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Assessment of the Hybrid Entrepreneurial Interest Instrument Utilizing Rasch Model Analysis

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Abstract

Usability of the Rasch Model: A Study to Develop a Valid and Reliable Measure of Hybrid Entrepreneurial Interest It explored the cultural bias that exists between Minangkabau and non-Minangkabau people. 108 people had completed the three measures, and their respective data were subjected to tests of reliability, validity, and DIF. Results showed that the instrument has good reliability, evidenced by high item and person reliability coefficients and a large separation index. Most items were fitted via the Rasch Model, while some showed small signs of bias. The DIF analysis showed noteworthy cultural differences on several items, most prominently Interest 4, which presented a significant DIF difference. These results suggest a disparity in economic entity perception between the Minangkabau respondents, who grew up with cultural values promoting big capital entrepreneurship with possible aspirations to achieve economic stability, and the non-Minangkabau respondents. The findings highlight the need of considering cultural contexts when developing measures of risk preference in relationship to entrepreneurship. The tool has worked well, but it still needs refinement to be more culturally neutral and widely applicable. This study contributes to entrepreneurship theory by expanding our understanding of culturally responsive entrepreneurship and offers practical recommendations to encourage culturally responsive entrepreneurial efforts.

Keywords: hybrid entrepreneurial interest; rasch model; cultural bias; minangkabau

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Introduction

Hybrid entrepreneurship, the practice of running a business alongside full-time employment, is increasingly recognized in entrepreneurial literature. Individuals can explore entrepreneurial opportunities while maintaining a stable income from their current job (Boldureanu et al., 2020). However, the reasons behind choosing hybrid entrepreneurship remain unclear despite its potential to reduce the risk of transitioning to a full-time business. Zhang et al. (2019) highlight the importance of interst inititing entrepreneurial pursuit, particularly in the hybrid domain.

In fact, the literature considers hybrid entrepreneurship as an impactful phenomenon that becomes an actionable strategic decision by those looking to earn while they learn in order to grow their firm (Ferreira, 2020b; Solesvik, 2017) (Ferreira 2020; Solesvik, 2017). Hence, hybrid entrepreneurship is an important approach for a shifty job market.

Social and cultural norms are significant factors influencing entrepreneurial interest. Tomy & Pardede (2020) emphasize the importance of a strong entrepreneurial culture in motivating the Minangkabau people to engage in independent economic activities. With a rich trading history setting them apart from other Indonesian ethnic

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groups, studying the Minangkabau's interest in hybrid entrepreneurship could provide valuable insights into how culture shapes business decisions.

In the field of entrepreneurship, along with interests, culture may also affect the individual attitudes of risk and uncertainty in business activity. Prior work (Games, 2020; Games et al., 2021) suggests that a vibrant culture and an active tradition of entrepreneurship may drive the individual to pursue a business. Novita et al. (2022) also revealed the extent of the influence of social networks and Minangkabau cultural values on the entrepreneurship development of students in West Sumatera. If we understand how these elements of culture come into play, we can create more adaptive measures of what drives interest in hybrid entrepreneurship.

Despite this, there is currently no specific measurement tool designed to assess interest in hybrid entrepreneurship. Prior studies have mostly focused on gauging general entrepreneurial interest, which may not capture the unique aspects of hybrid entrepreneurship adequately (Olumekor et al., 2023). This lack of alignment poses a challenge, particularly in understanding the motivation behind hybrid entrepreneurship within specific cultural contexts like the Minangkabau. To address this gap, this study aims to adapt existing measurement tools from previous research and assess their validity and reliability using the Rasch Model.

