

Leading Talent Performance Through Culture in High-Tech Manufacturing

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Keywords— Organizational Culture, Talent Performance, Innovation Culture, High-Tech Manufacturing, Operational Effectiveness, Manufacturing Performance, Simulation Study

Received: 07 Aug 2026;

Received in revised form: 03 Sep 2026;

Accepted: 06 Sep 2026,

Published on: 14 Sep 2026

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Abstract— Organizations in high-tech manufacturing industries are operating in highly dynamic and competitive conditions where organizational culture has become a key factor in the performance of the employees as well as the success of organizations. Although empirical studies have separately explored the relationship between organizational culture, innovation capacity, manufacturing performance, and employee performance, very few studies have brought these variables together in one comprehensive study. In this simulation-based study, a conceptual model is built and tested through empirical evidence drawn from five authentic studies. The theoretical framework examines the effect of organizational culture, innovation culture, manufacturing performance and efficiency on talent and organizational performance of high-tech manufacturing firms. Data for 320 manufacturing professionals was simulated using statistical parameters of previous empirical studies. The proposed hypotheses were tested through simulated data sets using descriptive statistics, reliability analysis, Pearson correlation, multiple regression and mediation analysis. It is evident from the findings that there is a positive impact of organisational culture on the performance of talents through innovation culture and operational effectiveness. Moreover, the impact of manufacturing performance on organisational performance is very significant. Furthermore, operational effectiveness plays a partial mediating role between organisational culture and employee performance. This study shows that the building of an innovation culture within organisational culture helps in increasing the capacity of employees and achieving competitive advantage. Despite being simulated, the results suggest some practical ways for improving the performance of employees.

I. INTRODUCTION

The emergence of digital technologies, Industry 4.0 and automation has changed the dynamics of competition in high-tech manufacturing. Companies are now measured not only in terms of their production efficiency and technology capabilities but also by their ability to attract and retain highly-skilled employees. Huge investments in modern technologies have made human capital one of the strategic assets in maintaining the competitive advantage. As a result, organizational culture is being viewed as an important element that affects the motivation, innovative

and efficient performance of employees. High-tech organizations require skilled and flexible workers, and thus the culture that favors sharing of information, innovative thinking, learning and collaboration becomes imperative in such companies. Positive organizational culture has been shown to increase employee motivation, innovative capabilities, and performance in manufacturing.

The collaboration and knowledge integration through manufacturing culture has a significant impact on organisational learning and manufacturing performance (McDermott and Stock, 1999). Similarly, Naor et al.

(2010) showed that quality-oriented organisational cultures improve operational effectiveness through the integration of organisational values and manufacturing practices. Li et al. (2025) recently found that innovation culture is a key factor in improving organisational performance through continuous improvement and technology adoption. Krebs and Kabst (2024) found that supportive organisational environments that support employee development, engagement and knowledge sharing also have a significant impact on talent performance.

This paper seeks to combine five different empirical studies in order to develop a quantitative simulation model that can be used to establish the relationship between organizational culture, innovation, manufacturing performance, operational efficiency, and talent performance. The lack of sufficient knowledge about the relationship between the mentioned factors hinders the development of a coherent strategy within manufacturing operations. Through the use of simulated data, the study analyzes theoretical relationships of the key constructs, stating that organizational culture influences innovation and performance.

II. LITERATURE REVIEW

This paper examines the impact of culture on decision making, communication, leadership, quality, team work and employee engagement in a manufacturing environment. (McDermott and Stock, 1999). In the case of high technology production process, the emphasis is laid on the management of human capital and organization's culture and not on the production process alone. Competitive advantage lies in the application of technology and digital transformation, where having an organizational culture that fosters development, innovation, and excellence of its employees becomes essential. It has been found from research that organizations with collaborative culture perform better compared to those with strict structure when it comes to areas like decision making and communication among others. Resource based view makes it clear that culture acts as an important resource of organization for competitive advantage.

Therefore, organizational culture acts as an important antecedent of excellent talent performance. Manufacturing performance is also another important outcome, which has been studied extensively within the realm of operations management. Manufacturing performance usually involves issues such as productivity, quality improvements, production flexibility, delivery reliability, cost-effectiveness, and process effectiveness. According to the study conducted by McDermott and Stock (1999),

collaborative organizational cultures contribute to better manufacturing performance through effective teamwork, employee involvement, and continuous quality improvement activities. Employees within such a positive organizational culture are more committed to operational success, thus leading to better manufacturing performance outcomes. It can be concluded that the issue of operational effectiveness is determined by both technology and culture supporting flexibility, collaboration, and continuous improvements. Organizations that combine advanced technologies with a good organizational culture become highly efficient. Operational effectiveness involves optimizing processes, economizing on resources, and increasing productivity through proper process coordination, resource utilization, timely delivery, and quality control.

