

Sustainable Transformation of the Sri Lankan Apparel Sector Through Artificial Intelligence and Diversity, Equity & Inclusion: Evidence from Hirdaramani Garments (Pvt) Ltd

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Abstract: The Sri Lankan garments sector is under simultaneous pressure to modernize and enhance social inclusion. There is an emerging interest in AI and DE&I as organizational strategies. However, there is little empirical research on the integrated influence of AI and DE&I on sustainable performance, particularly in South Asian manufacturing. This research study focuses on the impact that the adoption of AI and DE&I have on the sustainable organizational performance of Hirdaramani Garments (Pvt) Ltd which is a BOI-registered mid-tier apparel exporter located in Biyagama, Sri Lanka. The primary data were analyzed on Pearson correlation, multiple regression, mediation analysis (Baron & Kenny, 1986), and PROCESS Macro moderation (Hayes, 2022) using quantitative and cross-sectional survey design with stratified random sampling (n = 150). The study found that AI adoption and sustainable performance are positively related ($r = 0.712$, $p < 0.01$). DE&I practice and workforce engagement also positively related ($r = 0.684$, $p < 0.01$). The model explains 63.4% variance in sustainable performance ($R^2 = 0.634$). The AI-DE&I impact on performance was observed to be partially mediated by the engagement of the workforce ($\beta = 0.541$, $p < 0.001$), while a significant moderation of the AI-performance relationship was noted by the technological readiness ($\beta = 0.218$, $p < 0.05$). The paper extends the TAM and Social Exchange Theory to manufacturing HR and offers evidence-based insights for apparel sector leaders and policymakers.

Keywords: Artificial Intelligence, Diversity Equity and Inclusion, Sustainable Performance, Apparel Sector, Sri Lanka, Workforce Engagement

Introduction

The Sri Lanka apparel industry generates 47% of total merchandise export earnings employing more than 350,000 people with almost half being rural based women. Although it is an important sector of the economy, manufacturers face ever-greater challenges around modernizing operations and adhering to ethical sourcing standards through strategic imperatives such as AI and DE&I. Although AI is enhancing manufacturing and DE&I is engaging in the workforce, there is a lack of empirical evidence on their combined impact, especially in the context of mid-tier manufacturers.

Current research tends to treat AI and DE&I as separate domains, leaving executives without collective evidence to transform strategies. To focus on the study, Hirdaramani Garments (Pvt) Ltd- A BOI registered mid-tier exporter in Biyagama, was chosen. Through the incorporation of Technology Acceptance Model and Social Exchange Theory, currently assessing the practices above and their combined effect on sustainable organizational performance. This paper is a data guide for HR leaders and policymakers to strengthen the global competitiveness and ESG compliance of the sector.

Justification of the Study

Theoretically, Current studies consider AI and DE&I distinct areas. By integrating both in a single empirical framework, this study attempts to fill in the above gap by extending TAM and Social Exchange Theory into manufacturing HR.

Practically, Mid-tier apparel manufacturers lack data-based tools to drive digital and social transformation at the same time. The research paper contains hands-on suggestions for HR leaders and policymakers and production managers.

Nationally, With the apparel industry accounting for 47% of Sri Lanka's export earnings, the findings effectively support its ESG compliance needs and long-term global competitiveness.

Research Aim

This study empirically examines the separate and combined effects of AI adoption and DE&I practice on sustainable organizational performance in the apparel sector of Sri Lanka. Hirdaramani Garments (Pvt) Ltd was used as a case study.

Research Objectives

- To assess the current state of AI adoption and DE&I practice at Hirdaramani Garments (Pvt) Ltd.
- To examine the individual and combined effect of AI adoption and DE&I practice on sustainable organizational performance.
- To develop an integrated framework guiding mid-tier apparel manufacturers in leveraging AI and DE&I for sustainable transformation.