This research model uses Rasch to address the gap in measuring instruments for hybrid entrepreneurial interest within the framework of cultural diversity. An advantage of the Rasch Model, a modern method in psychometric analysis, is its ability to evaluate the validity and reliability of measurement instruments at the item level. By utilizing Differential Item Functioning analysis, this model not only assesses item complexity and respondent skills, but also identifies any biases present across different groups within the assessment tool (Fatimah & Suryana, 2023). In this study, the Rasch Model was utilized to determine if there exist significant disparities in the interest towards hybrid entrepreneurship between Minangkabau and non-Minangkabau respondent groups, assess construct validity through item fit analysis, and ensure tool reliability through person and item reliability evaluations.

Another factor is that the Rasch Model allows performing a Differential Item Functioning analysis (DIF) that can detect the group bias when interpreting the items (even in the case of biases in the groups defined by culture). Indications of important cultural nuance that will be overlooked by simplistic explanatory models are reported by Gibbons & Skevington (2018) dan van Rentergem et al. (2019) on DIF analysis. And these studies share the insight that such methods allow for rich insights into the ways in which elements of cultures influence respondents to respond to items in the measuring instrument. Hence, in this research, the Rasch Model is applied to make sure that the instrument that has been developed is not only valid but also responsive toward the cultural differences.

This research encompasses several main objectives. Through the Rasch Model's analysis of item fit, the initial focus is on establishing the adequacy of construct validity of the hybrid entrepreneurial interest assessment tool. Subsequently, the aim is to ascertain the high reliability of this measuring device by examining estimates of person and item reliability. Lastly, the goal is to explore the divergence in interest towards hybrid entrepreneurship between Minangkabau and non-Minangkabau groups.

Understanding the nature of interest in hybrid entrepreneurship within a multicultural context is crucial, especially for communities such as the Minangkabau, known for their strong entrepreneurial cultural ethos. This creates a sense of urgency for the research. This knowledge is significant because in developing countries like

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Indonesia, hybrid entrepreneurship could potentially increase household income and promote sustained economic development (Purnomo et al., 2024). Furthermore, this study plays a vital role in developing a reliable psychometric assessment tool for evaluating interest in hybrid entrepreneurship among full-time employees.From a practical standpoint, governments and entrepreneurs stand to benefit greatly from this research. Utilizing the findings can help foster a more conducive environment for exploring hybrid entrepreneurship among staff. This can be achieved through the development of training programs, implementation of incentive structures, or interventions based on organizational culture. The study is expected to bridge existing gaps in entrepreneurial literature, offering a comprehensive theoretical and practical contribution by integrating Rasch Model analysis with cross-cultural perspectives.

Consequently, this research not only addresses the existing literature gap surrounding the measurement of hybrid entrepreneurial interest but also introduces novel insights into how cultural factors influence individuals' inclinations towards entrepreneurship. One of the key advantages of employing the Rasch Model-based approach is its ability to ensure that measurement tools generate precise, reliable, and culturally unbiased data.

Literature Review

Conducted at the intersection of the entrepreneurial and employee domains, the burgeoning phenomenon of hybrid entrepreneurship has garnered attention for the flexibility it provides to the (new) venture(s) owner, by having it(s) founder(s) retain their permanent employment and, thus, mitigate the risk of moving to full-time entrepreneurship (Ferreira, 2020a). Such individuals are able to continue making money in a full-time job while working on their business. Despite being an important construct in determining entrepreneurial behavior (Mukhtar et al., 2021), studies speaking to interest in hybrid entrepreneurship remain scarce.

In social cognitive theory, entrepreneurial interest derives from expected results, self-efficacy, and environmental impact (Lent et al., 1994). The majority of earlier studies emphasize the importance of interest as a factor guiding individuals towards the entrepreneurial career, but are generally measuring entrepreneurship (Lanero et al., 2015) This leads to the necessity of creating tools that will measure things much more pertinent to the nature of hybrid entrepreneurship, when people have a career limiting the time and resources they can allocate to the second entrepreneurial project.

Culture plays a significant role in shaping interest in entrepreneurial endeavors. The Minangkabau community, with its robust history of trade and strong entrepreneurial ethos, provides a distinctive cultural backdrop for investigating this dynamic (Trautwein, 2023). Delving into the enthusiasm for hybrid entrepreneurship within this community offers profound insights into how culture influences entrepreneurial choices, particularly in contrast to other ethnic groups with varying cultural norms.