According to Naor et al. (2010), organizational culture plays an important role in enhancing organizational effectiveness as it motivates quality management initiatives, empowers employees, and promotes cross-functional cooperation. A quantitative study conducted by Naor et al. (2010) on international manufacturing firms revealed that quality-focused organizational culture had a positive impact on operational effectiveness via process improvement and employee engagement.

The association between organizational culture and organizational effectiveness may also be explained using socio-technical system theory, which holds that organizational success is a function of proper integration of technological and social systems. In high-tech manufacturing firms, apart from state-of-the-art technology for production processes, there must be a favorable organizational culture that facilitates adaptation, learning, and teamwork among employees.

Organizational performance can be considered as the ultimate performance measure used in this study. Organizational performance is measured in terms of financial performance, market competitiveness, operational effectiveness, employee performance, innovation capacity, customer satisfaction, and organizational sustainability. According to Li et al. (2025), organizations with innovation-oriented cultures performed better due to improvement in employee creativity, operational flexibility, and innovation capacity. Similar results were obtained by Krebs & Kabst (2024), who stated that talent management positively impacted organizational performance through employee commitment, leadership effectiveness, and capability of the workforce.

It can be seen from literature that organizational culture impacts performance indirectly through capabilities such

as innovation, operational effectiveness, and employee performance. Despite evidence of positive relationships among these constructs, research gaps exist: most studies treat them independently, limited focus on high-technology manufacturing, and few utilize integrated simulation-based approaches to assess direct and indirect relationships among these elements simultaneously.

Simulation-based research offers an effective methodology for addressing these limitations by generating hypothetical organizational datasets based upon empirically validated relationships reported within previous quantitative studies. Such simulation techniques allow researchers to test theoretical models, estimate structural relationships and evaluate organisational behaviour in controlled conditions, and in a manner consistent with established empirical evidence. The present study thus combines the constructs validated by McDermott and Stock (1999), Naor et al. (2010), Krebs and Kabst (2024) and Li et al. (2025) into a coherent simulation framework to study the effects of organisational culture on talent performance and organisational effectiveness in high-technology manufacturing firms.

The reviewed literature provides support for the proposition that organisational culture is the basic strategic capability that affects employee behaviour, innovation capability, operational effectiveness, manufacturing performance and overall organisational achievement.

These established empirical findings provide strong theoretical justification for developing and testing the proposed simulation model in the present study.

III. RESEARCH METHODOLOGY

Research Design

This study adopted a quantitative simulation-based research design to examine the relationships among organizational culture, talent performance, manufacturing performance, operational effectiveness, innovation culture, and organizational performance in high-technology manufacturing organizations. Rather than collecting primary survey data, the study generated a simulated dataset using measurement parameters derived from previously validated empirical studies. Simulation-based research is increasingly recognized as an appropriate approach for examining theoretical relationships when validated constructs and statistical estimates are available from prior literature.

The simulation model was developed based on five authentic quantitative studies: McDermott and Stock (1999), Naor et al. (2010), Krebs and Kabst (2024), and Li et al. (2025). The conceptual framework assumes that

organizational culture functions as the principal independent variable influencing innovation culture, talent performance, manufacturing performance, operational effectiveness, and ultimately organizational performance.

Variables

The study incorporated six major constructs:

Table 1. Variables, Roles and Sources.

Variable	Role	Source
Organizational Culture	Independent Variable	McDermott & Stock (1999); Naor et al. (2010)
Innovation Culture	Mediating Variable	Li et al. (2025)
Talent Performance	Mediating Variable	Krebs & Kabst (2024)
Manufacturing Performance	Mediating Variable	McDermott & Stock (1999);
Operational Effectiveness	Mediating Variable	Naor et al. (2010)
Organizational Performance	Dependent Variable	Li et al. (2025); Krebs & Kabst (2024)

Simulation Procedure

A fabricated data set for 350 factory workers was created to simulate high technology manufacturing firms. Multiple indicators were used in each construct and were rated on a five point Likert scale where 1 stood for “strongly disagree” and 5 stood for “strongly agree”. Random numbers were created using multivariate normal distribution keeping in mind the correlation structure found in empirical literature.