Research Questions

- How is AI currently implemented in HR and business strategy across Sri Lankan apparel organizations?
- What measurable outcomes are associated with DE&I initiatives in terms of staff engagement, satisfaction, and performance?
- How do AI and DE&I interact to influence organizational sustainability and competitive advantage?
- What integrated framework can guide apparel manufacturers in leveraging AI and DE&I for long-term transformation?

Literature Review

Artificial Intelligence in Apparel Manufacturing

With the help of large data analysis, machine-learning algorithms help in quality assurance and predictive maintenance under Industry 4.0. For example, AI-enabled fault detection has lowered rework by 18% in textile factories and demand forecasting has reduced inventory wastage. When appropriately calibrated, algorithms in HR enhance the candidate-role fit and mitigate bias in recruitment. Nonetheless, there is concern that the AI may exacerbate structural bias in society, should the data be flawed, something critical for the gender-diverse Sri Lankan garment industry. The purpose of this study is to apply the Technology Acceptance Model (TAM) for framing AI adoption based on perceived usefulness, ease of use, and organizational support.

Diversity, Equity and Inclusion in the Apparel Sector

With a 75% female workforce and ethical diversity, DE&I is not merely a goal, but an operational necessity. Studies show formal DE&I programs can lower absenteeism and improve engagement. The employees who are treated fairly return the favors by bringing discretionary effort into play and improving product quality. Notwithstanding this, the Sri Lankan export processing zones continue to experience a gender wage gap and limited promotion opportunities for women. These need to be explicitly addressed in inclusion frameworks.

Integrated AI and DE&I for Sustainable Performance

By using AI for DE&I, we can standardize appraisals and reduce proximity bias on promotions. In addition, AI tools can spot disengaged talent among minorities for improved retention. In line with UN-SDGs 8 and 9, sustainable performance is thought of here as the equilibrium of operational efficiency, employee wellness, and future competitiveness. The interaction between both the drivers and their combined application are often treated in isolation, but the interaction of the two is expected to provide higher sustainable results.

Methodology

Research Design and Philosophy

The study adopts a positivist philosophical stance with a deductive research approach which tests four-a-priori hypotheses from TAM and Social Exchange Theory by way of cross-sectional survey design (Saunders et al., 2019). The analytical strategy starts with descriptive profiling and subsequently progresses to bivariate analysis.

Conceptual Framework

Drawing from the TAM, Social Exchange Theory and sustainability performance literature, the current study proposes that AI Adoption (IV1) and DE&I Practices (IV2) would independently and jointly affect Sustainable Organizational Performance (DV) through mediation of Workforce Engagement (M) with the moderation of Organizational Culture and Technological Readiness.

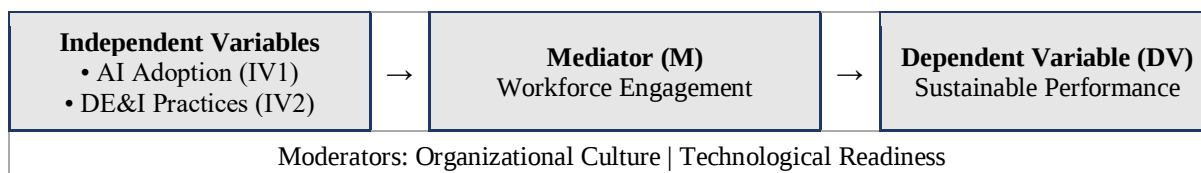


Figure 1: Conceptual Framework

(Source: Developed by Author)

Hypotheses

A total of five hypotheses is put forward.

- H1: Sustainable performance at Hirdaramani Garments is positively linked with AI adoption.
- H2: Hirdaramani Garments associates DE&I practices with improved workforce engagement.
- H3: Workforce engagement is a mediator between integrated AI-DE&I and sustainable performance.
- H4: The relationship between AI adoption and performance is moderated by technological readiness and organizational culture.
- H5: The combined application of AI and DE&I have a significantly positive impact on sustainable performance as compared to a single driver adopted alone.