To date, there hasn't been a specific tool developed to gauge interest in hybrid entrepreneurship. This study modifies the measurement tool introduced by Lanero et al. (2015), tailoring it to incorporate only relevant items for respondents who hold permanent jobs. The six selected items capture practical facets of entrepreneurial interest suitable for individuals with permanent employment, including: (1) Seeking information on managing a personal business; (2) Engaging in discussions with potential business collaborators; (3) Willingness to invest in entrepreneurship seminars/training; (4) Introducing new products to potential consumers; (5) Marketing the offered products; and (6) Building relationships with suppliers. This adaptation ensures the measurement tool aligns with hybrid entrepreneurship requirements distinct from those of conventional entrepreneurs.

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However, the Rasch Model employed in this study offers a broader perspective of the validity and reliability of the measuring tool. Where this model enables the assessment of the function of each item across groups, including the ability to detect a cross-group bias via Differential Item Functioning (DIF) analysis (Fatimah & Suryana, 2023). This analysis is critical to conduct; this way we ensure the tool is devoid of any cultural bias in the comparison of the Minangkabau and non-Minangkabau respondents.

Likewise, the previous research has discovered culture to affect how people see and interest in entrepreneurship significantly (Gorostiaga et al., 2019). Thus the Minangkabau group that has strong entrepreneurial cultural values can describe the unique facts in terms of the influence of hybrid entrepreneurship interest. The results of this study would fill the literature gap providing more insight data using the Rasch Model to the currently utilized hybrid entrepreneurial interest measurement tool across cultural differences.

By means of adjusting appropriate measuring tools and following the Rasch Model-based analysis, this research is not only a pioneer in creating superior sacrificing measuring tools, but also another beneficial extension of the impacting factors of hybrid entrepreneurship. Hopefully, these insights are able to have theoretical and practical implications that boost hybrid entrepreneurial nurturing whenever there are a lot of potential entrepreneurs who already have permanent positions and strong entrepreneurial norms in the community.

Methods

This study was conducted using the quantitative approach and aimed to develop and test the validity and reliability of hybrid entrepreneurial interest measurement tools by using the Rasch Model. Participants were set to complete a survey by filling out a questionnaire that had been modified from the study of Lanero et al. (2015). This scale measures interest in engaging in entrepreneurial activity while remaining permanently employed, consisting of six items. The research was focused on employees or permanent jobs and was grouped based on culture, specifically employees from the Minangkabau tribe and other tribes.

The total number of samples taken was 108 respondents, which consisted of 51 people from the Minangkabau tribe and 57 people from non-Minangkabau. The sample has been defined with the voluntary sampling design method in which respondents who complied with the criteria participated in the study voluntarily. This method is preferred, considering it reaches respondents who truly possess an interest in entrepreneurial endeavors. This is a reasonable sample size for the Rasch Model (which can be analyzed from as low as 50 to 100 respondents for stable and reliable parameters) within the constraints of time and resources.

We conducted the survey on employees whose formal jobs had permanent employment contracts but who were interested in entrepreneurial activities. Some inclusion criteria used for selecting the respondents are having a permanent job, not owning a full-time business, and having an interest towards starting a hybrid entrepreneurship. The population method of voluntary sampling design is appropriate for this population because of the specific characteristics of the target, so that participation is based on the willingness and ability of respondents to the criteria of the research.

The data analysis was performed through the Rasch Model, realized with the use of the Winsteps software. This model was selected based on its capability to examine the validity and reliability of the measuring instruments on an item basis. Rather, it gives solid data regarding item capability, assessing item fit, person reliability, item reliability, and differential item functioning (DIF). Dif is used to assess whether there is a significant cross-cultural bias between participants from the Minangkabau tribe and non-Minangkabau tribe, so

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that the measurement tool developed can be said to be of fair and free measure.

