plays a crucial role in fostering a collaborative and innovative work environment. When employees feel valued for their knowledge and insights, they are more likely to contribute actively to the sharing of creative ideas and solutions. This creates an environment that supports innovation and new inventions, which in turn can enhance the competitiveness of small microenterprises in an increasingly dynamic and competitive market.

In the context of globalization and digitalization, knowledge management also helps small microbusinesses adapt quickly to changing trends and technologies. By managing knowledge of markets, customers, and industry developments, small micro businesses can make better and timely decisions, as well as take strategic steps for long-term growth.

In the face of increasingly complex business competition, companies must understand the importance of Knowledge Management as part of their business strategy. (Terán-Bustamante et al., 2021) The implementation of an effective Knowledge Management system will enable organizations to face challenges, seize opportunities, and achieve a competitive advantage in a dynamic and evolving market. Therefore, it is essential to develop a valid and reliable instrument for measuring the effectiveness of knowledge management. The Item Fit and Person Fit methods, which are based on the Rasch Model, are the appropriate analysis choices for measuring the achievement of knowledge management in small microenterprises. Item Fit refers to the extent to which the questions on the questionnaire reflect the desired knowledge management construct. (Han et al., 2024) Meanwhile, the Item Fit and Person Fit models in the Rasch model are useful statistical tools for measuring the extent to which knowledge has been acquired in small microenterprises. (Köhler et al., 2020) The Rasch model, which is probability-based, enables an objective and valid analysis of the degree of compatibility between the knowledge possessed and the existing items of knowledge. Person Fit measures the extent to which individuals in an employee group align with a pre-established model, thereby providing information about the effectiveness of knowledge management at the individual level.

Knowledge management, as measured in micro and small enterprises, is studied using the item fit and person fit method of the Rasch model. This approach is employed for scale-based testing and evaluation, enabling the measurement of individual characteristics and questionnaire items with high accuracy and reliability. (Mohamud & Jusoh, 2023) The use of the Rasch model aims to evaluate the extent to which the items on the questionnaire are by the model and the extent to which individuals who are respondents in this study are also by the Rasch model so that in the end it will

provide a clear and complete and comprehensive picture of the achievement of knowledge management in micro and small businesses. In addition, the use of the Rasch model in this study will provide in-depth insight into the achievement of knowledge management in individual employees (person fit) and the extent to which questions or items in the questionnaire reflect the construct of knowledge management (item fit). By integrating the Rasch model in this study, it also collected individual responses to questions that reflected the mastery of knowledge from the company's workforce. The use of the Rasch model with a statistical approach is used to measure attitudes, performance, and perceptions (Tesio et al., 2024) The Rasch model is widely used for research in the social sciences (Khine, 2020) The rasch model can also be used to validate broader research in all fields. (Enright et al., 2024)

MATERIALS & METHODS

This study employs a quantitative approach to test the validity and reliability of knowledge management instruments used in micro and small enterprises (MSEs). The instruments are designed to measure three main variables, namely motivation, knowledge sharing, and trust in knowledge sharing, which are important elements in the application of knowledge management in micro and small enterprises.

Subjects and Sampling Techniques

The respondents in this study consisted of 50 MSME actors who were members of the MSME Clinic in Kediri City. Respondents were selected using purposive sampling, considering their active involvement in business activities and the relevance of their experiences to the topic of knowledge management. The number of respondents referred to the provisions of Bujang et al. (2024), who state that preliminary studies or pilot studies can be conducted with a sample size of between 25 and 100 people.

Data Collection and Instruments

Data was collected through closed questionnaires based on knowledge management dimensions. Each question was developed to describe the behavior and attitudes of MSME actors toward knowledge sharing and management activities in their businesses.

Data Analysis Techniques

Data analysis was performed using the Rasch Model, a probabilistic statistical approach that enables researchers to evaluate the suitability of respondents (person fit) and questions (item fit) with a predetermined model. Data processing was performed using Winsteps software version 3.92.1.

