

Analysis of the Impact of Supply Chain, Human Capital, and Technology on Productivity, with Corporate Culture as a Moderating Variable, at PT Mensana Aneka Satwa

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Abstract: This study aims to analyze the relationship between Supply Chain, Human Capital, and Technology on Productivity and examine the role of Corporate Culture as a moderating variable at PT. Mensana Aneka Satwa. The study was conducted using a sample of 67 employees spread across the PT. Mensana Aneka Satwa factory. The sampling technique used was purposive sampling, which is a sampling technique based on specific criteria deemed relevant and able to provide data appropriate to the research needs. Data collection utilized a questionnaire method. The analysis used in this study was structural analysis using the partial least squares (PLS) approach, processed using Smart PLS version 4 software. Data testing used convergent validity, construct reliability, multicollinearity, and discriminant tests. The analysis results indicate that supply chain and human capital have a positive and significant impact on productivity. Corporate culture does not moderate the impact of the supply chain on productivity; however, it does moderate—by weakening—the impact of human capital on productivity. Conversely, corporate culture does not moderate the impact of technology on productivity. These findings highlight the crucial roles of human capital and corporate culture in enhancing productivity, as well as the need for more effective supply chain strategies and up-to-date technology.

Keywords : Supply Chain, Human Capital, Technology, Corporate Culture, Productivity.

1. Introduction

In an increasingly competitive and dynamic business environment, organizations are required to continuously improve operational efficiency and productivity to achieve sustainable competitive performance. Productivity reflects an organization's ability to transform available resources into valuable outputs through the effective coordination of human resources, technology, and operational systems. In manufacturing and distribution-intensive industries, productivity is particularly important because operational disruptions, inaccurate information, inefficient resource utilization, and delays in the movement of goods can directly affect service quality, operating costs, and customer satisfaction. Consequently, improving productivity requires organizations to understand not only the direct contribution of individual organizational resources but also the organizational conditions that determine whether these resources can be effectively integrated into business processes.

Supply chain management has become one of the critical organizational capabilities for improving operational performance. An effective supply chain enables firms to coordinate procurement, inventory, production, warehousing, logistics, and distribution activities in an integrated manner. Supply chain integration facilitates information sharing, interdepartmental coordination, and responsiveness to changes in demand and supply conditions. Conversely, weaknesses in supply chain coordination may result in delays, inaccurate deliveries, inefficient inventory management, and disruptions throughout the operational process. Recent empirical research has generally indicated that supply chain integration and coordination can contribute positively to operational and supply chain performance. Therefore, the effectiveness of supply chain management is expected to be an important determinant of organizational productivity, particularly in companies whose operations depend heavily on timely distribution and coordination among multiple functional units.

Human capital represents another strategic resource that may influence organizational productivity. Employees are not merely operational resources but also possess knowledge, skills, experience, and capabilities that contribute to organizational value creation. Investments in employee training, competency development, knowledge acquisition, and continuous learning can improve employees' ability to perform tasks efficiently and respond to changing business requirements. In

contemporary business environments, the importance of human capital has increased alongside the growing demand for digital competencies, analytical capabilities, cross-functional communication, and innovation. Organizations with competent and adaptable employees are more capable of utilizing organizational resources efficiently and converting technological and operational investments into improved performance. Thus, human capital development may constitute an important mechanism through which organizations improve productivity.

Technology adoption has also transformed the way organizations manage operational activities. Digital technologies can facilitate information integration, process automation, data accuracy, inventory monitoring, logistics coordination, and managerial decision-making. The implementation of technologies such as enterprise systems, warehouse management systems, and business analytics can reduce manual errors and accelerate the flow of information across organizational units. However, technology adoption does not automatically generate superior organizational performance. The benefits of technology depend on the extent to which technological systems are aligned with organizational tasks, employee capabilities, and existing business processes. Limited technological utilization, inadequate digital competencies, and fragmented information systems may therefore constrain the potential contribution of technology to organizational productivity.

The interaction among supply chain management, human capital, and technology is particularly relevant in distribution-oriented companies. Supply chain systems require employees who possess appropriate knowledge and competencies, while technological systems require human resources capable of operating, interpreting, and utilizing digital information. At the same time, effective supply chain coordination requires technological infrastructure that enables timely and accurate information exchange. These interdependencies suggest that organizational productivity cannot be fully explained by examining supply chain practices, human capital, or technology independently. Instead, their effects may depend on the organizational environment in which these resources are implemented.

