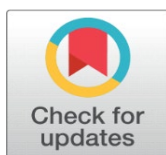
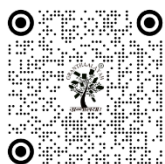


PEOPLE, PROCESS, AND ENVIRONMENT AS DRIVERS OF SUSTAINABLE PROJECT EFFECTIVENESS: AN SEM STUDY IN THE STEEL INDUSTRY

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ABSTRACT

Industries are under increasing pressure to deliver economic performance while also minimizing their impact on the environment and society. There are only a few studies that investigate the link between human factors, process capabilities, business environments and sustainability practices in heavy industries. The current study fills those gaps with an integrated solution with a three-organizational-drivers framework. Factors related to people, processes and business environment are analysed as predictors of sustainability practices and sustainable project effectiveness in the steel industry. For the purpose of testing the relationship between people factors, process capability, business environment conditions, sustainability practices and sustainable project effectiveness in Steel Projects, quantitative cross sectional design was used in the study. Responses have been gathered from 350 professionals from steel companies throughout India. People factors improved sustainability practices and sustainable project effectiveness. Process capability improved sustainability practices and sustainable project effectiveness. Business environment conditions improved sustainability practices and sustainable project effectiveness. Sustainability practices improved sustainable project effectiveness. People factors showed the strongest total effect on sustainable project effectiveness. The results indicate that a good organizational system fosters good sustainability practices which in turn help produce good sustainable project effectiveness in steel projects.

Keywords: Sustainability, Steel Industry, People Factors, Process Capability, Business Environment, Sustainable Projects, Project Effectiveness, Sustainability Practices, Organizational Drivers, Human Factors

1. INTRODUCTION

Industries are under a bigger pressure to deliver economic performance while also minimizing their impact on the environment and society. The more sustainability is under pressure, the more this includes heavy industries that are characterized by having high energy demands and complicated material flows. This pressure is shared by the steel industry where material flows are high and project cycles are long, together with tough market demands. This business segment's leaders seek systems that produce consistent results and are sustainable. These are dependent on people, process and the business environment. Previous studies deal with each of these domains separately. This study addresses this and builds on project management and sustainability science studies.

Afzal and Tumpa (2024), Boeske (2023), and Zada et al. (2024) emphasized the role of human factors in contributing to project's success, while Ahmad et al. (2022) and Moroojo et al. (2024) highlighted the relationship between leadership style and the performance of the project through shared goals and role clarity. Process management research further makes major contributions: they note structured methods for the consistent delivery of results. According to Martens et al. (2017) reliable methods adapted lead to better projects result in uncertain environment. In addition project environments are seen from a wider perspective by studies. García-Feijoo et al. (2022) revealed that execution quality depends on organizational influences and the external context. Finally, the ideas support choices throughout project phases; argued that Sustainability Principles are used as guidance for choices throughout project phases (Shaukat et al., 2021). Previous research identifies environmental and social attributes affecting the effectiveness of projects.

Sustainability practices are of longer term impact on projects' effectiveness. According to the findings of Martens et al. (2017), there is greater stakeholder support for projects that apply sustainability practices, which in turn also impact on project outcomes and organisation priorities. There are only a few studies that investigate the link between human factors, process capabilities, business environments and sustainability practices in heavy industries. There are few studies that examine the influence that these connections make on the effectiveness of sustainable projects. Existing research frequently has a focus on sustainability as an external target to be aimed for but not practiced within the organization. Another neglected area of research is one in which the conditions in the steel sector are different; namely, in complex supply chains where compliance requirements and fluctuating markets influence project decisions. An all-encompassing explanation is required for these conditions. An organizational structure to connect with sustainability results. Current study proposes an empirical link between the organizational factors, sustainability practices and project effectiveness which addresses this need.

