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Rasch Model: Employment Transition in Malaysia Driven by Environmental, Social, and Governance-Driven Transformation and Sustainable Social Innovation

Nur Diyana Mustapha[1]*, Nur Ilyana Ismarau Tajuddin[2], Saheera Sardar Mohamed[1], Daljit Singh A/L Gurbaksh Singh[1], Abdul Samad Shibghatullah[3], Fatimah Noor Rashidah Mohd Sofian[4], Shahri Abd Seman[5], Ali Yahya Gheni[6]

[1]INTI International University, Nilai, Malaysia, [2]Tamhidi Centre, Universiti Sains Islam Malaysia, Nilai, Malaysia, [3]Universiti Tenaga Nasional, Kajang, Malaysia, [4]Department of Finance, Kulliyyah of Economics Management and Sciences, International Islamic University Malaysia, Selangor, Malaysia, [5]Faculty of Business and Accountancy, Universiti Poly-Tech Malaysia, Kuala Lumpur, Malaysia, [6]College of Excellence, University of Baghdad, Baghdad, Iraq. *Email: nurdiyana.mustapha@newinti.edu.my

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ABSTRACT

Employment transition in Malaysia is undergoing significant change as organizations adapt to sustainability demands and shifting workforce dynamics for economic growth. This paper presents a pilot study investigating the influence of environmental, social, and governance (ESG) and sustainable social innovation on employee transition. The sample comprised 31 audit firms registered with the Malaysian Institute of Certified Public Accountants (MICPA). The research employed a quantitative survey design, with data analyzed using the Rasch measurement model to assess the validity and reliability of the instruments. Data were analyzed using the Rasch rating scale model (RSM), with the partial credit model (PCM) applied where response categories varied. Model evaluation included category functioning, item-person fit, and reliability and separation indices. Targeting was examined using Wright maps, while unidimensionality was assessed through principal component analysis (PCA) of residuals. Local item dependence and differential item functioning (DIF) were also explored to ensure measurement validity. The survey instrument was designed to capture three latent constructs: ESG adoption, SSI practices, and ET readiness. The results show strong psychometric properties, with person reliability of 0.82 and item reliability of 0.91, confirming consistency and structural soundness. Person and item separation indices of 2.11 and 3.15 further demonstrate the model's effectiveness in differentiating between ability levels and item difficulty. However, some misfit items and potential multidimensionality highlight areas for refinement. This study places ESG and sustainable social innovation in the context of sustainable development goals (SDGs) and focuses on their potential to create inclusive and sustainable solutions.

Keywords: Employment Transition, Environmental, Social, and Governance, Sustainable Social Innovation, Rasch Model, Malaysian Institute of Certified Public Accountants
JEL Classification: J21

1. INTRODUCTION

Employment transition is a critical phenomenon affecting various industries in Malaysia driven by dynamic economic, technological, social, and regulatory changes. The rapid evolution of industries has necessitated shifts in job roles, career trajectories, and workplace expectations leading to a transformation in employment structures. The expansion of remote work, the gig economy, and skill-based employment models has further redefined traditional employment patterns requiring greater adaptability and stronger social connections within the workforce (Klotz et al., 2021; Kim, 2024). Additionally, changes in industrial policies, labor

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regulations, and corporate strategies alongside shifting social expectations and work-life balance led to workforce restructuring, impacting job security, career progression, and labor market dynamics (Department of Statistics Malaysia, 2022; Klotz et al., 2021; Vasylieva et al., 2022). More recent statistics further show a recovery in employment and wages, yet highlight persistent mismatches between available jobs and the skills of the labour force (Department of Statistics Malaysia, 2024).

In the Malaysian context, employment transition is strongly shaped by economic volatility and structural reforms within key industries. For instance, the manufacturing and services sectors have undergone significant transformation due to international trade liberalisation and foreign direct investment (Department of Statistics Malaysia, 2022). This has created new employment opportunities but also displaced certain segments of the workforce and low-skilled workers. With the government's push towards Industry 4.0 and Malaysia MADANI policies, firms are increasingly pressured to adapt by implementing new workforce strategies that balance efficiency with inclusivity (Economic Planning Unit, 2023). The government's Industry4WRD blueprint and the broader Malaysia MADANI framework are designed to drive competitiveness through automation, smart manufacturing, and sustainability while ensuring inclusivity in workforce development (Economic Planning Unit, 2023). These initiatives are reshaping employment by creating demand for skilled digital workers but, at the same time, displacing sustainability (Department of Statistics Malaysia, 2022; Tee et al., 2024; Qing and Jin, 2023).