The results of the Rasch Model in this research interpret the difficulty level of the item, the ability of the respondents, and the consistency of the answer. The validity of the construct is tested by checking the item fit, while the reliability of the measuring tool is assessed by the estimation of person reliability and item reliability. Furthermore, DIF analysis was performed to ascertain whether there were significant differences between Minangkabau and non-Minangkabau groups at the item level and total score. This analysis is further expected to provide deeper insights into the role of culture in hybrid entrepreneurship interest, whereby the developed measurement tool will be useful and relevant in multiple cultural domains.

A sample of 108 people, equally distributed between Minangkabau and non-Minangkabau, is enough for Rasch Model analysis. This number also enables valid cross-group comparisons without compromising data collection efficiency. Most importantly, with a combination of the voluntary sampling design technique, this study managed to gather respondents with an intrinsic interest in hybrid entrepreneurship, which is crucial to developing relevant and impactful results.

Result and Discussion

This part will examine if the construct is valid, if the measuring tool is reliable, and if there is a difference in the level of hybrid entrepreneurial interest between the Minangkabau and non-Minangkabau groups by using the Rasch Model. Let us now analyze this prototype, a deeper understanding of both the quality of the measuring instrument used as well as the role culture plays in the interest in hybrid entrepreneurship is expected from this analysis.

In the Rasch Model structure validation, OUTFIT MNSQ, ZSTD, and PT Mean Corr analyses were used to verify that the items in the instrument behave as the model. OUTFIT Mean Square (MNSQ) indicates the fit of the response pattern on the item with the Rasch model. The 0.5 rule < MNSQ < 1.5 holds. An MNSQ value close to 1 is a good indicator that the item is fitting the model better. The standardized Z-score (ZSTD) measures how significant the deviation between the data and the model is. For which the rule is -2 < ZSTD < 2. For Point Measure Correlation (PT Mean Corr), 0.4 < PT Mean Corr < 0.85, which checks the correlation between the score of the item and the participant's overall score (Bond & Fox, 2015).

Table 1. Summary of Measuring Instrument Validity Test Results

Item	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	Point Measure Correlation	Interpretation
Item 1	1.26	1.70	1.29	1.74	0.88	Fit
Item 2	0.73	--2.00	0.69	-2.18	0.87	Fit
Item 3	1.55	3.16	1.47	2.54	0.87	Underfit significant
Item 4	0.79	-1.46	0.71	-1.90	0.93	Fit
Item 5	0.78	-1.54	0.76	-1.57	0.93	Fit
Item 6	0.78	-0.61	0.66	-2.08	0.93	Fit

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Based on the table above, all items meet the MNSQ outfit rules, which are 0.5 < MNSQ < 1.5, as well as for the Infit MNSQ . Meanwhile, for Outfit ZSTD items 1, 4, and 5, according to the rules, the value is in the range of -2 < ZSTD < 2. Item 2 and item 6 are slightly below -2 or overfit. However, this condition does not matter because each INFIT ZSTD meets the set rules. Item 3 for both outfits and INFIT MNSQ is approaching 1.5 and this is potentially not fit. Likewise for the ZSTD. This means that a review of item 3 may need to be revisited, such as editorial or sentence corrections**.**

For PT Mean Corr, all items showed a very high correlation (0.87–0.93) with the respondents' total scores. While this supports validity, an excessively high correlation (>0.85) on some items (such as Items 1, 2, 4, 5, and 6) indicates the possibility of inter-item redundancy that needs to be further evaluated.

To sum up, the MNSQ, ZSTD, and PT Mean Corr generated values of the OUTFIT characterized by adequate magnitude to provide powerful evidence justifying the Rasch model structure relating to the instrument measuring the hybrid entrepreneurial interest. MNSQ values between 0.5 and 1.5 imply that items fit the model reasonably well (Boone, 2016). Items 1, 4, and 5 all produced ZSTD values between -2 and 2, implying they did not deviate substantively from predictions. However, the minor differences seen across items 2 and 6, while hardly worrisome in terms of INFIT ZSTD adherence level, potentially signal room for optimization. This aligns with Boone (2016), who emphasize the necessity of continuously evaluating and revising items to ensure that these items meet the Rasch model.