The current study fills those gaps with an integrated solution with a three-organizational-drivers framework. Factors related to people, processes and business environment are analysed as predictors of sustainability practices and sustainable project effectiveness in the steel industry. Two types of test, direct and mediating effect of sustainability practices. It seems to be consistent with the ongoing trend in the project management field towards system models and multiple performance measure. To investigate the effect of people, process and environment factors on sustainability practices and effectiveness of the sustainable projects in steel. The study was guided by 4 questions: How can people factors impact sustainable project effectiveness and practices? What impact do process capacities have a these outcomes? What is the role of the business environment factors for sustainable practices and effectiveness of sustainable projects? Are sustainability practices intervening variables within the relationship between these organisational factors and sustainable project effectiveness?

The study has three aspects of novelty. It integrates People, Process and environmental perspectives in one empirical model for Heavy Industrial Projects. It places sustainability practices as a target of organizational driving notions as well as a tool aggregating them and sustainable project effectiveness. It tests these links with data from the steel sector using structural equation. This helps to enhance the conceptual understanding and practice in the sector. A field in which the sustainability results rely on an organizational system than on an individual effort. The study is developed to help in development of theory by combining people, process and environment by using one model for a project in the context of sustainability. It helps practice by identifying organizational capabilities to support sustainability in steel projects as well as helps policy by identifying external pressures that influence sustainable project outcome.

2. LITERATURE REVIEW

Previous research has established a significant connection between the factors and sustainability. There are still some pieces of evidence. This is because many studies review these factors separately which restricts the understanding of the factors put together. This section lays the ground work for an integrated approach.

2.1. PEOPLE FACTORS AND PROJECT OUTCOMES:

Related drivers are found to be one of the main inputs to project performance through research. Zada et al. (2024) and Kumar et al. (2020) argued that that leadership style influence on coordination, shared meaning and execution quality. Kumar et al. (2020) argued that team learning and knowledge flow improves team performance when circumstances change. Such studies indicate that human skills help to provide direction to project efforts in complex

situations. Conventional research on sustainability-related projects indicates that people factors impact the ecological and socio-environmental decisions, although there is no clarity on the mechanisms involved. Heavy sectors have complex systems, compliance requirements, and there's a high risk of operation. For all of these conditions, there is a need for people who have related judgement, awareness and involvement in sustainability activities. Hence it is hypothesized that:

H: Sustainable project effectiveness is positively influenced by people factors.

H2: People factors have a positive effect on sustainability practices.

2.2. CAPABILITY AND PERFORMANCE OF THE PROCESS:

Process capabilities embody the organization, methods and structures used for guiding project execution. Sharma et al. (2020) emphasized on the need of using the structured methods for consistent results. Branca et al. (2020) said that process adaptation contributes to ensure the quality of the delivery when dealing with uncertainty. Here are some insights that support the idea of methods enhancement and control in execution. There are mixed findings in associating processes with sustainability practices within the studies. Some report that structured processes can help them to ensure they are aligned for sustainability: they have checks and review gates. Others point to the fact that hard approaches leave less room for adjustments in connection with environmental and social aspects. Such variations indicate that the process capabilities can have differing effects on sustainability practices in context. Heavy sectors typically have long cycles and have to operate under technical and regulatory constraints, enhancing the need for a strict process discipline. All of these arguments lead us to formulate another hypothesis:

H3: Process capabilities have a positive effect on sustainable project effectiveness.

H4: Process capabilities have a positive effect on sustainability practices.

2.3. BUSINESS ENVIRONMENT FACTORS:

Zhang and Su (2020), Shan et al. (2024) and Bag (2023) highlights that business environments set external pressures and build internal support systems. These pressures shape project execution and the outcomes as well. Shan et al. (2024) found that organizational support, ease of access to resources and effective governance impact project effectiveness. Zhang and Su (2020) highlight that regulations, industry standards and market volatility determine project choices. Strong environmental and social expectations influence firm behavior and impact sustainability practices (Bag, 2023). Strong norms lead to stronger sustainability practices and reduces negative environmental impact. Financial pressure reduces investment in environmental and social priorities. Heavy industries such as steel operate under strict compliance frameworks. The sector face sensitive community expectations. The business environment has a bigger role in shaping sustainability practices and project outcomes. This supports the following hypotheses:

H5: Business environment factors have a positive effect on sustainable project effectiveness.

H6: Business environment factors have a positive effect on sustainability practices.