One organizational factor that may explain such differences is corporate culture. Organizational culture represents a system of shared values, beliefs, assumptions, and behavioral norms that shapes how employees perceive problems, interact with colleagues, respond to change, and perform their responsibilities. A culture characterized by collaboration, learning, openness to change, and innovation may facilitate the effective integration of people, technology, and operational processes. In contrast, rigid hierarchical structures, resistance to change, and weak cross-functional collaboration may reduce the effectiveness of organizational resources. Corporate culture may therefore function not only as an organizational characteristic but also as a contextual mechanism that strengthens or weakens the relationship between strategic resources and productivity.

The relevance of this issue can be observed at PT. Mensana Aneka Satwa, a multinational company engaged in the production and distribution of veterinary medicines and livestock equipment, with approximately 500 employees working across manufacturing facilities, the head office, and branch operations. The company operates in a market that requires reliable distribution, accurate product handling, and effective coordination among organizational units. Based on the preliminary observations reported in the present study, the company has experienced challenges associated with supply chain processes, human capital capabilities, technological utilization, and organizational culture. These challenges include delays in the distribution of raw materials, discrepancies in product specifications and quantities received, limited digital training, differences in employee competencies, and limited employee participation in process innovation. Such conditions may potentially affect operational efficiency and productivity.

The preliminary organizational context further indicates that several operational processes remain dependent on manual recording and control systems. This situation may increase the possibility of information delays and operational errors, particularly in logistics and distribution activities. At the

same time, coordination among warehouse, logistics, and sales functions remains an important challenge. The combination of supply chain inefficiencies, differences in employee competencies, limited digitalization, and insufficient cross-functional collaboration provides an important empirical context for examining the determinants of productivity. Importantly, these challenges should not be viewed as isolated organizational problems because supply chain processes, human capital, technology, and organizational culture are interconnected components of organizational capability.

Although previous studies have examined the relationships between supply chain management, human capital, technology, and organizational performance, several gaps remain. First, much of the existing literature tends to examine these determinants separately or focuses on direct relationships between individual organizational resources and performance. Such an approach may not sufficiently capture the interconnected nature of organizational resources in operationally complex environments. Second, although organizational culture has been recognized as an important factor in organizational performance, relatively limited empirical attention has been given to its role as a moderating mechanism that determines whether supply chain capabilities, human capital, and technology translate into higher productivity. Third, empirical evidence remains limited in the context of companies operating in specialized distribution industries, particularly veterinary pharmaceutical and livestock-equipment distribution. This context provides an opportunity to extend existing knowledge by examining whether corporate culture changes the strength of the relationships between organizational resources and productivity.

The present study addresses these gaps by integrating supply chain management, human capital, and technology into a single analytical framework and examining corporate culture as a moderating variable. Rather than assuming that supply chain capabilities, human capital, and technology have uniform effects on productivity, this study proposes that their effectiveness may depend on the organizational culture within which they are implemented. A collaborative, adaptive, and innovation-oriented corporate culture may strengthen the contribution of these resources to productivity by facilitating knowledge sharing, technology utilization, cross-functional coordination, and employee engagement. Conversely, a rigid or less adaptive culture may weaken these relationships by limiting organizational responsiveness and reducing the effective utilization of available resources.

The study therefore contributes to the literature in several ways. Theoretically, it extends the discussion of organizational productivity by integrating three strategic organizational resources—supply chain management, human capital, and technology—with corporate culture as a contextual moderating factor. This integrated perspective provides a more comprehensive explanation of how organizational resources can generate productivity outcomes. Empirically, the study provides evidence from PT. Mensana Aneka Satwa, offering insights from a specialized distribution and production context that has received relatively limited attention in previous research. Practically, the findings are expected to assist management in identifying whether improvements in supply chain processes, employee capabilities, and technological systems are sufficient on their own or require complementary cultural transformation to achieve sustainable productivity improvements.

Accordingly, this study aims to empirically examine the effects of supply chain management, human capital, and technology on organizational productivity and to investigate whether corporate culture moderates these relationships at PT. Mensana Aneka Satwa. By examining both the direct and moderating relationships within an integrated framework, the study seeks to provide a deeper understanding of the organizational mechanisms through which operational resources can be transformed into improved productivity.