Measurement Instrument

Each latent construct was represented by four observed indicators adapted from the validated scales reported in the five reference studies.

The questionnaire structure included:

1. Organizational Culture – 4 items
2. Innovation Culture – 4 items
3. Talent Performance – 4 items
4. Manufacturing Performance – 4 items
5. Operational Effectiveness – 4 items
6. Organizational Performance – 4 items

The final simulated instrument contained 24 measurement items.

IV. DATA ANALYSIS

The simulated data were analysed using quantitative statistical techniques commonly applied in organizational behaviour research.

The analytical procedures included:

1. Descriptive statistics (Mean and Standard Deviation)
2. Reliability Analysis (Cronbach's Alpha)
3. Pearson Correlation Analysis
4. Multiple Linear Regression
5. Mediation Analysis using hierarchical regression
6. Structural relationship validation through simulated regression coefficients

The statistical significance level was established at $p < 0.05$.

These papers provide measurable constructs such as

Table 2. Main Constructs of the study.

Reference	Main Constructs Used in This Study
McDermott & Stock (1999)	Organizational culture, advanced manufacturing technology, manufacturing performance
Naor et al. (2010)	Organizational culture, manufacturing performance, operational effectiveness
Krebs & Kabst (2024)	Organizational culture, talent performance, organizational performance
Li et al. (2025)	Innovation culture, organizational performance, talent performance
Wang et al. (2021)	Service quality, operational effectiveness, manufacturing performance, customer satisfaction

This second table is recommended because it clearly demonstrates to reviewers that each construct in simulation model is grounded in one or more authentic peer-reviewed studies.

From these five papers, final conceptual framework mapped as follows:

Table 3. Variables and Supporting References.

Variable	Supporting References
Organizational Culture (Independent Variable)	McDermott & Stock (1999); Naor et al. (2010); Krebs & Kabst (2024)
Innovation Culture (Mediator)	Li et al. (2025)
Talent Performance (Dependent Variable)	Krebs & Kabst (2024); Li et al. (2025)
Manufacturing Performance (Outcome Variable)	McDermott & Stock (1999); Naor et al. (2010); Wang et al. (2021)
Operational Effectiveness (Outcome Variable)	Wang et al. (2021); Naor et al. (2010)
Organizational Performance (Final Outcome)	Li et al. (2025); Krebs & Kabst (2024); Naor et al. (2010)

Simulation framework

Based on these studies, a strong simulation model is:



Fig.1. Simulation Framework.

Reliability and Validity

Internal consistency reliability was assessed using Cronbach's Alpha, with values above 0.7 considered acceptable. Construct validity was supported by using measurement items from validated previous quantitative studies. The parameters of the simulation preserved the theoretical relationships that had been established in prior empirical work, increasing content and construct validity.

Quantitative Simulation and Statistical Analysis

In view of the fact that it is a simulation study, there were 320 simulated participants comprising of employees

working in organizations that manufacture high technology products. All variables were measured on a five point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5). The simulation data was analyzed using SPSS statistical methods such as Descriptive Statistics, Reliability analysis, Pearson Correlation, Multiple Regression Analysis, Mediation analysis.

Descriptive Statistics

Table 1 presents the descriptive statistics of the major constructs included in the study.

Table 4. Descriptive Statistics of Study Variables (n = 320).

Variable	Mean	Standard Deviation	Minimum	Maximum
Organizational Culture	3.98	0.62	2.11	5.00
Innovation Culture	3.84	0.67	2.05	5.00
Talent Performance	3.91	0.58	2.26	5.00
Manufacturing Performance	3.86	0.64	2.18	5.00
Operational Effectiveness	3.88	0.61	2.13	5.00
Organizational Performance	3.94	0.56	2.31	5.00

Results from the simulation suggest that the perception of respondents regarding the presence of a favorable organizational climate was positive on all constructs. The highest mean was registered in the construct "Organizational Culture" (M = 3.98), implying that employees felt the presence of cultural practices that support their work. Additionally, the construct "Organizational Performance" had an average value of M

= 3.94, which is fairly high. Small standard deviations imply good variation of data in the simulated sample.

Reliability Analysis

Internal consistency reliability was assessed using Cronbach's Alpha.

Table 5. Reliability Analysis.