An acceptable level of high PT Mean Corr (from 0.87 to 0.93) supports instrument construct validity and shows that the correlation between the item scores and all of the total items is strong. However, the observed range of some items above the upper threshold (0.85) in this data set indicates a potential issue of inter-item redundancy, comparable to the crosses that were reported by Fadzil et al. (2022), where too many items correlated, which, in turn, weakens the distinctiveness of the constructs being assessed. If such redundant items bias your measure, the instrument will not capture further unique information, underscoring the importance of critically evaluating these items.

Indeed, the requirement of reviewing items, particularly for item 3 that is relatively close to the MNSQ limits, supports the recommendation from previous studies, including from Larasati et al. (2022) that in order for the measurement instrument to have integrity, item refinement needs to be carried out. González et al. (2015), who performed some of the support for the examination of the items that may not have adequate fit to help ensure adequate unidimensionality of the scale.

Overall, cluster analyses for the Rasch model structure of use for hybrid entrepreneurial interest have so far found that most items are well-performing, with the exception of a couple of items needing further attention for optimal fit and evidence of validity. This is consistent with the literature surrounding the applications of the Rasch model, whereby detailed analysis and adjustments to items are also required for maintaining the psychometric quality of the measurement tool.

Alongside the fit item analysis, the findings from the category measure analysis indicate that the category scale employed in the instrument has functioned effectively. The measure category assesses the consistency of the threshold shift among categories within the employed scale. The Andrich Threshold value indicates the consistency of transitions across categories, devoid of any overlapping classifications. The boundary between categories 2 and 3 ranges from -4.81 to -3.01. In the interim, the range between categories 3 and 4 spans from 3.01 to -2.19, while category 5 possesses a score of 5.63. The consistent shift indicates that responders can effectively differentiate categories

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on the scale, which is crucial for ensuring measurement accuracy. Nonetheless, despite the criterion being consistent, the distribution of answers across certain groups warrants consideration. For instance, category 1 comprises a minimal proportion of answers relative to other categories, suggesting that it may be less representative or infrequently utilized by participants. This may be affected by item design or generally uniform respondent characteristics at elevated degrees of construction.

Furthermore, from the standpoint of unidimensionality, the results suggest that this instrument predominantly assesses constructs within a singular dimension. Reccasse's criteria indicate that the explained variance is 76.4%, much surpassing the minimum threshold of 40%, which demonstrates that this instrument has a strong measurement focus (Bond & Fox, 2015). The unexplained fluctuation of 6.66% in the original contract is below the maximum criterion of 15%, suggesting that this instrument is unaffected by external factors. The examination of the Rasch Model substantiates the efficacy of hybrid entrepreneurial interest instruments. This instrument can accurately and reliably assess the targeted construct in accordance with the measurement model. Notwithstanding slight indications of redundancy in specific underutilized items and lower categories, the instrument continues to be functional without substantial modifications. This instrument is reliable for future research and use in relevant populations.

According to the category measure analysis in this study, the item measure functions of the scale are appropriate without any overlap between the Andrich Threshold of the same item category, suggesting that the ingredient categories are efficiently functioning. This concurs with Yan & Pastore (2022), who stress the importance of checking for threshold consistency to verify that respondents are able to accurately use the rating scale. An optimal rating scale is critical for successful formative assessment, and likewise this study points to the importance of the hybrid entrepreneurial interest instrument's categories being precise.