Due to the growing warning of environmental concerns, implementing green, sustainable, and reliable investments has become a top concern for every firm to increase profitability and work to develop in harmony with the environment; ESG has been introduced. Lately, numerous researchers worldwide tend to evaluate the impact of ESG in respect of the different domains of business. The focus of this study is to identify the valuation of possible effects of ESG on firm's employment transition. ESG considerations have gained prominence as firms strive to align with international sustainability standards and meet stakeholder demands for corporate responsibility. The adoption of ESG practices further influences employment structures by shaping recruitment strategies, workplace policies, and employee well-being (Yusoff et al., 2021). Moreover, firms that prioritize social and environmental sustainability tend to provide greater job stability and improved working conditions, thereby fostering long-term employee engagement and organizational resilience (Khan et al., 2024; Jamal et al., 2021; Sadiq et al., 2020; Arokiasamy et al., 2024).

Complementing ESG, sustainable social innovation (SSI) creates new business models, policies, and practices and has also emerged as a key factor in employment transitions (Noorhaslinda et al., 2023). Companies integrating social innovation strategies often adopt inclusive hiring practices, expand professional development opportunities, and embrace flexible work arrangements which contribute to workforce stability (Klotz et al., 2021; Mustapha et al., 2021; Xi and Wang, 2024). ESG and sustainable social innovation provide a dual pathway for organizations to strengthen workforce resilience. As industries in Malaysia undergo structural transformation, understanding the interplay of these factors in shaping employment trends becomes increasingly important.

Within this context, the integration of environmental, social, and governance (ESG), together with sustainable social innovation, has emerged as a key determinant influencing workforce stability and organizational sustainability (PwC Malaysia, 2021; Jamal et al., 2021). Despite their growing prominence, the direct impact of ESG and social innovation on employment transitions remains underexplored, warranting further investigation (Jamal et al., 2021). By embedding these values into employment policies, firms can enhance workforce adaptability, foster innovation, and strengthen social cohesion, ultimately contributing to long-term national development (Yusoff et al., 2021; Mustapha et al., 2021).

Nevertheless, the role of ESG and SSI in employment transitions remains underexplored in scholarly research. While much has been written about ESG's financial and governance impacts, its effects on employment structures and workforce strategies are less clear in Malaysia. There is a pressing need to examine how ESG adoption shapes employee transitions in professional service sectors, where intangible human capital is the core asset. This study addresses this gap by linking ESG and SSI implementation with workforce adaptability and sustainability outcomes.

2. LITERATURE REVIEW

2.1. Employment Transition

Employment transition refers to the reconfiguration of job roles, career paths, and workplace arrangements as organisations respond to internal and external pressures (Errida and Lotfi, 2021). Employment transition has become a defining feature of the modern labour market, driven largely by rapid technological advancements, globalisation, and evolving regulatory frameworks. Globally, industries are experiencing restructuring as automation and digitalisation displace routine jobs while simultaneously creating demand for new skill sets (Teoh et al., 2024). Workers are increasingly required to reskill and upskill to remain competitive, while employers must redesign work processes to adapt to these structural shifts. The gig economy and the rise of non-traditional employment forms, such as freelancing and platform-based work, have also challenged traditional career paths and job stability, adding new dimensions to employment transitions.

New patterns of employment are also emerging. Employment transitions are most visible through restructuring efforts such as competency-driven hiring, flexible work arrangements, and performance-based compensation models (Errida and Lotfi, 2021). Employers are now expected to provide not only stable employment but also career development opportunities that align with evolving market demands (Ministry of Human Resources Malaysia., 2023). The integration of human capital strategies with technological adoption is essential in ensuring that employees remain relevant in the digital economy (Klotz et al., 2021; Xie et al., 2024). Firms that fail to anticipate employment transitions risk higher turnover, reduced productivity, and weaker competitiveness in global markets.

Short-term contracting, platform-based work, and participation in the gig economy are increasingly common across both developed

and developing economies. While these arrangements provide flexibility and opportunities for additional income, they also create vulnerabilities such as irregular earnings and reduced access to social protections (Klotz, Swider).

Demographic realities intensify these pressures. Malaysia's aging workforce and the outward migration of skilled professionals raise concerns about the sustainability of its human capital base. In response, organisations are expected to take greater responsibility not only for providing stable employment but also for offering structured upskilling opportunities, flexible work practices, and competency based hiring (Errida and Lotfi, 2021). Initiatives such as the Program Latihan Madani have been introduced to enhance employability among vulnerable groups, reflecting a broader policy emphasis on inclusive growth and resilience (HRD Corp, 2023).

2.2. Environmental, Social, and Governance (ESG)

ESG has emerged as a central framework for assessing corporate sustainability, guiding firms to align with international standards and stakeholder expectations (Vadimovna and Gulnoza, 2025). Globally, ESG adoption has been linked to improved financial performance, reputational capital, and risk management, making it a strategic imperative for organisations (Jamal et al., 2021; Makhecha et al., 2023). Beyond financial outcomes, ESG has social implications, influencing employee engagement, workplace culture, and long-term job security. As firms embed ESG considerations into their governance structures, employment strategies are increasingly being shaped by ethical and sustainability-driven policies (Makhecha et al., 2023).