There are three leading indicators used to evaluate item validity:

1. Infit and Outfit Mean Squared (MNSQ): This measure indicates the consistency of respondents' answers regarding the level of difficulty of the item; acceptable values fall within the range of 0.5 to 1.5.
2. Z-standard (ZSTD): z-standard value to determine the extent to which the item deviates from the model; the range used is -2.0 to +2.0.
3. Point Measure Correlation (Pt Mean Corr): measures the strength of the relationship between each item and the construct being measured; the expected value is between 0.4 and 0.85.

An item is categorized as valid if it meets at least two of the three criteria. This approach aligns with common practice in Rasch analysis, as ZSTD values are highly sensitive to sample size. In large samples, ZSTD tends to exhibit extreme values, even though MNSQ and Pt Corr values remain within a reasonable range. Therefore, ZSTD is often considered a complementary indicator, while MNSQ and Pt Corr are used as primary indicators in determining item fit to the model (Boone et al., 2014; Müller, 2020)

Analysis Steps

The analysis was conducted in three main stages:

1. Identification of Misfit Items, to find items that did not fit the Rasch model and required revision.
2. Identification of Misfit Persons: to identify respondents who gave inconsistent answers to the construct being measured.
3. Person-Item Mapping (Wright Map), to illustrate the distribution of respondents' abilities and item difficulty levels, thereby determining the extent to which respondents understand the concept of knowledge management.

In addition to identifying mismatched items and persons, the Wright Map (person-item map) is used to provide a visual representation of the distribution of item difficulty relative to individual ability, helping to interpret how well items capture variation in knowledge management understanding among respondents

RESULT

The results of the data analysis are presented through several statistical summary tables, which are used to evaluate the validity of the instrument items used in this study, specifically the knowledge management instrument, as analyzed using the Rasch model. The evaluation is based on three main criteria: the Outfit Mean Square (MNSQ) value, which should be within the range of 0.5 to 1.5; the Z-standard (ZSTD) value, which should be between -2.0 and +2.0; and the Point Measure Correlation (Pt Measure Corr) value, which should be within the range of 0.4 to 0.85. An item is considered valid if it meets at least two of these three criteria.

Table 1: Test Results of Fit Order Items

INFIT		OUTFIT		PTMEASUR-AL		EXACT MATCH		
MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	Item
1.61	2.42	1.65	2.45	A .53	.61	31.6	48.1	KM3
1.36	1.34	1.31	1.15	B .61	.56	34.2	61.1	KM10
1.22	.88	1.26	.97	C .64	.56	39.5	61.1	KM11
1.25	1.01	1.25	.98	D .57	.58	60.5	59.9	KM5
1.25	.97	1.21	.81	E .61	.56	47.4	61.1	KM12
1.15	.64	1.17	.73	F .51	.48	57.9	63.1	KM7
1.00	.09	1.00	.08	G .41	.44	65.8	61.3	KM8
.91	-.28	.98	.00	H .47	.51	63.2	63.9	KM13
.88	-.43	.85	-.59	h .46	.46	68.4	62.2	KM6
.83	-.64	.87	-.43	g .63	.58	47.4	59.7	KM9
.79	-1.07	.77	-1.11	f .64	.64	50.0	43.7	KM14
.70	-1.17	.78	-.78	e .47	.54	73.7	62.8	KM1
.74	-1.02	.73	-1.13	d .41	.49	71.1	63.5	KM4
.67	-1.36	.69	-1.27	c .57	.50	71.1	64.0	I0016
.52	-2.13	.56	-1.85	b .59	.54	76.3	62.9	KM2
.36	-3.17	.39	-2.94	a .68	.52	81.6	64.0	I0015

Based on the research results shown in Table 1, most of the questionnaire items in this study met the required threshold. Based on the test results summarized in Table 1, most of the questionnaire items met the required threshold for MNSQ and Pt Measure Corr. However, there was one item, KM3, which did not meet the MNSQ and ZSTD criteria simultaneously. The MNSQ Outfit value for KM3 is 1.65, exceeding the upper limit of 1.5, and its ZSTD value is 2.45, also above the maximum threshold of +2.0. Meanwhile, the Pt Measure Corr value for this item remains within the acceptable range (0.53). Based on the Rasch evaluation approach, if only one criterion is met, the item is not considered valid.