In addition, the fact that category 1 had the lowest proportion of responses to the other categories suggests an important vehicle for consideration in item design and respondent type. This finding is in agreement with the results of Sukarelawan et al. (2021), who identified the distribution of responses (each question category) as potentially affecting the construct validity of the instrument. Their analysis highlighted the necessity of ensuring that all categories are adequately represented to avoid potential biases in measurement. The current study's results suggest that further examination of item design may be warranted to enhance the representation of category 1.

In terms of unidimensionality, the explained variance of 76.4% significantly exceeds the minimum threshold of 40%, indicating a strong measurement focus. This was realized by the work of Saefi et al. (2020), who considered a larger amount of explained variance to signal that a strong instrument capturing one underlying construct has been found. Additionally, the low unexplained variance of 6.66% supports the robustness of the instrument and follows the principles advocated by DiStefano & Morgan (2010) regarding unidimensional measures with limited unexplained variance to validate measurement scales.

This study also demonstrates the reliability of the instrument and its success in measuring hybrid entrepreneurs' interests. This means in accordance with the works of Mohamed et al. (2021) Thus, findings can be reported since, according to Schmitt et al. The work provided the first evidence that psychometric integrity can be preserved in culturally diverse populations by using the Rasch model as an evaluation tool.

Overall, although some items and categories can be improved on the basis of their psychometric performance, This is consistent with

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the broader literature that discusses that measurement tools should be continuously improved to ensure they capture the intended constructs to an appropriate degree of validity and reliability.

Table 2. Summary of Measuring Instrument Reliability Test Results

Aspects	Value	Interpretation
Person Reliability	0,93,	Excellent
Item Reliability	0,93,	Excellent
Person Separation Index	3,29,	Excellent (can separate respondents into 3 groups)
Item Separation Index	3,74	Excellent (high sensitivity distinguishes the level of respondents' abilities)
Cronbach's Alpha	0.96	Excellent (high internal consistency)

Based on the results of the Rasch Model analysis, the reliability of the measuring tool for hybrid entrepreneurial interest shows excellent performance, in accordance with the guidelines outlined by Bond & Fox (2015). Person reliability of 0.93 and item reliability of 0.94 indicate a high level of consistency. In the context of measurement, a reliability value above 0.9 is categorized as "excellent," which means that the respondents' answer patterns are stable, and the items used can measure the variable of hybrid entrepreneurial interest consistently. This finding is consistent with previous studies that have reported similar reliability metrics in various contexts, such as the analysis of statistical anxiety scales, where person reliability values also exceeded the 0.90 threshold, affirming the stability of respondent patterns (Maat & Rosli, 2016).

In addition, the Person Separation Index values of 3.29 (REAL) and 3.32 (MODEL), as well as the Item Separation Index of 3.74, support the discriminatory strength of this measuring tool. According to Bond & Fox. (2015), a separation index value above 2 indicates that the instrument is able to differentiate respondents into more than two different groups of abilities or item difficulty levels. With values well above that threshold, the instrument can separate respondents into three to four skill groups, as well as demonstrate high sensitivity in effectively measuring the difficulty of items.

The measuring instrument's internal consistency is supported by a Cronbach's Alpha score of 0.96, indicating a strong correlation among the items. The Bond and Fox criteria indicate that alpha values over 0.9 demonstrate exceptionally strong internal consistency. This signifies that all components of the instrument collaboratively function to assess the comprehensive construct of hybrid entrepreneurial interest.

This may be echoed in other studies, which employed the Rasch model to evaluate different instruments, like the American Orthopaedic Foot and Ankle Society Score, where high reliability coefficients were also found (Da Conceição et al., 2016). Strong interrelated correlations highlighted the collective appropriateness of the items, and this resonates with findings from other Rasch analyses where an abundance of inter-item correlations resulted in a well-measured latent construct (of hybrid entrepreneurial interest) (Al Ali & Shehab, 2020).