2.4. SUSTAINABILITY PRACTICES AS A LINKING MECHANISM:

Sustainability focused research identifies sustainability practices as central to long term project performance. Shaikat et al. (2021) highlight that sustainability principles directs all stages of the project life cycle. Stronger stakeholder support reflects strong sustainability alignment (Kumar et al., 2020). Adebayo et al. (2024) noted that sustainability practices influence both project outcomes and strategic direction. These findings show that sustainability practices serve as a driver of project results. Many studies do not explain how these practices emerge from internal factors such as people, process, and business environment conditions. Fewer studies examine whether sustainability practices serve as a mechanism that links these factors to project outcomes. These gaps provide the basis for the next hypothesis.

H7: Sustainability practices have a positive effect on sustainable project effectiveness.

2.5. CONTRADICTIONS AND GAPS:

Three gaps are identified in studies reviewed. Research is frequently done in isolation — looking at people, processes or business environment. This can limit understanding of the interaction between these elements within the project system. Secondly, the information about sustainable practices for the agricultural sector is not consistent and is different according to the sector. Quite definite time schedules, heavy capital requirements, environmental risks and regulatory oversight are typical of steel projects. Previous studies negate the effects of sector specific influences. Secondly, there are some studies that examine mediation paths between the organizational drivers and the successful application of sustainability in projects. The resultant gaps sets the groundwork for the final set of hypotheses:

H8: The People Factors have an indirect relationship on Sustainable project effectiveness through Sustainability practices.

H9: Nature of the Sustainable Project Effectiveness is mediated by Sustainability Practices.

H10: Business environment factors influence the sustainable project effectiveness through sustainability practices.

2.6. MOVING TOWARDS AN INTEGRATED FRAMEWORK:

Evidence for the influence of people, process and business environment conditions is indicated well in the reviewed work. It also highlights some missing pieces that impact heavy industrial insight. It addresses this study by structuring all these domains into one; a framework that explains how these domains impact sustainability practices and sustainable project effectiveness (Figure 1). The model views sustainability practices as a goal of organizational elements, and as a tool that links them and end results. Strengthening of theory and supporting sector specific decision making through this approach.