Item KM3 substantively measures aspects of individual motivation in sharing knowledge, particularly related to the desire to share all skills and knowledge acquired from workplace training with coworkers and store them in company documentation. The extreme values that emerge indicate the possibility of inconsistent or overly

idealistic responses from some respondents, or that the item is formulated too absolutely, making it difficult for respondents to respond honestly and consistently. Therefore, KM3 is identified as an item that requires review or revision, both in terms of wording and measurement approach. Conversely, all other items, including KM1, KM2, KM4 to KM14, met at least two of the three criteria set. The MNSQ values of all these items ranged from 0.5 to 1.5, while the ZSTD values were mostly between -1.2 and +1.2. Additionally, the Pt Measure Corr values for all items fall within the range of 0.4 to 0.85, indicating consistency between the item content and the knowledge management construct being measured. Therefore, it can be concluded that, except for KM3, all questionnaire items in this instrument are valid and suitable for measuring knowledge management achievements among micro- and small-business operators.

The next test was to examine the Item Characteristic Curve (ICC), which showed that all responses, including those from misfit respondents, were within the Rasch model confidence interval. This indicates that all questionnaire items functioned consistently across different levels of knowledge and ability of respondents in answering the questions on the questionnaire.

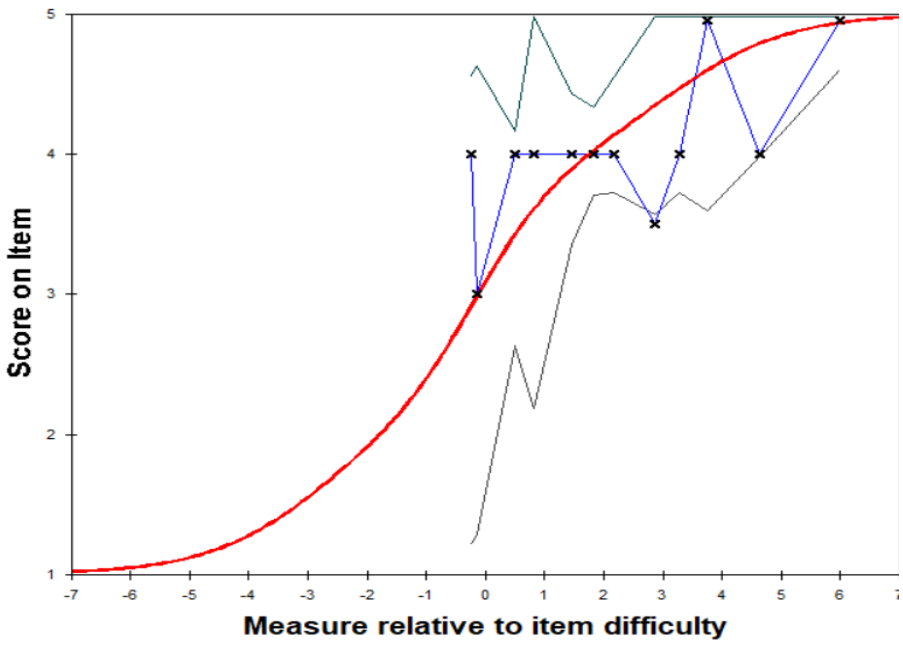

Figure 1. ICC Expected Score Curve

Based on the item dimensionality test to obtain the validity of the construct with a criterion that states that the test can measure range variables or measure all respondents if the Raw Variance explained by measure is above 40% of table 2 below, the total raw variable explanided is 41.,2% above the required criteria. Thus, it is concluded that the knowledge management instrument possesses construct validity and can be interpreted as measuring the range of variables encompassing all responses from respondents.