2. Research Methodology

2.1. Research Design and Study Context

This study employed a quantitative explanatory research design to examine the relationships between supply chain management, human capital, technology, and organizational productivity, while assessing the moderating role of corporate culture. The explanatory design was selected because the study seeks to empirically test the proposed relationships among the research constructs through hypothesis testing. The research was conducted at PT. Mensana Aneka Satwa, a company operating in the manufacturing and distribution of veterinary medicines and livestock equipment. The research context was selected because the company relies on supply chain activities, human resource capabilities, technological systems, and organizational coordination to support its operational productivity. The study was conducted over a six-month period from December 2025 to May 2026, covering the stages of research planning, data collection, analysis, and reporting. The empirical model consists of three independent variables—Supply Chain (X1), Human Capital (X2), and Technology (X3)—one dependent variable, Productivity (Y), and Corporate Culture (X4) as the moderating variable.

2.2. Population and Sample

The target population consisted of employees of PT. Mensana Aneka Satwa working in the company's plant area and involved directly or indirectly in operational activities, including supply chain management, production, technology utilization, human resource management, and other managerial functions. The total population comprised 203 employees. A sample of 67 respondents was determined using the Slovin formula with a 10% margin of error. The study subsequently employed purposive sampling to ensure that respondents possessed sufficient knowledge and experience concerning the company's operational processes. Respondents were selected according to three criteria: (1) they were permanent employees of PT. Mensana Aneka Satwa; (2) they had worked for the company for at least one year; and (3) they were directly involved in, or had adequate knowledge of, operational, production, logistics, or managerial activities related to organizational productivity. The use of purposive sampling was intended to obtain responses from employees who were sufficiently familiar with the organizational processes examined in this study. Accordingly, the final sample comprised 67 respondents from the population of 203 employees.

2.3. Data Collection Procedure

Primary data were collected through a structured questionnaire distributed to the selected respondents. The questionnaire was designed to measure respondents' perceptions of Supply Chain, Human Capital, Technology, Corporate Culture, and Productivity. A five-point Likert scale was used to capture respondents' level of agreement with each statement, ranging from 1 = strongly disagree to 5 = strongly agree. In addition to primary questionnaire data, the study utilized organizational and documentary information as supporting contextual evidence. The research process also incorporated field observations to obtain a more comprehensive understanding of the operational conditions relevant to the research variables. The questionnaire-based approach was selected because the constructs examined in this study involve employee perceptions of organizational processes, capabilities, technological utilization, corporate culture, and productivity. The collected data were subsequently screened and analyzed using statistical procedures appropriate for evaluating the measurement and structural models.

2.4. Measurement of Variables

The study examined five principal constructs: Supply Chain, Human Capital, Technology, Corporate Culture, and Productivity. Each construct was operationalized using four indicators. Supply

Chain (X1) was conceptualized as the management of the flow of materials, information, and products from suppliers to customers to support operational efficiency and effectiveness. The construct was measured through four dimensions: supplier partnership, inventory management, distribution effectiveness, and cross-functional coordination. Human Capital (X2) refers to employees' knowledge, skills, experience, and work-related capabilities that contribute to organizational value creation and performance. It was measured using employee competence, education and training, work experience, and work commitment and motivation.

Technology (X3) refers to the utilization of technological systems, equipment, and information technology to support work processes, decision-making, and operational efficiency. The construct was measured through information technology utilization, system reliability, ease of technology use, and technological support for work activities. Corporate Culture (X4) represents the values, norms, and behavioral patterns shared by organizational members and used as guidance in performing daily work activities. The construct was measured through work values and ethics, teamwork, work discipline, and performance and innovation orientation. Productivity (Y) represents the organization's ability to generate optimal outputs through the efficient and effective utilization of available inputs. Productivity was measured through work efficiency, quality of work outcomes, timeliness of task completion, and achievement of work targets. The operational indicators were developed from the conceptual definitions and measurement framework presented in the original research instrument. The complete operationalization of the variables is summarized in Table 1.

Table 1. Operationalization of Research Variables

Construct	Operational Definition	Measurement Indicators
Supply Chain (X1)	Management of material, information, and product flows from suppliers to customers to support operational efficiency and effectiveness	Supplier partnership; inventory management; distribution effectiveness; cross-functional coordination
Human Capital (X2)	Employees' knowledge, skills, experience, and work capabilities that contribute to organizational value creation	Employee competence; education and training; work experience; commitment and work motivation
Technology (X3)	Utilization of technological systems and information technology to support work processes, decision-making, and operational efficiency	IT utilization; system reliability; ease of use; technological support for work
Corporate Culture (X4)	Shared organizational values, norms, and behavioral patterns that guide employees' work activities	Work values and ethics; teamwork; work discipline; performance and innovation orientation
Productivity (Y)	The organization's ability to generate optimal outputs through effective and efficient input utilization	Work efficiency; quality of work outcomes; task completion timeliness; achievement of work targets

Source: Adapted from the measurement framework of the present study.