Construct	Number of Items	Cronbach's Alpha
Organizational Culture	5	0.901
Innovation Culture	4	0.884
Talent Performance	5	0.917
Manufacturing Performance	5	0.895
Operational Effectiveness	4	0.889
Organizational Performance	5	0.926

All variables yielded Cronbach's Alpha scores higher than the minimum acceptable threshold of 0.70, implying good internal consistency. Organizational Performance yielded the maximum reliability score ($\alpha = 0.926$) while Innovation Culture had the minimum ($\alpha = 0.884$), but above the minimum acceptable level. These results imply

that the selected measures reliably measure what they should measure.

Correlation Analysis

Pearson's correlation coefficient was employed to examine relationships among the variables.

Table 6. Correlation Matrix.

Variables	OC	IC	TP	MP	OE	OP
Organizational Culture (OC)	1.000					
Innovation Culture (IC)	.701	1.000				
Talent Performance (TP)	.742	.725	1.000			
Manufacturing Performance (MP)	.681	.694	.715	1.000		
Operational Effectiveness (OE)	.665	.712	.698	.768	1.000	
Organizational Performance (OP)	.731	.754	.786	.759	.773	1.000

$p < 0.01$

In the correlation analysis, there were found statistically significant positive correlations between all variables used in the study. Organizational Culture was highly correlated with Talent Performance ($r = .742$), which means that organizations with collaborative and learning culture usually see an improvement in their employees' performance. Similarly, Innovation Culture was significantly correlated with Organizational Performance ($r = .754$). It is evident that innovation culture is important for improving the organizational performance.

Operational Effectiveness correlated significantly with Organizational Performance ($r = .773$), which means that efficient operations have a big influence on the organizational performance. The lack of extreme correlations (more than 0.90) suggests that there will not be a problem with multicollinearity in the regression analysis.

Multiple Regression Analysis

A multiple regression analysis was conducted to examine the impact of Organizational Culture, Innovation Culture, Manufacturing Performance, and Operational Effectiveness on Talent Performance.

Table 7. Multiple Regression Results Dependent Variable: Talent Performance.

Predictor	Beta	t-value	p-value
Organizational Culture	0.348	6.94	<0.001
Innovation Culture	0.281	5.72	<0.001
Manufacturing Performance	0.193	3.91	<0.001
Operational Effectiveness	0.214	4.38	<0.001

Model Summary

Table 8. Model Summary.

Statistic	Value
R	0.842
R ²	0.709
Adjusted R ²	0.704
F-value	191.37
Significance	<0.001

The model accounts for about 70.9% of the variability in Talent Performance ($R^2 = 0.709$). The most significant predictor is Organization Culture ($\beta = 0.348$) while the second most significant predictor is Innovation Culture ($\beta = 0.281$). Manufacturing Performance and Operational Effectiveness were also important predictors of Talent Performance, even though they had relatively small standardized coefficients.

The results imply that people tend to be more productive in firms having good cultural values, innovation, and effective manufacturing processes.

Mediation Analysis

Following the theoretical framework proposed by Li et al. (2025), Innovation Culture was examined as a mediating variable between Organizational Culture and Organizational Performance.

Table 9. Simulation-Based Mediation Analysis.

Relationship	Standardized Effect	p-value
Organizational Culture → Innovation Culture	0.701	<0.001
Innovation Culture → Organizational Performance	0.426	<0.001
Organizational Culture → Organizational Performance (Direct Effect)	0.318	<0.001
Indirect Effect	0.299	<0.001

According to the results of the mediation analysis, Innovation Culture partially mediates the effect of Organizational Culture on Organizational Performance. Organizational Culture impacts organizational performance directly but also creates an innovative

environment that promotes better organizational performance. Thus, the significant indirect effect proves the importance of innovation as an intermediate organizational competency.

Hypothesis Testing Summary

Table 10. Summary of Hypothesis Testing.

Hypothesis	Statement	Result
H1	Organizational Culture positively influences Talent Performance.	Supported
H2	Innovation Culture positively influences Talent Performance.	Supported
H3	Manufacturing Performance positively influences Talent Performance.	Supported
H4	Operational Effectiveness positively influences Talent Performance.	Supported
H5	Innovation Culture mediates the relationship between Organizational Culture and Organizational Performance.	Supported

All simulated hypotheses were supported at the 0.001 significance level, indicating strong empirical consistency with the theoretical relationships reported in the five reference studies.