Table 2 Test Item: Dimensionality

	Eigenvalue	Observed
Total raw variance in observations	27.1915	100.0%
Raw variance explained by measures	11.1915	41.2%
Raw variance explained by persons	4.7625	17.5%
Raw variance explained by items	6.4290	23.6%

DISCUSSION

The analytical results using the Rasch model show that the instrument developed to measure the achievement of knowledge management among micro and small business actors has met the criteria for validity and reliability. This is demonstrated by the fact that most of the questionnaire items meet the three leading indicators in item fit testing, namely Outfit MNSQ,

The analytical results using the Rasch model show that the instrument developed to measure the achievement of knowledge management in micro and small businesses has met the criteria for validity and reliability. This is demonstrated by the fact that most of the items in the questionnaire meet the three leading indicators in item fit testing, namely Outfit MNSQ, ZSTD, and Point Measure Correlation (Boone et al., 2014; Müller, 2020). Although this study included the KM3 items, which initially showed indications of misfit, revisions to the wording and context of the statements in the questionnaire successfully brought these items back within the model fit limits. This finding is consistent with the results of the study by Enright et al. (2024), which confirms that the Rasch Model is effective in testing the validity and reliability of instruments in the social sciences.

The use of the Rasch model in this study not only serves to evaluate the instrument but also provides a deeper understanding of the distribution of individual abilities (person fit) and the level of difficulty of items that measure aspects of knowledge management. Thus, this model enables the identification of the extent to which SME actors have internalized and applied knowledge management practices in their business environment. In line with Khine's research, which states that the Rasch model not only provides accuracy in instrument measurement but also allows for in-depth analysis of individual variation, making it an excellent instrument for human and social research. Khine also emphasizes that the Rasch model can integrate individual data and instrument items into a coherent framework, thereby enhancing the quality of measurement result interpretation (Khine, 2020).

The findings of this study are consistent with those of Enright et al (2024), who developed research using a perception-based scale and confirmed that the Rasch model can measure item function and the consistency of respondents' answers. This approach is considered highly appropriate for measuring attitudes and perceptions, as done in this study to assess perceptions and attitudes regarding knowledge management practices in companies.

The findings of this study indicate that nine respondents were identified as person misfits, indicating a need for intervention by the company through training or strengthening the culture of knowledge and skill sharing in the workplace. This aligns with the research by Yasin et al. (2015), which emphasizes the importance of an objective approach in measuring validity and reliability using the Rasch model to assess knowledge management processes and knowledge sharing within companies.

From a strategic perspective, the role of knowledge management in maintaining the competitiveness of micro and small businesses is also reinforced by research from Alshebami (2025) and Idrees et al (2023), which states that KM plays an important role in reducing the risk of losing competence due to human resource turnover, as well as encouraging innovation and efficiency. However, unlike previous studies that focused more on the impact of KM on business performance, this research emphasizes explicitly the validity of the instrument as a tool for measuring KM achievement. Thus, this research fills a gap in the literature regarding scientifically validated instruments that MSEs can practically use. This finding is consistent with the conceptual study by Ngah et al (2015), which suggests that intellectual capital, knowledge management, and innovative intelligence are the foundations for building a sustainable competitive advantage for SMEs.

Additionally, research by Wijaya & Suasih (2020) shows that knowledge management has a positive and significant impact on competitive advantage, which in turn affects business performance, particularly in the silver craft sector. These findings reinforce the mediating role of competitive advantage in the relationship between KM and SME business performance.

The main contribution of this study lies in the new approach to evaluating KM achievements based on the Rasch Model, which produces a practical instrument for diagnosing human resource development needs in the SME environment. This contribution is important in designing more accurate data-driven managerial interventions. Beyond strengthening theoretical aspects, this study also provides a practical foundation for developing more adaptive knowledge management systems in the future. This is relevant to the research presented by Shaher & Ali, (2020) and Terán-Bustamante et al. (2021), and reinforced by recent studies from Edwards & Lönnqvist (2023) and -Bustamante et al. (2021), and reinforced by recent studies from Edwards & Lönnqvist (2023) and (Durst et al., 2024) (2024) which advocate for the use of technology and knowledge-based approaches in the development of micro and small enterprises.

CONCLUSION

By analyzing the achievement of knowledge management using the Item Fit and Person Fit models in the Rasch model, MSEs can obtain a more comprehensive picture of the extent to which knowledge has been well managed within their organization. These findings can serve as a basis for identifying weaknesses, enhancing processes, and improving the effectiveness of knowledge management in MSEs.

Declaration by Authors

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