2.5. Data Analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. PLS-SEM was selected because the analytical framework contains multiple latent constructs and includes interaction effects involving a moderating variable. The analysis was conducted through two principal stages: evaluation of the measurement model and evaluation of the structural model.

2.5.1. Measurement Model Assessment

The measurement model was assessed to determine whether the indicators adequately represented their respective latent constructs. Convergent validity was evaluated using indicator outer loadings and the Average Variance Extracted (AVE). Indicators with sufficiently high outer loadings were considered to provide adequate representation of the associated construct. Construct reliability was assessed using Cronbach's alpha, composite reliability, and rho_A. The study used a threshold of 0.70 as the general criterion for acceptable internal consistency, while an AVE value above 0.50 was used as evidence of adequate convergent validity. The measurement model assessment was conducted before the structural relationships were interpreted to ensure that the constructs demonstrated acceptable reliability and validity.

2.5.2. Collinearity Assessment

Collinearity was evaluated using the Variance Inflation Factor (VIF). VIF values were examined to determine whether substantial collinearity existed among the predictor constructs and interaction terms. The assessment was particularly important because the structural model incorporates interaction terms between Corporate Culture and each of the three predictor variables.

2.5.3. Structural Model Assessment

The structural model was evaluated by examining the explanatory capability of the model and the statistical significance of the hypothesized relationships. The coefficient of determination (R^2) was used to assess the proportion of variance in Productivity explained by the predictor constructs and the moderating effects. The significance of the structural relationships was evaluated using bootstrapping procedures in SmartPLS 4. The analysis considered path coefficients, t-statistics, and p-values to determine whether the hypothesized relationships were statistically significant. A significance level of 5% ($\alpha = 0.05$) was applied. A positive path coefficient indicates a positive relationship between the predictor and the dependent construct, whereas a negative coefficient indicates an inverse relationship.

2.6. Moderating Effect Analysis

Corporate Culture was specified as a moderating variable in the relationships between Supply Chain, Human Capital, Technology, and Productivity. The moderation analysis examined whether the strength or direction of the relationship between each independent variable and Productivity changes depending on the level of Corporate Culture.

Three interaction effects were therefore specified:

Supply Chain $\times$ Corporate Culture $\rightarrow$ Productivity

Human Capital $\times$ Corporate Culture $\rightarrow$ Productivity

Technology $\times$ Corporate Culture $\rightarrow$ Productivity

The structural model can be represented as follows:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 (X_1 \times X_4) + \beta_6 (X_2 \times X_4) + \beta_7 (X_3 \times X_4) + \varepsilon$$

where:

- Y = Productivity
- X_1 = Supply Chain
- X_2 = Human Capital
- X_3 = Technology
- X_4 = Corporate Culture
- $X_1 \times X_4$ = Supply Chain $\times$ Corporate Culture
- $X_2 \times X_4$ = Human Capital $\times$ Corporate Culture

- $X_3 \times X_4$ = Technology $\times$ Corporate Culture
- β_1 - β_7 = structural path coefficients
- ε = error term

The moderating effect was assessed based on the significance and direction of the interaction coefficients. A statistically significant interaction coefficient indicates that Corporate Culture changes the relationship between the corresponding independent variable and Productivity. The interpretation of the interaction effect was based on the estimated coefficient and its statistical significance obtained through the PLS-SEM bootstrapping procedure.

3. Results and Discussion

3.1 Results

3.1.1. Research Context

PT. Mensana Aneka Satwa was established in 1986 and initially produced pharmaceutical veterinary medicines primarily for internal requirements. The company obtained its first veterinary medicine registration in 1993, and more than 70 veterinary medicine products have subsequently received government registration. Product quality is controlled through the company's quality assurance and quality control functions and through monitoring by the competent government authority, including the Balai Besar Pengujian Mutu dan Sertifikasi Obat Hewan (BBPMSOH). The company expanded its production capacity by relocating from its earlier facility in Cibitung, Bekasi, to a larger and more modern manufacturing facility in Wanaherang, Gunung Putri, Bogor, in 2010. In 2014, the company obtained the CPOHB certification covering several product categories, including non-sterile antibiotics, non-sterile anthelmintics, disinfectants, and premixes.