Previous findings argued ESG adoption has accelerated in response to government incentives, Bursa Malaysia reporting requirements, and growing investor pressure (Jamal et al., 2021; Sadiq et al., 2020). Companies integrating ESG into their operations are better positioned to attract talent, retain employees, and enhance organisational resilience (PwC Malaysia, 2021). ESG's social dimension has led to improvements in workplace inclusivity, occupational health and safety, and community development. These initiatives not only strengthen firms' reputational capital but also contribute to workforce stability by creating environments where employees feel valued and supported (Yusoff et al., 2021).

ESG influences employment transitions by reshaping recruitment and retention strategies (Makhecha et al., 2023; Jamal et al., 2021). Firms with strong ESG commitments often implement diversity and inclusion programs, offer professional development aligned with sustainability goals, and invest in employee well-being initiatives. These strategies reduce turnover rates and enhance employee loyalty, demonstrating that ESG is not only a compliance issue but also a driver of human capital sustainability (Khan et al., 2024).

A growing stream of literature points to environmental, social, and governance (ESG) integration as a strategic driver of organisational change that has implications for employment (Vadimovna and Gulnoza, 2025). Firms that embed ESG principles into corporate strategy regularly revise recruitment, retention, and reward systems to reflect new performance criteria (Jamal et al., 2021). Employee transition and ESG are interconnected concepts driving corporate sustainability (Vadimovna and Gulnoza, 2025). ESG help employees move through job transitions by giving them training, flexible work options, fair opportunities, and support for their well-being (Makhecha et al., 2023). Moreover, firms with superior ESG can attract talented employees, and increase productivity and talented employees (Jamal et al., 2021). Despite these significant developments, research on employment transition in Malaysia remains relatively limited (Vadimovna and Gulnoza, 2025). Much of the existing scholarship has focused on macro-level labour market outcomes, with less emphasis on employee perspectives.

- H_1: ESG have a significant influence on employee transition.

2.3. Sustainable Social Innovation (SSI)

Sustainable social innovation (SSI) represents a transformative approach that seeks to address societal and environmental challenges through innovative business models, policies, and practices (Mustapha et al., 2021; Calò et al., 2024). Globally, SSI initiatives have been linked to inclusive hiring practices, professional development opportunities, and innovative workplace arrangements that enhance job stability (Noorhaslinda et al., 2023; Calò et al., 2024). SSI is gaining traction as industries adapt to digitalisation, sustainability pressures, and structural reforms. Firms are beginning to adopt SSI-driven practices such as community-based training programs, youth employability initiatives, and social enterprise collaborations to create pathways for vulnerable groups to enter the workforce (Mustapha et al., 2021).

Companies that embed SSI in their strategies often implement flexible work arrangements, mentorship schemes, and employee-driven innovation programs that enhance adaptability (Calò et al., 2024). These practices help employees navigate employment transitions more effectively in industries undergoing rapid technological disruption (Klotz et al., 2021). By linking innovation to social outcomes, firms are able to balance profitability with workforce well-being, positioning themselves as socially responsible employers.

However, SSI remains an under-researched area in employment studies especially within the Malaysian context. Most research has focused on social enterprises or community projects with limited attention to how mainstream firms adopt SSI in managing workforce transitions. Furthermore, empirical studies exploring the measurable impact of SSI on employment outcomes are scarce. SSI often entails new business models, collaborative partnerships, and inclusive practices that shift how organisations organise labour and deploy human capital. Thus, while ESG sets the strategic priorities, SSI operationalises those priorities into practices that directly affect worker experiences and employability. Employee transition and SSI are interconnected concepts driving corporate sustainability (Vadimovna and Gulnoza, 2025; Calò et al., 2024).

- H_2: SSI have a significant influence on employee transition.

3. METHODOLOGY

This study adopted a quantitative survey design to investigate the influence of environmental, social, and governance (ESG) and sustainable social innovation (SSI) on employment transition (ET) among Malaysian audit firms. The measurement properties of the survey instrument were examined using the Rasch measurement model to ensure validity and reliability.

Data were collected from 31 registered audit firms with Malaysia under Malaysian Institute of Certified Public Accountants (MICPA). Each firm was represented by one key informant such as a partner, manager, or senior staff member familiar with workforce policies, ESG practices, or innovation strategies. A purposive sampling method was employed to ensure that only firms meet the inclusion criteria. Participants were contacted via email, phone and site visit. Participation anonymity was assured.