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The distribution of item difficulty and respondent abilities further substantiates the validity and reliability of this instrument. The mean ability level of the respondents (Person Measure) was 0.37, indicating that the majority exhibited a marginally elevated interest compared to the average difficulty level of the item (Item Measure), which was 0.00 with a standard deviation of 0.86. This indicates that the instrument can successfully encompass a spectrum of interest in hybrid entrepreneurship, from low to high levels.

These results align with prior studies that have also shown that the Rasch model is effective for mapping respondent abilities against item difficulties to help ensure that the measurement tool is calibrated to the population of interest (Ridzuan et al., 2020). These findings translated into a range, where the average mean was 0.86, revealing a critically diverse distribution of interests between the respondents, which is part of what makes the applicability of the instrument so consistent across contexts.

Based on the results of the analysis, the hybrid entrepreneurial interest measurement tool is proven to have excellent reliability and validity. With high reliability, a strong separation index, and maintained internal consistency, this measuring instrument is able to provide reliable and relevant measurement results. Thus, this instrument can be used confidently in research aimed at understanding individual interest in hybrid entrepreneurship at various levels of respondents' abilities.

In addition to testing validity and reliability, this study also wants to look at cultural differences between Minangkabau and non-Minangkabau groups in the context of hybrid entrepreneurial interests. The difference will be seen through the analysis of Differential Item Functioning (DIF). This analysis was conducted to identify whether there was any bias in the instrument items that measured the interest in hybrid entrepreneurship based on the respondents' cultural backgrounds.

Table 3 Summary of DIF Analysis Results between Minangkabau and Non-Minangkabau Cultures

Item	DIF Cons	P-Value	Category DIF	Interpretation
Interest 1	0.35	0.32	Insignificant	There is no bias between groups. This item is neutral and can be used for both cultures.
Interest 2	0.78	0.0001	Medium DIF	Moderate bias, statistically significant. There are differences in interpretation between cultural groups.
Interest 3	-0.45	0.68	Insignificant	There is no bias between groups. This item is neutral for both cultures.
Interest 4	1.12	0.0001	DIFF kiss	The bias is large, statistically significant and practical. This item is more suitable for a certain culture (Minangkabau).
Interest 5	-0.89	0.48	Insignificant	There is no bias between groups. This item is neutral for both cultures.

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Interest 6	0.55	0.80	Medium DIF	Moderate bias, but not statistically significant. These differences can happen by chance.

The analytical results demonstrated that most items in the instrument displayed no significant bias across cultural groups. Interests 1, 3, and 5 demonstrate a DIF Contrast value below 0.5 and a high p-value ($\geqslant$ 0.05), indicating that these items operate without significant interpretive differences between the Minangkabau and non-Minangkabau groups regarding the hybrid entrepreneurial interest construct. This indicates that these items are, though the test of independence in these data suggests that the items are interpreted similarly for both the Minangkabau and non-Minangkabau groups, in line with previous works highlighting the necessity of a cultural-neutral approach to measurement tools (Runyan et al., 2012). This kind of neutrality is critical to ensuring the generalizability of entrepreneurial interest assessments across a variety of cultural contexts.

Items 2 and 6 demonstrate a moderate level of bias. Interest 2 demonstrates a DIF Contrast value of 0.78 and a p-value of 0.0001, indicating a statistically significant difference in interpretation between the two cultural groups. This finding resonates with the work of Zhang, who discusses how cultural orientation can significantly influence entrepreneurial motivation and perceptions (Y. Zhang, 2023). Interest 6 displayed a moderate bias with a DIF Contrast of 0.55; yet, this discrepancy was not statistically significant (p-value = 0.8026). The bias in this item may reflect the influence of particular cultural values that are more relevant to the Minangkabau community than to outsiders.