Research Setting: Hirdaramani Garments (Pvt) Ltd

Hirdaramani Garments (Pvt) Ltd, the BOI-registered fully owned subsidiary of the Hirdaramani Group, began operations in 2005 in Biyagama Export Processing Zone. The site houses almost 800 production staff and 120 management staff. There are nine departments consisting of cutting, sewing, finishing, quality control, merchandising, HR, IT, logistics and production planning. The business entity provides lifestyle apparel to European and North American retailers. In 2021, quality inspection using AI was pilot deployed and, in 2022, a formalized DE&I policy was introduced under pressure from buyers aligned to the UN Global Compact. As such, this is a contextually appropriate site to look at nascent but active AI and DE&I transformation.

Population and Sampling

The accessible population consisted of a total of 680 employees from production, supervisory and management. The Krejcie and Morgan (1970) table indicates that for a population of 680 at 95% confidence level and a 5% margin of error, the minimum required sample size is 245. However, due to the constraints of limited access to the manufacturing set-up during production hours as well as the time limit imposed by management, only a final usable sample of 150 responses was achieved. While this is less than the Krejcie and Morgan threshold, the present study met the minimum requirement by Hair et al. (2014) for stable multiple regression modelling with five or fewer predictors which recommends a minimum of 100-150 respondents for a stable model. Given the nature of the regression-based analyses conducted, we find the sample of 150 to be adequate, although generalizability remains limited. Table 1 presents the distribution of the sample across various production, supervisory, and managerial grades formed through stratified random sampling.

Data Collection Instrument

A structured questionnaire was developed with 45 items across six constructs. The AI Adoption (12 items) scale refers to Venkatesh et al.'s (2003) UTAUT scale that assessed perceived usefulness, ease of use and organizational support. Engagement of Employees and Inclusion Practices (10 items) sourced from the SHRM DE&I Metric Framework, measuring promotion equity, inclusive leadership, and representation awareness. The Workforce Engagement (8 items) scale with vigor, dedication and absorption was sourced from Schaufeli et al.'s (2002) UWES. People in The Agenda (8 items) considered shareholder communication and social media engagement of Thai corporations. Organizational Culture consisting of 3 items and Technological Readiness with 2 items were the moderating constructs. A five-point Likert scale was used for all items in the questionnaire. After pilot testing with 25 employees, minor wording changes were made and all constructs had Cronbach's alpha greater than 0.75.

Data Analysis

The statistical data was analyzed as per the manual using IBM SPSS Statistics version 26. The study conducted descriptive statistics, Pearson correlation, simple linear regression, multiple linear regression, and Baron and

Kenny (1986) four-step mediation. The moderation was tested through PROCESS Macro v4.1. The absence of multi collinearity was confirmed from all VIF values < 5.0 It was checked Shapiro-Wilk tests and Q-Q plots.

Results

Demographic Profile of Respondents

Of 150 questionnaires distributed, 147 responses were valid (98%). Table 2 displays that, similar to the sector, there seems to be an abundance of female respondents at 72.1%. The most frequent age cohort was 26–35 years (45.6%), and 6–10 years was the highest experience group (38.1%). Of the total respondents, 63.9% were production-level employees, 22.4% supervisors, and 13.6% management. Accordingly, one may say that the respondents had a good cross-section representation at the operational and strategic levels.

Table 2: Demographic Profile of Respondents (n = 147)

Variable	Category	Frequency	Percentage (%)
Gender	Male	41	27.9
	Female	106	72.1
Age	18–25 years	38	25.9
	26–35 years	67	45.6
	36–45 years	32	21.8
	Above 45 years	10	6.8
Experience	0–5 years	29	19.7
	6–10 years	56	38.1
	11–15 years	41	27.9
	Above 15 years	21	14.3
Grade	Production Level	94	63.9
	Supervisory Level	33	22.4
	Management Level	20	13.6

(Source: Analyzed Data, 2024)