The survey instrument was designed to capture three latent constructs: ESG adoption, SSI practices, and ET readiness. Items were structured as Likert-type statements on a five-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Data collection was carried with the survey taking approximately 10-12 min to complete. Measures were taken to enhance data quality, including mandatory responses to prevent missing values and monitoring response patterns to identify straight-lining or unusually rapid completions.

Data analysis was conducted using the Rasch rating scale model (RSM), given that all items shared common response categories. Where category structures varied, the partial credit model (PCM) was considered. Several diagnostic criteria were used to evaluate the measurement model. Category functioning was assessed by checking threshold ordering, minimum response frequency, and monotonic advancement of average measures. Item and person fit statistics were examined, with acceptable infit and outfit mean-square (MNSQ) values ranging from 0.5 to 1.5 and standardized Z-scores (ZSTD) within −2-+2. Reliability and separation indices were also calculated, with person and item separation values above 2.0 considered desirable for differentiating respondent abilities and item difficulty.

In addition, targeting was evaluated using Wright maps to determine the alignment between item difficulty and respondent ability levels. Unidimensionality was assessed through principal component analysis (PCA) of standardized residuals, with variance explained by the Rasch dimension expected to exceed 40-50% and the first contrast eigenvalue ideally below 2.0-3.0. Local item dependence was monitored by examining residual correlations, with values exceeding 0.30 flagged for potential revision. Finally, exploratory differential item functioning (DIF) analysis was conducted across firm size categories to identify potential item bias.

4. FINDINGS

4.1. Description

The Rasch analysis, Table 1 shows that the person reliability is 0.82, indicating a good level of consistency in measuring individual abilities, while the item reliability is higher at 0.91, suggesting that the test items are well-structured to differentiate difficulty levels. The person separation index (2.11) and item separation index (3.15) further confirm that the test can distinguish between different ability levels and item difficulties effectively.

For persons, the mean measure is 49.76 logits with a standard deviation of 4.59, and the mean infit and outfit MNSQ values (1.01) indicate a good fit to the Rasch model. For items, the mean measure is 50.00 logits with a standard deviation of 5.27, and the mean infit (0.96) and outfit (1.01) MNSQ values suggest a good model fit. However, some items may have slight misfit, as indicated by the highest outfit ZSTD value of 3.0.

The analysis supports a well-functioning measurement system, with minor misfitting responses that may require further investigation.

4.2. Determine Misfit Items/Person

There are means of checking for item quality control in Rasch (Table 2). Item fit refers to an index which implies the functionality of an item. A misfit item means that the item is either too difficult or too easy for the respondent, or the item is not really testing the desired latent trait. Similarly, person fit refers to an index which signifies the responses of an individual. An irregular or erratic response could be a sign of a misfit. According to Fisher (2007), in order to verify for fit and misfit items or persons, the following criteria must be satisfied:

- Point measure correlation, $0.4< X <0.8$
- Outfit mean square (MNSQ), $0.5< Y <1.5$
- Outfit Z standard (ZSTD), $-2.0 <Z <+2.0$

The item statistics analysis indicates that the real item separation index is 3.15, with high reliability (0.91), meaning the test can distinguish between different levels of item difficulty effectively. The mean item measure is 50.00 logits, with a standard deviation of 5.27, showing a reasonable spread of item difficulty levels.

The mean infit and outfit MNSQ values (0.96 and 1.01, respectively) are close to 1.00, indicating a good model fit. However, some items exhibit misfit, such as Item 3 (ET_3), which has an outfit MNSQ of 5.08 and Item 5 (ET_5), with an outfit MNSQ of 1.93, suggesting possible inconsistencies in responses. The mean point-measure correlation (PTMEASURE-AL) is 0.35, showing a moderate relationship between item difficulty and person ability.

The test items generally align with the Rasch model, a few misfitting items (e.g., ET_3, ET_5) may require further investigation or revision to improve measurement validity.

The person statistics: Misfit Order table presents an analysis of 31 persons based on their total scores, item counts, and fit indices as shows in Table 3. Key highlights from this table include:

- The mean total score is 92.1, with a mean measure of 49.76, indicating an a balanced distribution of person abilities
- Person reliability is 0.82, suggesting a moderate level of consistency in responses
- The real separation index of 2.11 implies that the test can differentiate roughly two distinct ability levels among the respondents

Table 1: Summary statistic for persons and items

INPUT: 31 Person 21 Item, Reported: 31 Person 20 Item, 10 Cats Ministep 5.8.4.0
Summary of 31 measured person