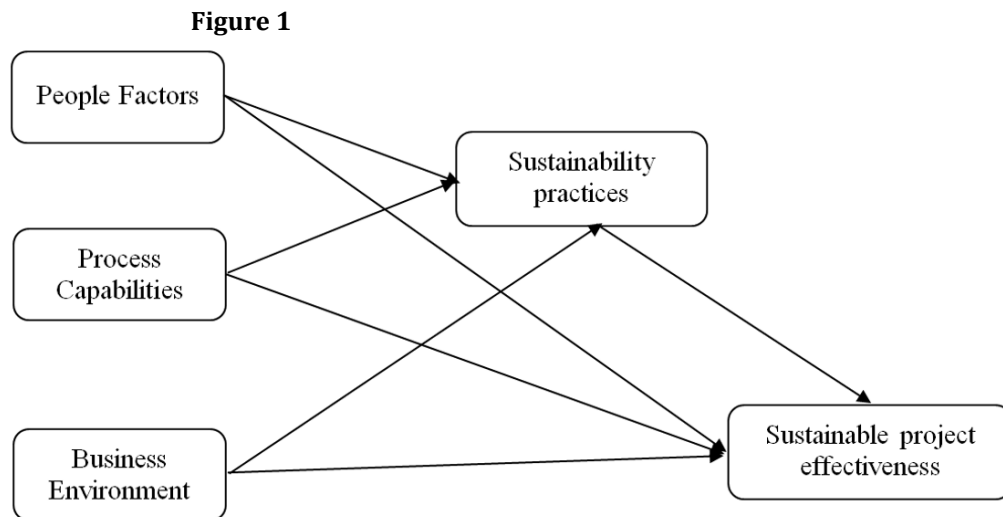


Figure 1 Conceptual Framework

3. METHODOLOGY

For the purpose of testing the relationship between people factors, process capability, business environment conditions, sustainability practices and sustainable project effectiveness in Steel Projects, quantitative cross sectional design was used in the study. Responses have been gathered from 350 professionals from steel companies throughout India. Engineers, supervisors or managers were all respondents. The experience of the respondents ranged from one year and above on the project. The respondents were selected based on purposive sampling. Those included only had project-related activities. People who did not have responsibilities to work on the project were not included. This is done to maintain the relevance of the data for answering the research questions. All constructs were adapted from pre validated scales adopted in studies conducted in steel sector. People factors: items borrowed from responsible leadership (Lin et al., 2023), workforce agility and safety culture studies (Patil and Suresh, 2019). Process capability: items were from project success processes (Albert et al., 2017), risk management (Colla et al., 2019) and digitalization

studies (Fonseca et al., 2024). Business environment: regulatory pressure and external environment (Zhang and Chen, 2017), sustainable practices, green operations (Bonfanti et al., 2022, Daddi et al., 2021), sustainable project effectiveness (Albert et al., 2017, Locatelli et al., 2023) and sustainable project management (Wu et al., 2023). For all items a 5-point scale was used. All item wording were checked for relevance, by subject expert. They tested against conditions prevailing in the Indian context in the steel sector. They reviewed them so that they would fit with the operational and regulatory requirements.

The study was carried out in a well-structured manner. The first step was to develop the items and to send these items to an expert review. The second step was to send out the survey via professional networks and steel companies. The third step was that data were screened for completeness and for the quality of response. Responses with lack of completion and/or with patterned/repetitive or inconsistent answers were excluded from screening. The dataset had acceptable levels of variance, completeness and the distribution of responses. Full collinearity VIF was used as a measure of common method bias. None of the values exceeded 3.3. This decreased concerns about "inflating" relationships because of responses from the same source. Correction for normality was done using the value of skewness and value of kurtosis. PLS-SEM values were within reasonable ranges for all values. ADANCO 2.3 supported measurement and structural model analysis. The measurement model assessed indicator reliability, internal consistency, convergent validity, and discriminant validity. The structural model estimated direct effects, indirect effects, effect sizes and explained variance. Bootstrapping with 5,000 resamples produced significance levels for all paths. Mediation tests used indirect paths to evaluate the linking role of sustainability practices. Participants provided informed consent before completing the survey. No personal identifiers were collected. Responses remained confidential throughout the study.

4. RESULTS

4.1. MEASUREMENT MODEL

The reliability and validity of the measurement model were assessed before testing the structural relationships. Table 1 reports all indicator loadings. All items met accepted thresholds. One process capability item loaded below 0.70 but stayed above the minimum level for exploratory studies, so the item remained in the model. These results support indicator reliability.

Table 1

Table 1 Indicator Loadings for All Items			
Construct	Items	Item Codes	Item Loadings
People Factors (PE)	Leaders respond quickly.	PE01	0.8192
	Leaders adapt to changes.	PE02	0.8276
	Leaders coordinate well.	PE03	0.8126
	Leaders promote communication.	PE04	0.8249
	Workforce adapts easily.	PE05	0.7430
	Team performs multiple roles.	PE06	0.8041
	Employees make quick decisions.	PE07	0.763
	Safety is prioritized.	PE08	0.7404
	Unsafe conditions reported.	PE09	0.8001
	Safety procedures reinforced.	PE010	0.8147
Process Capabilities (PR)	Planning is structured.	PRO1	0.7913
	Schedules updated realistically.	PRO2	0.7715
	Milestones clearly defined.	PRO3	0.7746
	Risks identified early.	PRO4	0.7685
	Mitigation steps followed.	PRO5	0.6843
	Risks reviewed regularly.	PRO6	0.8979
	Digital tools are used.	PRO7	0.7884
	Digital systems improve transparency.	PRO8	0.7860
Business Environment (BE)	Analytics support decisions.	PRO9	0.8423
	Policies support sustainability.	ENV1	0.8587