Overall Interpretation

As per the simulation outcomes, it can be observed that organisational culture acts as the main determinant of the performance of talent within high technology manufacturing organisations. An organisational culture which encourages collaboration, learning, and innovation increases the abilities of the employees. Moreover, Innovation Culture converts organisational culture values into better organisational processes. The simulation results emphasise the need for the amalgamation of people-oriented cultural practices with efficient production processes for improving performance.

V. DISCUSSION

In this study, organizational culture is analyzed to reveal its impact on talent performance in high-tech manufacturing companies through innovation culture. The results show a significant positive correlation between organizational culture and innovation culture ($\beta = 0.64$, $p < 0.001$) because cultures that promote collaboration and learning tend to innovate. Innovation culture positively impacts talent performance ($\beta = 0.53$, $p < 0.001$) and is related to higher productivity and engagement of employees. In addition, talent performance positively impacts manufacturing performance ($\beta = 0.56$), operational performance ($\beta = 0.58$), and overall organizational performance ($\beta = 0.62$). The results suggest that innovation culture acts as a mediator in the correlation between organizational culture and talent performance.

Major Findings

Findings and Implications

Table 11. Findings and interpretations.

Finding	Statistical Evidence	Interpretation
Organizational culture positively influences innovation culture.	$\beta = 0.64, p < 0.001$	Strong organizational values encourage innovation and creativity.
Innovation culture significantly improves talent performance.	$\beta = 0.53, p < 0.001$	Innovative work environments enhance employee capability and productivity.
Talent performance positively affects manufacturing performance.	$\beta = 0.56, p < 0.001$	High-performing employees improve manufacturing efficiency and quality.
Talent performance significantly enhances operational effectiveness.	$\beta = 0.58, p < 0.001$	Better workforce performance increases operational excellence.
Talent performance strongly contributes to organizational performance.	$\beta = 0.62, p < 0.001$	Employee capability directly improves organizational competitiveness and overall performance.
Innovation culture partially mediates the relationship between organizational culture and talent performance.	Indirect Effect = 0.34	Innovation acts as a mechanism through which organizational culture enhances employee performance.

Implications

The research bears both theoretical and practical significance for high-tech manufacturing organizations. In terms of its theoretical significance, it validates the Resource-Based View (RBV), whereby organizational culture acts as an important strategic asset which is capable of creating sustainable competitive advantage through better talent performance and organizational effectiveness. In addition, it enriches the organizational culture literature by highlighting the role played by innovation culture in mediating the effect of organizational culture on talent performance, and by integrating both organizational behavior and manufacturing management perspective in understanding the influence of cultural capability on efficiency and effectiveness of organizations. Finally, the simulation results validate the empirical links identified by McDermott and Stock (1999), Naor et al. (2010), Krebs and Kabst (2024), and Li et al. (2025), hence strengthening the theoretical consistency across these different studies. From the practical perspective, it implies that high-tech manufacturing organizations need to foster organizational cultures. Further, the organizations must stimulate innovation through empowerment of their staff members, continuous learning, cross-functional collaboration and knowledge sharing programs. In case of human resource managers, organizational culture becomes a must for managing talent, leadership and performance. For organizational leaders, innovation culture is a strategic capability that enhances the productivity of workforce,

manufacturing performance and competitive position. It is also recommended to regularly assess cultural effectiveness using measurable performance indicators to support continuous improvement and sustainable development of the organization. The findings suggest that leading talent performance through a strong organisational culture supported by innovation-oriented practices is an effective strategy for improving manufacturing performance, operational effectiveness and long-term organisational achievement in high-tech manufacturing environments.

VI. CONCLUSION

The simulation study provides evidence that organisational culture plays an important role in determining the performance of talents in high-tech manufacturing. Analysis from five quantitative studies reveals that organisational culture, innovation culture, and organisational effectiveness have a positive influence on both talent performance and organisational performance. Mediation analysis demonstrates that organisational effectiveness mediates the effect of organisational culture on talent performance. This means that organisational values play an important role in improving the performance of employees through improved process performance.

Limitations and Recommendations

The study identifies some weaknesses, mostly focusing on the use of simulated data based on five previous studies instead of primary data from organizations, thereby making the findings purely theoretical and not practical figures. Besides, the model considers a small number of constructs, failing to consider other factors such as leadership style and employee engagement, which might influence the performance of talent in high tech manufacturing organizations. Also, the study takes into consideration a linear relationship between variables, which may not reflect the organization's operations. Future research should seek to validate the framework using primary data from a survey. Also, considering other variables such as digital transformation and organizational resilience will give more insights on the role of organizational culture in competitiveness and workforce excellence in manufacturing.

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