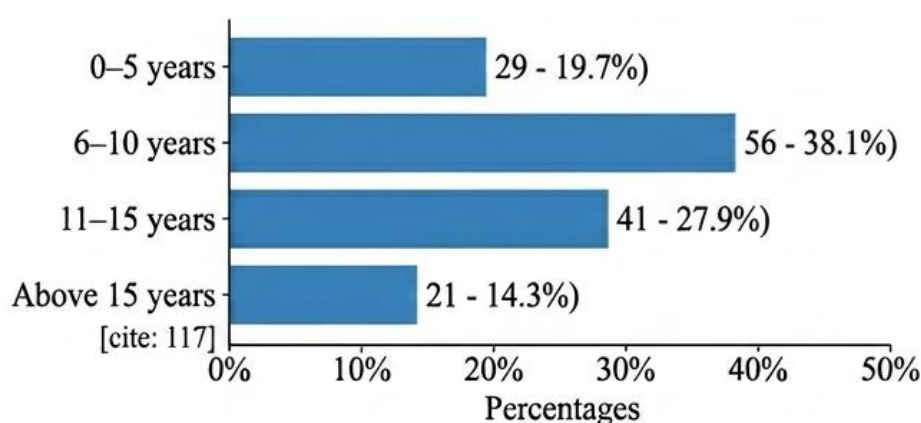


Figure 2: Experience Distribution

(Source: Company HR Records & Analyzed Data, 2024)

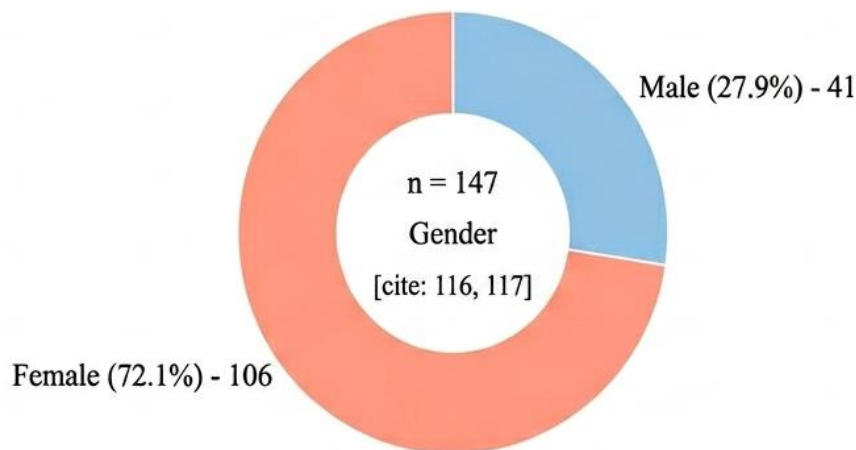


Figure 3: Gender Composition

(Source: Company HR Records & Analyzed Data, 2024)

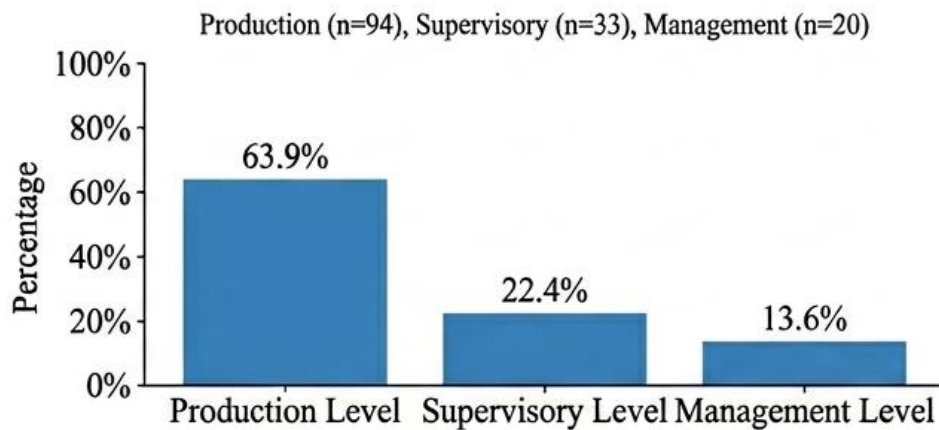


Figure 4: Grade composition by percentage

(Source: Company HR Records & Analyzed Data, 2024)