	Regulations influence decisions.	ENV2	0.7137
	Compliance shapes planning.	ENV3	0.8071
	Market conditions unpredictable.	ENV4	0.8253
	Cost fluctuations affect planning.	ENV5	0.8369
	Demand changes rapidly.	ENV6	0.7464
Sustainability Practices (SP)	CE practices applied.	SUS1	0.8048
	Materials can be reused/recycled.	SUS2	0.7351
	Sustainability included in design.	SUS3	0.8334
	Waste minimized.	SUS4	0.8161
	Emissions reduced.	SUS5	0.7426
	Energy efficiency applied.	SUS6	0.7060
Sustainable Project Effectiveness (SPE)	Project met schedule.	EFF1	0.8272
	Project stayed within budget.	EFF2	0.8534
	Quality requirements met.	EFF3	0.8371
	Safety improved.	EFF4	0.7708
	Fewer incidents occurred.	EFF5	0.8135
	Stakeholders satisfied.	EFF6	0.8696
	Stakeholder concerns addressed.	EFF7	0.7945
	Environmental benefits achieved.	EFF8	0.8554
	Sustainability goals achieved.	EFF9	0.8157

Table 2 presents composite reliability, Cronbach’s alpha, and AVE values. All constructs recorded reliability values above accepted standards. All AVE values exceeded 0.50. These results support internal consistency and convergent validity.

Table 2

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_c)	Cronbach's alpha(α)	AVE
PE	0.9457	0.9451	0.9450	0.6330
PR	0.9396	0.9375	0.9382	0.6261
BE	0.9163	0.9138	0.9143	0.6395
SP	0.9019	0.8996	0.9000	0.5998
SPE	0.9516	0.9511	0.9511	0.6837

Discriminant validity was assessed with the Fornell–Larcker criterion and the HTMT ratio. Table 3 shows the square root of AVE for each construct. Each value is higher than the construct correlations in the same row and column.

Table 3

Construct	PE	PR	BE	SP	SPE
PE	0.796				
PR	0.1058	0.791			
BE	0.0877	0.0871	0.799		
SP	0.2010	0.2533	0.2364	0.775	
SPE	0.3349	0.293	0.2187	0.3420	0.827

Table 4 reports HTMT values. All values remained below 0.85. These findings support discriminant validity.

Table 4

Table 4 Discriminant Validity: Heterotrait-Monotrait Ratio of Correlations (HTMT)					
Construct	PE	PR	BE	SP	SPE
PE					
PR	0.3250				
BE	0.2943	0.2947			
SP	0.4462	0.5007	0.4857		
SPE	0.5788	0.5388	0.4651	0.5830	

4.2. STRUCTURAL MODEL ASSESSMENT

Figure 2 presents the full structural model with standardized path coefficients. The figure shows positive relationships across all paths. People factors, process capability, and business environment conditions show direct paths to sustainability practices and sustainable project effectiveness.