Statistic	Total			Model	Infit		Outfit	
	Score	Count	Measure	S.E.	MNSQ	ZSTD	MNSQ	ZSTD
Mean	92.1	20.0	49.76	1.75	1.01	−0.29	1.01	−0.25
SEM	2.8	0	84	01	0.12	0.36	0.12	0.36
P.SD	15.5	0	4.59	08	0.65	1.96	0.64	1.95
S.SD	15.8	0	4.66	08	0.67	1.99	0.65	1.98
Max	125.0	20.0	60.87	1.99	3.21	4.65	3.07	4.45
Min	47.0	20.0	37.28	1.62	0.20	−3.83	0.22	−3.63

Real RMSE=1.97, True SD=4.14, Separation=2.11, Person reliability=0.82
Model RMSE=1.75, True SD=4.24, Separation=2.43, Person reliability=0.85
S.E. of person mean=0.84
Person RAW score-to-measure correlation=1.00
Cronbach alpha (kr-20) person raw score "test" reliability=0.86, SEM=5.89
Standardized (50 item), reliability=0.94
Summary of 20 measured item

Statistic	Total			Model	Infit		Outfit	
	Score	Count	Measure	Standard Error	MNSQ	ZSTD	MNSQ	ZSTD
Mean	142.7	31.0	50.00	1.41	0.96	−0.89	1.01	−0.73
SEM	6.2	0	1.21	0.02	0.24	0.67	0.25	0.68
P.SD	27.1	0	5.27	0.10	1.04	2.93	1.08	2.98
S.SD	27.8	0	5.41	0.10	1.07	3.00	1.10	3.06
Max	164.0	31.0	70.93	1.81	5.08	8.76	5.21	8.93
Min	36.0	31.0	45.86	1.32	0.30	−3.86	0.31	−3.79

Real RMSE=1.60, True SD=5.03, Separation=3.15, Item Reliability=0.91
Model RMSE=1.41, True SD=5.08, Separation=3.61, Item Reliability=0.93
S.E. of item mean=1.21
Lacking responses: 1 item
Item raw score-to-measure correlation=−1.00
Global statistics: Please see Table 44.
Umean=50.0000 Uscale=10.0000

Table 2: Items measure

Input: 31 person 21 item, Reported: 31 person 20 item, 10 Cats Ministep 5.8.4.0
Person: Real Sep.: 2.11 Rel.: 0.82 . Item: Real Sep.: 3.15 Rel.: 0.91
Item Statistics: Measure order

Entry number	Total score	Total count	JMLE Measure	Model Standard Error	Infit		Outfit		Ptmeasur-AL		Exact	Match	Item
					MNSQ	ZSTD	MNSQ	ZSTD	CORR	EXP	OBS%	EXP%	
2	36	31	70.93	1.81	1.13	0.50	1.69	2.00	−0.25	039	35.5	40.3	ET_2
9	12	31	53.91	1.32	1.30	1.20	1.31	1.24	0.40	0.53	29.0	29.2	ESG_3
6	1	31	52.50	1.33	0.97	−0.06	0.99	0.06	0.43	0.53	45.2	29.3	ET_6
5	129	31	51.97	1.34	1.97	3.16	2.00	3.21	0.10	0.53	29.0	29.1	ET_5
7	132	31	51.79	1.34	1.37	1.43	1.43	1.60	0.31	0.53	35.5	29.2	ESG_1
3	133	31	51.25	1.35	5.08	8.76	5.21	8.93	−0.02	0.53	6.5	29.4	ET_3
8	136	31	49.96	1.36	0.80	−0.78	0.82	−0.69	0.56	0.52	45.2	28.5	ESG_2
4	143	31	49.03	1.38	1.26	1.06	1.26	1.06	0.45	0.52	25.8	27.9	ET_4
18	148	31	48.64	1.39	0.39	−3.15	0.41	−3.02	0.81	0.52	51.6	28.0	SSI_6
19	150	31	48.06	1.40	0.51	−2.30	0.53	−2.17	0.68	0.52	38.7	28.3	I0019
17	153	31	47.87	1.40	0.39	−3.1	0.41	−2.97	0.80	0.52	45.2	28.2	SSI_5
10	154	31	47.67	1.40	0.39	−3.15	0.39	−3.12	0.74	0.52	38.7	28.3	ESG_4
16	155	31	47.67	1.40	0.42	−2.92	0.44	3.12	0.79	0.52	41.9	28.3	SSI_4
13	155	31	47.48	1.41	0.55	−2.09	0.57	−2.77	0.72	0.51	32.3	28.8	SSI_1
15	156	31	47.28	1.41	0.38	−3.24	0.39	−1.96	0.78	0.51	41.9	28.9	SSI_3
20	157	31	47.28	1.41	0.58	−1.87	0.60	−1.80	0.75	0.51	29.0	28.9	I0020
21	157	31	47.28	1.41	0.47	−2.58	0.48	−2.53	0.79	0.51	32.3	28.9	I0021
12	159	31	46.88	1.42	0.45	−2.72	0.46	−2.62	0.84	0.51	29.0	29.2	ESG_6
14	160	31	46.68	1.42	0.30	−3.86	0.31	−3.79	0.86	0.51	45.2	29.4	SSI_2
11	164	31	45.86	1.44	0.54	−2.12	0.54	−2.08	0.80	0.51	35.5	30.0	ESG_5
Mean	142.7	31.0	50.00	1.41	0.96	−0.89	1.01	−0.73			35.6	29.4	
P.SD	27.1	0.0	5.27	0.10	.04	2.93	1.08	2.98			9.6	2.6	