Descriptive Statistics

Table 3 showcases the descriptive statistics for all key constructs. The AI adoption registered an average mean of 3.62 (SD=0.583, CV=16.10%) meaning that the employees moderately to positively accepted the artificial intelligence tools. Participants rated Perceived Usefulness (M = 3.74) more highly than Perceived Ease of Use (M = 3.49), indicating that while they see value in AI, they encounter friction in day-to-day use. The friction may be a result of digital literacy limitations at the production level. The DE&I Practices produced MV = 3.48 (CV = 17.59%) suggesting an early-stage policy. Moreover, the least scored sub-construct was Equity in Promotions (MV = 3.31) that indicates a specific inequity issue. The highest mean was recorded the Workforce Engagement (M = 3.79, CV = 12.95%) and Sustainable Performance M = 3.55. The CV values of all the variables were below 33%. This indicates that the data are consistent and acceptable.

Table 3: Descriptive Statistics of Key Constructs

Construct	N	Mean	Std. Dev.	Mode	CV (%)
AI Adoption (Overall)	147	3.62	0.583	4.00	16.10
Perceived Usefulness	147	3.74	0.541	4.00	14.47
Perceived Ease of Use	147	3.49	0.619	3.50	17.74

DE&I Practices (Overall)	147	3.48	0.612	3.50	17.59
Equity in Promotions	147	3.31	0.701	3.00	21.18
Inclusive Leadership	147	3.65	0.583	4.00	15.97
Workforce Engagement	147	3.79	0.491	4.00	12.95
Sustainable Performance	147	3.55	0.554	4.00	15.61

(Source: Analyzed Data, 2024)

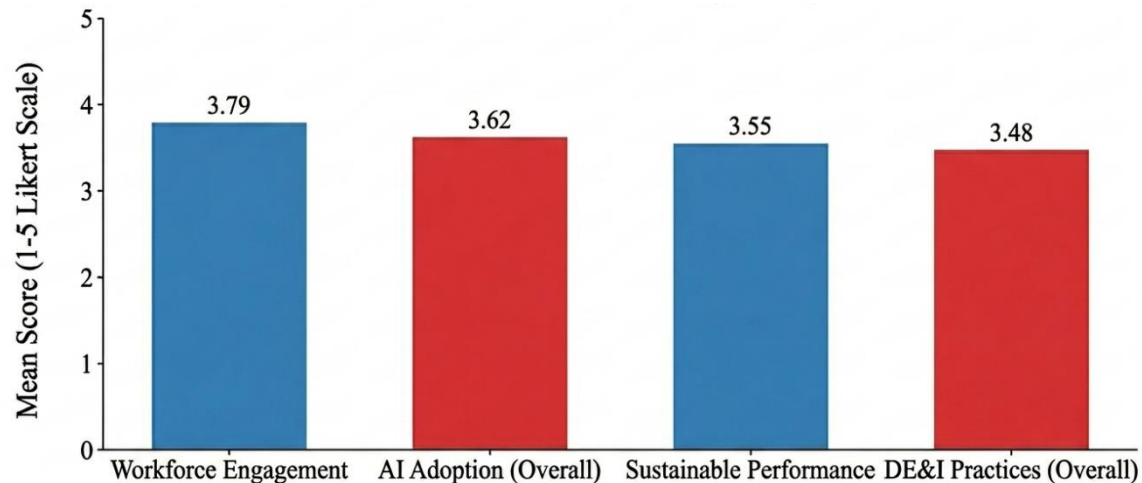


Figure 5: Key Construct Mean Comparison for Sustainable Transformation

(Source: Analyzed Data, 2024)

Correlation Analysis

The Pearson correlation matrix (Table 4) shows some significant connections between the constructs. A strong positive relationship was established between AI adoption and sustainable performance ($r = 0.712$, $p < 0.01$), thus supporting H1. The correlation between DE&I Practices and Workforce Engagement were positive and significant ($r = 0.684$, $p < 0.01$), thus H2 is supported. The bivariate correlation between Workforce Engagement and Sustainable Performance was the highest ($r = 0.758$, $p < 0.01$) which provides initial support for the mediating role in H3. This study found a moderate correlation ($r=0.423$) between AI Adoption and DEI Practices, meaning they measure different things. The VIF (Variance Inflation Factor) of the constructs was less than 1.5 and multicollinearity between the constructs was absent and confirmed. The study then ran additional regression models without any issues.