Figure 2

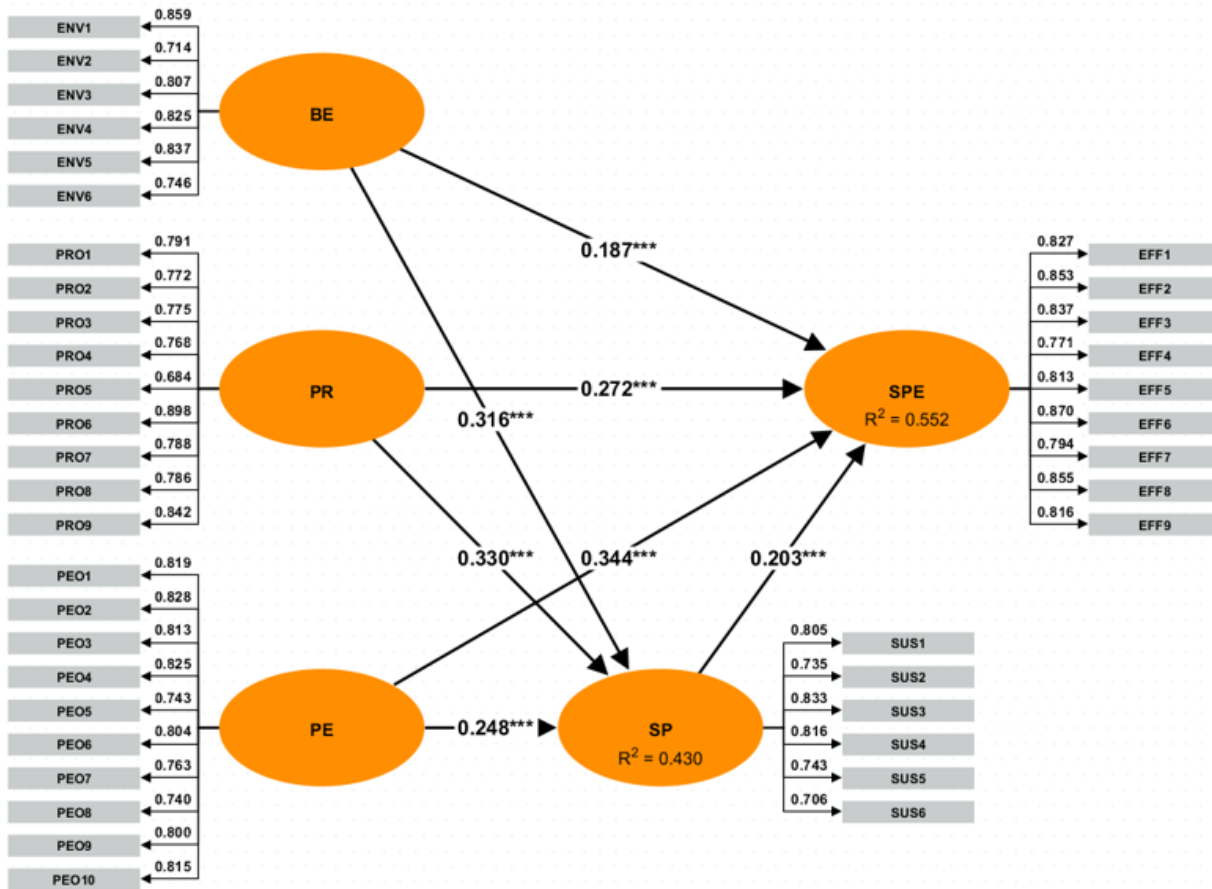


Figure 2 Structural Model Diagram Showing Standardized Path Coefficients

Table 5 reports the direct effects. People factors improved sustainability practices and sustainable project effectiveness. Process capability improved sustainability practices and sustainable project effectiveness. Business environment conditions improved sustainability practices and sustainable project effectiveness. These results support H1 through H6.

Table 5 also shows that sustainability practices improved sustainable project effectiveness. This supports H7.

Table 5

Table 5 Direct Effects Inference					
Effect	Original coefficient	Standard bootstrap results			
		Mean value	Standard error	t-value	p-value
PE -> SP	0.2477	0.2485	0.0492	5.0292	0.0000
PE -> SPE	0.3440	0.3452	0.0447	7.6957	0.0000
PR -> SP	0.3295	0.3313	0.0492	6.6944	0.0000
PR -> SPE	0.2722	0.2721	0.0441	6.173	0.0000
BE -> SP	0.3156	0.3144	0.0460	6.8588	0.0000
BE -> SPE	0.1870	0.1865	0.0453	4.1249	0.0000
SP -> SPE	0.2027	0.2020	0.0503	4.0262	0.0001

Mediation Analysis

Table 6 presents the indirect effects based on bootstrapping. People factors showed a significant indirect effect on sustainable project effectiveness through sustainability practices. The direct effect also remained significant. This shows partial mediation. Process capability showed partial mediation through sustainability practices. Business environment factors also showed partial mediation through sustainability practices. These results support H8 through H10.

Table 6

Table 6 Indirect Effects Inference					
Effect	Original coefficient	Standard bootstrap results			
		Mean value	Standard error	t-value	p-value
PE -> SPE	0.0502	0.0503	0.0167	3.0014	0.0027
PR -> SPE	0.0668	0.0670	0.0199	3.3509	0.0008
BE -> SPE	0.0640	0.0636	0.0189	3.3796	0.0007

Explained Variance and Effect Sizes

Table 7 reports the R² values for sustainability practices and sustainable project effectiveness. People factors, process capability, and business environment factors explained a moderate share of the variance in sustainability practices. The predictors explained a higher share of the variance in sustainable project effectiveness.