- The outfit mean-square (MNSQ) statistics show variation, with some respondents exceeding the acceptable range (e.g., P14, P01, and P04 have high outfit MNSQ values), indicating possible unexpected response patterns or guessing effects

Table 3: Persons measure

Input: 31 Person 21 Item Reported: 31 Person 20 Item 10 Cats Ministep 5.8.4.0
Person: Real Sep.: 2.11 Rel.: 0.82 Item: Real Sep.: 3.15 Rel.: 0.91
Person statistics: Measure order

Entry number	Total score	Total count	Jmle measure	Model standard error	Infit		Outfit		Ptmeasur- al	Exact	Match		Person
					MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	
31	125	20	60.87	1.99	1.36	1.03	1.35	1	0.5	0.6	45.0	39.9	P31
2	114	20	56.68	1.9	1.28	0.88	1.21	0.71	0.85	0.61	15.0	30.3	P02
27	109	20	54.92	1.85	0.38	−2.47	0.37	−2.53	0.66	0.61	45.0	30.1	P27
15	106	20	53.91	1.83	1.59	1.69	1.49	1.46	0.69	0.6	40.0	29.3	P15
1	105	20	53.57	1.82	2.11	2.8	2.00	2.57	0.76	0.6	15.0	28.9	P01
20	104	20	53.24	1.81	1.12	0.46	1.04	0.22	0.51	0.6	45.0	29.5	P20
18	103	20	52.92	1.80	0.84	−0.45	0.8	−0.56	0.54	0.6	40.0	29.1	P18
3	102	20	52.60	1.79	0.64	−1.24	0.63	−1.28	0.72	0.59	30.0	28.7	P03
4	100	20	51.96	1.78	2.05	2.7	2.00	2.6	0.76	0.59	0.0	27.9	P04
8	100	20	51.96	1.78	1.84	2.25	1.72	2.01	0.60	0.59	25.0	27.9	P08
24	100	20	51.96	1.78	0.33	−2.84	0.33	−2.83	0.80	0.59	20.0	27.9	P24
14	99	20	51.65	1.77	3.21	4.65	3.07	4.45	0.61	0.59	10.0	27.7	P14
6	98	20	51.33	1.76	0.55	−1.63	0.55	−1.63	0.87	0.59	15.0	28.0	P06
22	98	20	51.33	1.76	1.18	0.66	1.15	0.56	0.39	0.59	10.0	28.0	P22
9	97	20	51.02	1.76	1.4	1.25	1.39	1.23	0.54	0.58	30.0	28.1	P09
12	93	20	49.81	1.73	0.27	−3.27	0.25	−3.44	0.78	0.57	75.0	29.5	P12
7	92	20	49.51	1.72	1.73	2.01	1.63	1.78	0.63	0.57	35.0	29.5	P07
11	91	20	49.22	1.72	0.55	−1.63	0.52	−1.77	0.75	0.57	60.0	29.6	P11
13	91	20	49.22	1.72	0.68	−1.04	0.65	−1.16	0.66	0.57	20.0	29.6	P13
26	90	20	48.92	1.71	0.20	−3.83	0.22	−3.63	0.77	0.56	70.0	29.6	P26
25	89	20	48.63	1.71	0.58	−1.46	0.6	−1.38	0.44	0.56	45.0	29.9	P25
19	87	20	48.05	1.70	0.89	−.26	0.83	0.46	0.46	0.55	45.0	29.8	P19
17	85	20	47.48	1.69	0.421	−2.30	0.4	−2.40	0.63	0.55	50.0	29.7	P17
5	84	20	47.20	1.68	1.00	0.09	0.98	0.04	0.53	0.54	20.0	29.6	P05
16	84	20	47.20	1.68	0.36	−2.62	0.34	−2.74	0.64	0.54	45.0	29.6	P16
29	83	20	46.91	1.68	0.92	−.15	0.92	−0.17	0.28	0.54	35.0	29.8	P29
21	80	20	46.08	1.66	0.55	−1.60	0.6	−1.39	0.51	0.53	40.0	31.6	P21
10	73	20	44.18	1.64	0.80	−0.60	0.75	−0.78	0.51	0.5	70.0	31.5	P10
28	64	20	41.8	1.62	0.90	−0.24	1.03	0.2	0.12	0.47	30.0	29.1	P28
23	62	20	41.28	1.62	0.52	−1.90	0.69	−1.08	0.20	0.46	40.0	26.4	P23
30	47	20	37.28	1.67	0.98	0.04	1.88	2.54	−0.14	0.39	40.0	25.7	P30
Mean	92.1	20	49.76	1.75	1.01	−0.29	1.01	−0.25			35.6	29.4	
P.SD	15.5	0	4.59	0.08	0.65	1.96	0.64	1.95			18.1	2.3	