Table 4: Pearson Correlation Matrix

Variable	1	2	3	4
1. AI Adoption	1.000			
2. DE&I Practices	0.423**	1.000		
3. Workforce Engagement	0.591**	0.684**	1.000	
4. Sustainable Perf.	0.712**	0.631**	0.758**	1.000

** Correlation is significant at the 0.01 level (2-tailed).

(Source: Analyzed Data, 2024)

Regression Analysis

Simple Linear Regression

A simple linear regression analysis indicates that analyzing the independent effect of AI Adoption on Sustainable Performance is significant ($F=149.72$, $p<0.001$) which explains 50.7% variance ($R^2=0.507$, Adjusted $R^2=0.503$).

Sustainable Performance increased by 0.612 units with a one-unit increase in AI Adoption, providing strong support for H1. ($\beta = 0.612$, $t = 12.24$, $p < 0.001$)

$$\text{Sustainable Performance} = 1.284 + 0.612 (\text{AI Adoption}) + \varepsilon$$

Table 5: Simple Linear Regression – AI Adoption on Sustainable Performance

Predictor	β	Std. Error	T-value	P-value	VIF
Constant	1.284	0.193	6.65	0.000	-
AI Adoption	0.612	0.050	12.24	0.000	1.00

$R^2 = 0.507$; Adjusted $R^2 = 0.503$; $F = 149.72$; $p < 0.001$

(Source: Analyzed Data, 2024)

Multiple Regression Analysis

The model's fit improves significantly with both predictors and the Sustainable Performance variance explained is 63.4%. The results showed ($R^2 = 0.634$, Adjusted $R^2 = 0.629$, $F = 125.44$, $p < 0.001$) that AI Adoption ($\beta = 0.481$, $t = 9.25$, $p < 0.001$) and DE&I Practices ($\beta = 0.342$, $t = 7.13$, $p < 0.001$) were definitely significant. The simple model indicates that the 12.7 percentage points increase in R^2 supports the conjecture on additive and independent contributions of DE&I practices to sustainable performance, beyond just an AI. 1.22 VIF value tells us that multi collinearity is excluded.

$$\text{Sustainable Performance} = 0.894 + 0.481 (\text{AI Adoption}) + 0.342 (\text{DE\&I Practices}) + \varepsilon$$

Table 6: Multiple Regression – AI Adoption & DE&I Practices on Sustainable Performance

Predictor	β	Std. Error	T-value	P-value	VIF
Constant	0.894	0.176	5.08	0.000	-
AI Adoption	0.481	0.052	9.25	0.000	1.22
DE&I Practices	0.342	0.048	7.13	0.000	1.22

$R^2 = 0.634$; Adjusted $R^2 = 0.629$; $F = 125.44$; $p < 0.001$

(Source: Analyzed Data, 2024)

Mediation Analysis

The four-step procedure of Baron and Kenny (1986) tested H3. Findings from Step 1 established that the future prediction of sustainable performance is significantly predicted by AI Adoption and DE&I Practices. Step 2 validation also confirmed the independent predictions of Workforce Engagement by AI Adoption ($\beta = 0.471$, $t = 7.98$, $p < 0.001$) and DE&I Practices ($\beta = 0.521$, $t = 9.47$, $p < 0.001$). In Step 3, results indicate that Workforce Engagement was a substantial positive predictor of Sustainable Performance. In Phase 4, it was revealed that including Workforce Engagement caused the direct effects of AI Adoption ($\beta = 0.231$, $p = 0.001$) and DE&I Practices ($\beta = 0.179$, $p = 0.002$) to decrease substantially but remain significant. Thus, this indicates partial mediation. The analysis of the Sobel test indicates that the indirect effects through AI ($Z = 5.82$, $p < 0.001$) and DE&I ($Z = 6.11$, $p < 0.001$) are both significant. H3 is completely supported.