Table 7

Table 7 R ² Values for Sustainability Practices and Sustainable Project Effectiveness		
Construct	Coefficient of determination (R ²)	Adjusted R ²
SP	0.4303	0.4254
SPE	0.5524	0.5472

Table 8 reports the effect sizes. People factors showed the largest effect size for sustainable project effectiveness. Process capability and business environment factors showed medium effect sizes as predictors of sustainability practices. People factors showed small effect sizes for sustainability practices. Sustainability practices showed a small effect size for sustainable project effectiveness. Values near 0.02 indicate small effects. Values near 0.15 indicate medium effects. Values near 0.35 indicate large effects. People factors showed the strongest total effect on sustainable project effectiveness.

Table 8

Table 8 Effect Overview				
Effect	Beta	Indirect effects	Total effect	Cohen's f ²
PE -> SP	0.2477		0.2477	0.0916
PE -> SPE	0.3440	0.0502	0.3942	0.2059

PR -> SP	0.3295		0.3295	0.1622
PR -> SPE	0.2722	0.0668	0.3390	0.1212
BE -> SP	0.3156		0.3156	0.1518
BE -> SPE	0.1870	0.0640	0.2509	0.0589
SP -> SPE	0.2027		0.2027	0.0523

Model Fit

Table 9 presents the model fit results. The SRMR value stayed below recommended thresholds. The dULS and dG values stayed below their reference limits. The model showed acceptable fit for the study context.

Table 9

Table 9 Model Fit Statistics Including SRMR			
	Value	HI95	HI99
SRMR	0.0303	0.0370	0.0392
d_{ULS}	0.7519	1.1251	1.2591
d_G	0.5153	0.6717	0.7313

5. DISCUSSION

5.1. INTERPRETATION

The study focused on the relationship between people factors, process capability and business environment and their influence on sustainability practices and the sustainability project effectiveness in steel projects. It was relevant on all paths. The results answer the research questions and demonstrate that sustainable outcomes are dependent on interconnected behaviour and operational and contextual baseline factors, and not on stand-alone actions.

Project effectiveness and Sustainability practices were impacted by people factors (Hubbart, 2024). The team seems to be influenced in their understanding of sustainability expectations and what they do about them by leadership behaviours and adaptability in the workforce as well as shared norms. Previous studies reported a relationship between leadership and team agility, and project outcomes. This study adds to this by demonstrating that not only delivery performance, but also the capabilities of individuals guide sustainability practices. This means that the vision, sense and definition given to sustainability targets and subsequent operational decisions are influenced by human systems.

Process capability was found to have an impact on sustainability practices and project performance (Branca et al., 2020). Digital workflows and risk processes seem to enable the creation of structured planning routines, that can support sustainability alignment. This complements the previous project success process studies as well as digital adoption studies. The findings provide clarity to the mixed findings regarding the process-sustainability link. The results here indicated that results are dependent upon the application of processes by teams. Strong process capability helps make decisions which incorporate environmental and social objectives and focusing on the application of the routine, in a disciplined manner with relevance. Goel and Kanwa (2026)

Business environment conditions affected the sustainability practices and effectiveness of projects (Zhang et al., 2020). Pressure by regulation, expectations of the environment and market turbulence affect internal answers (Jeswani et al., 2023). Previous studies have reported these relationships, but with mixed results. This incongruity is lessened by the present results. When sustainability practices are between external signals and project results, external influences are more apparent to affect performance. Sustainability practices exist as a translation layer which translates the expectations of the outside into in-house practices. In all contexts results are consistent with the previous studies. It takes them further with its support of sustainability actions as a part of its main connecting mechanism. This combines to create a holistic perspective on sustainable project delivery that is required in heavy industrial environments where the results are not achieved through isolated project actions but through systems.