- Person P26 and P12 show the lowest outfit ZSTD values (−3.63 and −2.83, respectively), suggesting they performed more predictably than expected.
- The exact match percentages (OBS%) range from 18.1% to 75.0%, with a mean of 35.6%, suggesting that some respondents fit the model well while others deviate.

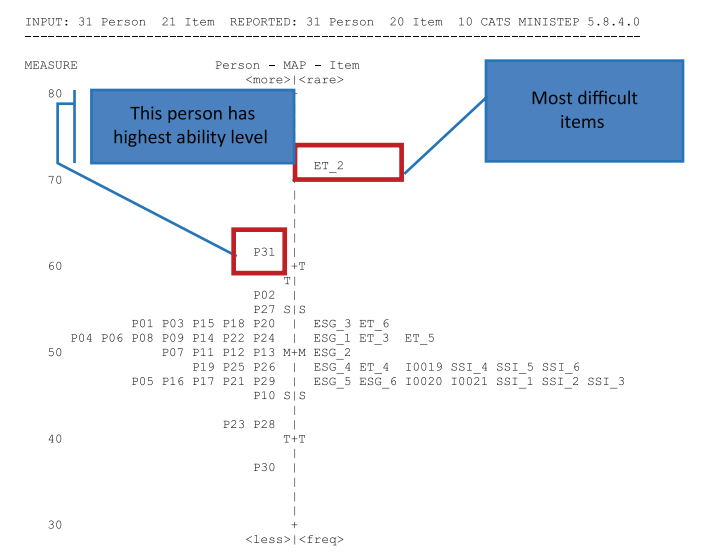
The test shows moderate reliability and good separation, but some individuals display misfit behavior, requiring further investigation into their response patterns.

The wright map (Person-Item Map) provides a visual representation of the distribution of persons and items along the measurement scale (Table 4). The left side represents the distribution of respondents (persons), while the right side represents test items, arranged from easiest (bottom) to hardest (top).

Key insights:

- Person P31 is at the highest ability level, indicating they found the test relatively easy
- Item ET_2 is the most difficult item, appearing at the highest point on the scale

Table 4: Wright map



- The majority of persons are concentrated around the 50-measure mark, aligning with the difficulty level of most

Table 5: Unidimensionality

Input: 31 Person 21 Item, Reported: 31 Person 20 Item, 10 Cats Ministep 5.8.4.0
Table of standardized residual variance in Eigenvalue units=Item information units

Variance component	Eigenvalue	Observed	Expected (%)
Total raw variance in observations=	37.0323	100.0	100.0
Raw variance explained by measures=	17.0323	46.0	45.4
Raw variance explained by persons=	7.6476	20.7	20.4
Raw Variance explained by items=	9.3847	25.3	25.0
Raw unexplained variance (total)=	20.0000	54.0	54.6
Unexpined variance in 1st contrast=	8.3754	22.6	41.9
Unexpined variance in 2nd contrast=	2.3949	6.5	12.0
Unexpined variance in 3rd contrast=	1.9913	5.4	10.0
Unexpined variance in 4th contrast=	1.4725	4.0	7.4
Unexpined variance in 5th contrast=	1.3619	3.7	6.8

Essential unidimensionality (Rasch/Common variance)= 52.2%

test items, suggesting a good match between item difficulty and person ability

- Some items (ESG_5, ESG_6, SSI_1, SSI_2, etc.) are positioned at the lower end, indicating they are among the easiest items
- There is a slight gap at the top where few persons align with the most difficult item (ET_2), possibly indicating an item that is too challenging for the sample. The test appears well-targeted, with a balanced distribution of item difficulty and person ability, though ET_2 might be too difficult relative to the respondents' abilities.