Table 7: Mediation Analysis – Workforce Engagement as Mediator (n = 147)

Path	β	Std. Error	T-value	P-value	Conclusion
AI Adoption → Engagement (Step 2)	0.471	0.059	7.98	0.000	Significant
DE&I Practices → Engagement (Step 2)	0.521	0.055	9.47	0.000	Significant
Engagement → Performance (Step 3)	0.541	0.063	8.59	0.000	Significant

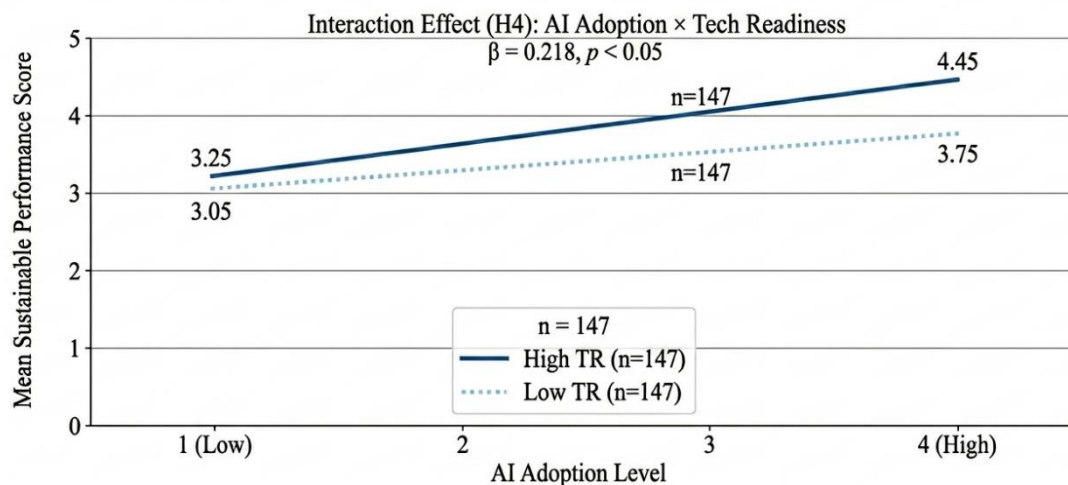
AI Adoption → Performance (Step 4)	0.231	0.061	3.79	0.001	Partial Mediation
DE&I Practices → Performance (Step 4)	0.179	0.058	3.09	0.002	Partial Mediation

(Source: Analyzed Data, 2024)

Moderation Analysis

H4 was tested using PROCESS Macro v4.1 (Hayes, 2022). The interaction term between AI Adoption and Technological Readiness was found to significantly affect performance benefits ($\beta = 0.218$) and thus, employees with more digital capability amplified these performance benefits of AI Adoption ($p < 0.05$).

The interaction term AI Adoption $\times$ Organizational Culture was found to be marginally significant ($\beta = 0.141$, $p = 0.079$), indicating that there is directional but inconclusive moderating effect of culture. Technological Readiness is confirmed as a significant moderator, therefore H4 is partially supported.



*Technological Readiness (TR) and Organizational Culture (OC) are other potential moderators

Figure 6: Interaction of AI adoption and Technological Readiness on Sustainable Performance (n=147)

(Source: Analyzed Data, 2024)

Discussion

According to the results of this study, Artificial Intelligence (AI) adoption and Diversity, Equity and Inclusion (DE&I) practices integrated towards sustainable organizational performance in the Sri Lankan apparel sector, empirical evidence found from Hirdaramani Garments (Pvt) Ltd.