5.2. IMPLICATIONS

Firstly, theory is improved by linking people, process capability and business environment conditions into one system. Previous research has focused on each domain. Findings suggest that sustainable approaches and activities act as a mechanism which links organizational capacity to project results. The study reinforces the theory in the area of Sustainable Project Management. Encourages industry specific explanations in heavy industrial environments. Second, the results give a concrete guidance for project leaders. Greater leadership action and common attitudes facilitate sustainability endeavours. By implementing well-thought out planning and digital workflows, process capability can be improved to ensure sustainability in day to day work. Third, the study offers advice for policy designing. Sustainability performance is assisted if there is (a) regulatory pressure and (b) internal capacity to react. Policies requesting compliance will be more effective than capability building measures too. Fourthly, relevance for industry and society. The steel industry has an impact on the demand for resources, emissions, and community well-being. The results show that there is a need for 'organisational capability' in the 'systems' – it is not only a question of technology investments. This aids businesses to transition to practices of circular economy and project delivery with low emission and responsibility.

5.3. LIMITATIONS AND FUTURE SCOPE

The study gives solid empirical supports and indicates their restrictions to inform further research. Firstly, due to the fact that the design is cross sectional, it is limited in regard to understanding temporal order. The mediation paths supported provide plausible mediators of the development of sustainability practices and changes in project outcomes, but additional research would be needed to determine whether this is verified using longitudinal designs. Causality could be enhanced through studies that follow projects through phases. The sample of steel industry would only restrict the broad applicability of the study. There are certain regulatory, operational and market requirements for steel projects. Model testing should also be carried out in the future in construction, chemicals, cement and energy for the purpose of boundary condition checking. Comparative designs by sector would be suitable to understand the different mediation paths under different sustainability mandates. Using self-reported data presents a potential for common method bias. While the concern was reduced by diagnostic tests, future research can include both self-reports and objective tests; for example, emissions, safety performance or digital maturity indicator could be included. Mixed-methods design using interview or observation would provide insight as to how teams interpret sustainability practices and how they put them into action on a day-to-day basis.

There were no moderator concepts in the current model. Presence of moderators may impact the strength of relationships. The relationship between people, process and environmental factors may be affected by the Project's size, Capital Intensity, Contract Structure and/or Digital Maturity. The explanatory model can be improved by future tests that test these links. Future research could possible associate sustainability practice to environmental, financial or social firm performance indicators. This will demonstrate a linkage from project activities back to project outcomes. Multi level models would be desirable as steel companies run a portfolio of projects instead of just one project. Qualitative studies could be used to examine cognitive/cultural factors that can contribute to the adoption of sustainability. Insights into project management, engineering and safety specialists through interviews may reveal why some practices develop into being embedded and others symbolic. These extensions will assist with an understanding of how organisational systems and external factors can affect sustainability practice and the effectiveness of projects over the long term in heavy industrial environments.

6. CONCLUSION

Also, the study emphasises the influence of people factors, process capability and conditions of the business environment on quality in the context of sustainability practices and the effective sustainable projects. Each of these three factors affected sustainability practices and the results or products of projects. These effects were connected in coherent systems that were sustainability practices. The results indicate dependency on the achievement of sustainable results due to aligned behavioral, operational and contextual conditions. The results underpin the need for and importance of an integrated approach (rather than singular activities). The research enhances theory by moving sustainability practice to the forefront and demonstrates its impact on project management performance. It provides

real world applicability to the steel industry, highlighting how leadership style, team capacity, formal tools, apps and digital solutions, and sensitivity towards regulatory signals can contribute to sustainability in everyday work of the project. The results inform policy makers showing that sustainability effects would be stronger when there is external pressure, on the condition of firms' strong internal capabilities. Integrating regulation with capability building support is likely to yield greater uptake of sustainability. The design is cross sectional, the study was limited to projects in the steel sector and self reported data was used, which limit the applicability of this study. Further research could involve testing the model in other industrial settings and use longitudinal designs, and explore potential moderating effects of indicators of sustainability. The results indicate that a good organizational system fosters good sustainability practices which in turn help produce good sustainable project effectiveness in steel projects.

CONFLICT OF INTERESTS

None.

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None.

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