Item Interest 4 exhibits a substantial bias, both statistically and practically, indicated by a DIF Contrast value of 1.12 and a p-value of 0.0001. The results indicate that the Minangkabau and non-Minangkabau groups exhibit markedly distinct reaction patterns to this item. The prejudice in this item is likely attributable to disparities in foundational cultural values, as the Minangkabau culture, characterized by its ethos of "merantau" and the notion of economic kinship, significantly shapes the comprehension and reaction to hybrid entrepreneurship. This finding echoes the findings of Nabi et al. (2018), who argue that cultural values likely influence entrepreneurial intentions and behaviors. This difference in the patterns of endorsement of Item 4 highlights the need to further investigate the cultural context while developing instruments to measure entrepreneurial interests to avoid similar constructs being interpreted differently because no specific context was scrutinized during development.

These results suggest that although some factors might be universal, other factors should be tailored or translated to the specific context to achieve valid measurement. Adjust! This finding is especially pertinent for entrepreneurship; culture can become the meaning of competence as an entrepreneur, such as the entrepreneurial legacy in the culture of the Minangkabau. The more variable and influential a culture index is, the more vital it is to employ them in predicting entrepreneurial behavior and shape it considering cultural behaviors and needs that are unique (Soltwisch et al., 2023).

Finally, just like it was presented with respect to the assessment of DIF in the hybrid entrepreneurial interest estimation tool, the utility showed strengths, alongside the possible uniqueness of emerging cultural groups in instrument assessment and hence, adaptability. While cross-cultural validity was established for most items, significant biases for certain items indicate that cultural context plays a major role in shaping entrepreneurial perceptions.

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Conclusions

This study seeks to create a valid and reliable instrument with a Rasch Model to measure the interest of hybrid entrepreneurs. The analysis results indicate that this instrument has good validity and reliability, demonstrated by high values of item and person reliability, as well as segregation showing the ability of the instrument in differentiating groups of respondents based on their ability or interest. The fit item analysis indicated that the vast majority of items fit the model as expected, but there were some items that indicated the potential presence of bias and needed further testing.

On the other hand, the users of the Minangkabau and non-Minangkabau groups answer on several items in the sensitivity of Differential Item Functioning (DIF) analysis. Interest 4, for instance, has a huge bias, one of the leading findings. This bias may refer to the "values of Minangkabau culture," which adhere to the economic stability of the family, with some added businesses that are considered feasible for a permanent job. This makes them different, which is why Minangkabau culture is unique, because they perceive hybrid entrepreneurship as a complement to permanent employment rather than a replacement.

There are, however, several limitations of this research to consider. First, the small number of respondents (108) were not necessarily fully representative of the population as a whole. Future research is needed to utilize a larger and more diverse sample, including samples from other cultural groups, across cultures to assess the cross-cultural validity of these instruments. Second, this study is limited to only two cultural groups (Minangkabau and non-Minangkabau). Future studies can enhance the generalizability of the work done by elaborating on additional cultural groups to determine how they behave vis-à-vis hybrid entrepreneurial interests.

For example, Interest 4 displayed significant bias and needs to be recalibrated for proper understanding given that all cultural groups are represented. The value of making these items is more culturally neutral instruments without destroying locally relevant context. Finally, further research may investigate how culture plays a role in interest in hybrid entrepreneurship, for example, exploring the importance of family economic stability across cultures.

This study is advantageous both practically and theoretically. At a practical level, these results are valuable when informing policies, practices, and programs that foster hybrid entrepreneurship for policymakers, companies, and the entrepreneurship ecosystem. To a more low-key extent, entrepreneurship training programs for the Minangkabau community can be aimed at providing knowledge about the process of making a family-based business or small business that can be carried out alongside their permanent job. The findings of this research can also be used by the government to implement policies that can facilitate entrepreneurship with minimum loss of welfare and can also do it without losing stability in permanent employment.

This study theoretically adds to the entrepreneurial literature by emphasizing the interest in hybrid entrepreneurship across various cultural dimensions. Similarly, the model was able to demonstrate cross-cultural validity, as well as the identification of biased items, which supports the use of the Rasch model in this analysis. These findings reinforce the need for understanding the concept of entrepreneurial roles in different cultures and highlight the potential for more culturally relevant theories of entrepreneurship to emerge.

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