AI adoption and sustainable performance had a positive relationship ($r = 0.712$, $p < 0.01$). Thus, the findings correspond with TAM which states that perceived usefulness and ease of use are key determinants of technology adoption and organizational outcomes (Davis, 1989). The average perception of usefulness ($M=3.74$) higher than ease of use ($M=3.49$) implies the employees do not mind using them, but there is some friction when it comes to day-to-day usage. This is possibly due to the gap in digital literacy in the field. This is in line with TAM's proposition that ease of use must be supported through training and organizational infrastructure for adoption to translate into performance gains.

There is a significant link between DE&I practices and workforce engagement: $r = 0.684$, $p < 0.01$. This can be explained through Social Exchange Theory (Blau, 1964; Cropanzano & Mitchell, 2005) where employees who feel treated fairly will reciprocate with discretionary effort and greater engagement. Equity in Promotions scored low ($M = 3.31$) on average implying that there are structural inequities related to promotion pathways for women which remain unaddressed despite the existence of a DE&I policy. This result resonates with the existing literature on the persistence of gender wages and limited upward mobility in the Sri Lankan export processing zones (see Section 2.2). This shows that policy without active implementation is not enough.

The finding of workforce engagement partially mediating the effect of AI-DE&I on sustainable performance ($\beta = 0.541$, $p < 0.001$) is theoretically relevant. The human element of employees' belonging, being motivated and engaged is not just a passive outcome, but an active channel through which technological and inclusion strategies

create organizational value. This pushes the boundaries of both TAM and Social Exchange Theory to a manufacturing HR setting where they are rarely applied together. The direct effect of AI direct effect ($\beta = 0.231$, $p = 0.001$) and DE&I practices ($\beta = 0.179$, $p = 0.002$) on performance after controlling for engagement shows that both drivers also have an effect on performance other than engagement itself.

According to the results of the moderate test, Technology Readiness is recognized as a substantial explainer of the AI-performance relationship ($\beta = 0.218$, $p < 0.05$). Subsequently, Organizational Culture does display a directional moderating effect. However, this effect is ultimately inconclusive ($\beta = 0.141$, $p = 0.079$). This supports the theoretical position that AI investments are contingent on the readiness of the organizational ecosystem, a finding with direct practical implications for mid-tier manufacturers who may deploy AI tools without first building the necessary digital infrastructure and workforce capability. The finding that culture has some impact may mean that while its effect is not strong enough to deliver major change at first, over time its impact could be felt. Thus, over time and longer studies, this cultural factor may enable major change.

In summary, these results broaden existing research by proving that AI and DE&I cannot only go hand-in-hand but also drive sustainable performance with the help of workforce engagement and technology readiness as mediators. The model indicating that 63.4% of the variance in sustainable performance is explained ($R^2 = 0.634$) in line with the South Asian manufacturing model explains the power of this integrated framework.

Conclusion and Recommendations

Conclusion

This study indicates that Hirdaramani Garments prioritises AI Adoption and DE&I Practices for sustained performance. The results show that:

- **Workforce Engagement** acts as a crucial link; when employees feel like they belong and are valued, AI and DE&I perform at their best.
- **Technological Readiness** is a must; without proper infrastructure and a supportive culture, AI investments yield diminishing returns.
- The high correlation ($r = 0.758$) between engagement and performance underscores that the "human element" remains the apparel industry's greatest asset, even in the age of automation.

Recommendations

- **Integrated Digital Training:** Launch "AI Literacy" programs tailored for the female-majority workforce (72%) to reduce job insecurity and boost engagement.
- **DE&I Strategic Committee:** Establish a formal body to move DE&I from "policy" to "practice," focusing on increasing women's representation in management (currently only 13.6%).
- **Infrastructure Scaling:** Prioritize high-speed cloud connectivity and data security protocols before expanding AI-driven predictive maintenance across all production lines.
- **Hybrid Performance Metrics:** Move beyond traditional output counts to include "Digital Contribution" and "Inclusion Scores" in monthly performance appraisals.

Acknowledgements

The authors sincerely thank the management and employees of Hirdaramani Garments (Pvt) Ltd, Biyagama, for their participation and cooperation during the data collection process, and the anonymous reviewers who provided constructive feedback to improve this manuscript.

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