4.3. Unidimensionality

Unidimensionality in Rasch is the key component of content validity. It refers to how well the items fit the constructs. In dimensionality analysis (Table 5), the variance explained by the first contrast in the residuals indicates whether there could be another dimension exists. The standardized residual variance table provides insights into the dimensionality of the data and the extent to which the measurement model explains variance. Key findings include:

- Total raw variance in observations is 37.0323 (100%), with 46.0% explained by measures, indicating that nearly half of the variance is accounted for by the Rasch model
- The variance is further broken down into 20.7% explained by persons and 25.3% by items, closely matching the expected values
- Unexplained variance (54.0%) suggests some noise or additional factors influencing responses**,** which is slightly above the expected 54.6%
- The first contrast has an eigenvalue of 8.3754 (22.6%), suggesting a possible secondary dimension, which may indicate a violation of unidimensionality
- Subsequent contrasts have lower eigenvalues (ranging from 2.3949 to 1.3619), contributing to smaller portions of unexplained variance
- Essential unidimensionality (Rasch/Common variance) is 52.2%, which is slightly above the threshold for acceptable unidimensionality, but the first contrast is large enough to warrant further investigation.

The Rasch model explains a significant portion of the variance, the high first contrast suggests possible multidimensionality, which should be explored to determine whether subconstructs exist within the data.

5. CONCLUSION

This study investigated the roles of environmental, social, and governance (ESG) and sustainable social innovation in facilitating employment transitions in Malaysia, validated via Rasch measurement modeling. Findings reveal strong instrument reliability (person reliability = 0.82; item reliability = 0.91) and effective differentiation of ability and item difficulty (separation indices: 2.11 and 3.15), supporting the robustness of the measurement system. The wright map indicated a well-targeted alignment between respondent abilities and item challenges, even though a few misfit items (e.g., ET_3, ET_5) and respondents suggest the need for further refinement. Unidimensionality was largely supported, though potential secondary dimensions warrant further exploration.

Beyond measurement performance, the findings underscore the positive impact of ESG on employment transitions. This aligns with literature demonstrating ESG's role in enhancing organizational resilience, stakeholder value, and workforce adaptability (Akhtar et al., 2025; Jamal et al., 2021). Additionally, studies in the Malaysian context have shown that sustainable practices and social innovation contribute significantly to worker well-being, engagement, and inclusive growth (Sadiq et al., 2020).

This study elucidates how ESG integrated with social innovation initiatives, significantly influence employment transitions within Malaysia's evolving economic landscape. This research employing the Rasch model, precisely quantifies the probabilistic shifts in employment status, thereby offering a nuanced understanding of how ESG adherence and innovative social frameworks facilitate adaptive labor market dynamics (Adomako et al., 2024). Specifically, the findings highlight that a robust commitment to ESG strategies, is crucial for fostering sustainable development and economic advancement in Malaysia (Lanzolla and Anderson, 2008; Sang et al., 2025).

This is an evident as transformation initiatives enhance firms' environmental, social, and governance performance by increasing

the extent of high-quality labor and elevating the skill levels of the existing workforce (He and Chen, 2024). This comprehensive enhancement of human capital, driven by robust ESG practices, directly contributes to more stable employment opportunities and a more engaging, diverse work environment within the Malaysian labor market (Popova, 2023).

Moreover, ESG principles are instrumental in cultivating a labor market that is both adaptable and equitable, promoting lifelong employment models and fair wage structures (Popova, 2023). This holistic approach ensures that the Malaysian workforce is well-equipped to navigate the complexities of a rapidly evolving global economy, thereby securing sustained economic growth and social well-being (Teoh et al., 2024).

Besides, this study investigates how social innovations contribute to navigating the complexities of employment transitions within Malaysia's evolving economic landscape. Specifically, it examines the multifaceted interplay between social innovation initiatives and their consequential impact on workforce adaptability, skill development, and the creation of sustainable employment pathways. This focus is critical given the increasing recognition of social innovation as a means to address both localized and widespread systemic issues within emerging markets like Malaysia (Adomako et al., 2024). The distinctive nature of social innovation, diverging from conventional business innovation, lies in its primary objective of achieving societal change rather than mere economic value creation (Adomako et al., 2024). However, recent perspectives acknowledge that social innovation can concurrently generate shared value, integrating economic success with social progress (Adomako et al., 2024). This dual focus distinguishes social innovation by emphasizing novel solutions to societal and environmental problems while potentially fostering new market opportunities through socially innovative products and services (Babu et al., 2020).

Previous research further delineates the mechanisms through which social innovations characterized by their system-changing capacity and focus on enhancing quality of life, influence employment dynamics in Malaysia (Babu et al., 2020). This includes analyzing how social innovations foster entrepreneurial activities, improve skill acquisition, and create resilient employment opportunities within the small and medium enterprise sector (Mostafiz et al., 2025; Sarker and Al-Bluwi, 2021; Mamun et al., 2018). This exploration is pertinent given Malaysia's commitment to achieving sustainable development goals through relies on adaptable and skilled labor markets (Lanzolla and Anderson, 2008). This necessitates a deep dive into how social innovations by prioritizing social rather than solely economic objectives can address pervasive socio-economic issues such as poverty reduction and educational access, thereby indirectly bolstering employment outcomes (Pillai et al., 2024; Wahid et al., 2021).

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