The company operates through pharmaceutical and premix divisions. The pharmaceutical division comprises several production areas covering natural and non-sterile medicines, beta-lactam products, disinfectants, and sterile medicines. The premix division produces products used as feed additives for poultry. This operational structure requires effective coordination of supply chain activities, human resources, technology, and organizational processes. The organizational context is particularly relevant to this study because productivity depends on the effective integration of operational resources across production, packaging, quality, technical, research and development, warehousing, and other functional areas.

3.1.2. Respondent Characteristics

The empirical analysis was based on questionnaire responses from **67 employees** of PT. Mensana Aneka Satwa. The questionnaire was distributed electronically using Google Forms through WhatsApp, and the completed responses were automatically recorded in a spreadsheet. The respondents were selected from a population of 203 employees working in the plant area.

3.2.1. Gender Distribution

Table 1 presents the gender composition of the respondents.

Table 1. Respondent Characteristics by Gender

Gender	Frequency	Percentage (%)
Male	46	68.7
Female	21	31.3
Total	67	100.0

Source: Authors' survey data, 2026.

Male respondents represented the majority of the sample, accounting for 46 respondents (68.7%), while female respondents accounted for 21 respondents (31.3%). The composition is consistent with the workforce characteristics of the plant area, where operational positions are predominantly occupied by male employees.

Figure 2. Respondent Distribution by Gender

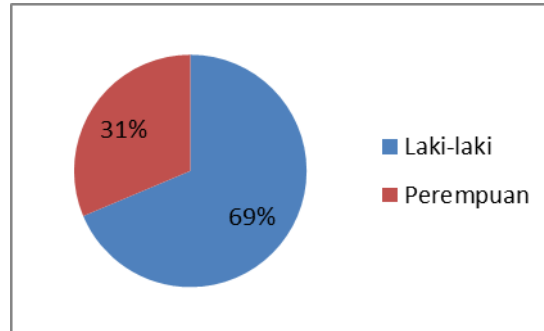


Figure 2. Distribution of respondents according to gender.

Source: Authors' survey data, 2026

3.2.2. Age Distribution

The respondents ranged from 18 to 55 years of age and were classified into three age groups.

Table 2. Respondent Characteristics by Age

Age Group	Frequency	Percentage (%)
18–30 years	47	70.1
31–43 years	18	26.9
44–55 years	2	3.0
Total	67	100.0

Source: Authors' survey data, 2026.

The largest proportion of respondents was in the 18–30 age group, comprising 47 employees (70.1%). Respondents aged 31–43 years accounted for 18 employees (26.9%), while only two respondents (3.0%) were aged 44–55 years. Thus, the sample was predominantly composed of employees in the younger and economically productive age category.

Figure 3. Respondent Distribution by Age

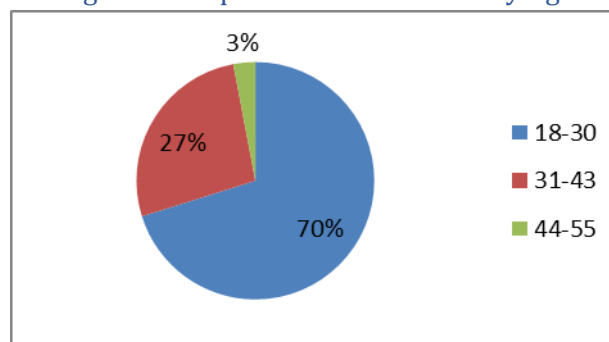


Figure 3. Distribution of respondents according to age group.

Source: Authors' survey data, 2026.

3.2.3. Departmental Distribution

The respondents represented several departments, including HRGA-General Affairs, PPIC, Quality, Production-Packaging, Engineering, Research and Development, and Finished Goods Warehouse.

Table 3. Respondent Characteristics by Department

Department	Frequency	Percentage (%)
HRGA-General Affairs	5	7.5
PPIC	7	10.4
Quality	13	19.4
Production-Packaging	34	50.7
Engineering	5	7.5
R&D	2	3.0
Finished Goods Warehouse	1	1.5
Total	67	100.0

Source: Authors' survey data, 2026.

The Production-Packaging department contributed the largest number of respondents, with 34 employees (50.7%). Quality accounted for 13 respondents (19.4%), followed by PPIC with seven respondents (10.4%). HRGA-General Affairs and Engineering each contributed five respondents, while R&D and Finished Goods Warehouse contributed two and one respondents, respectively. The distribution reflects the operational structure of the company's plant environment.

Figure 4. Respondent Distribution by Department

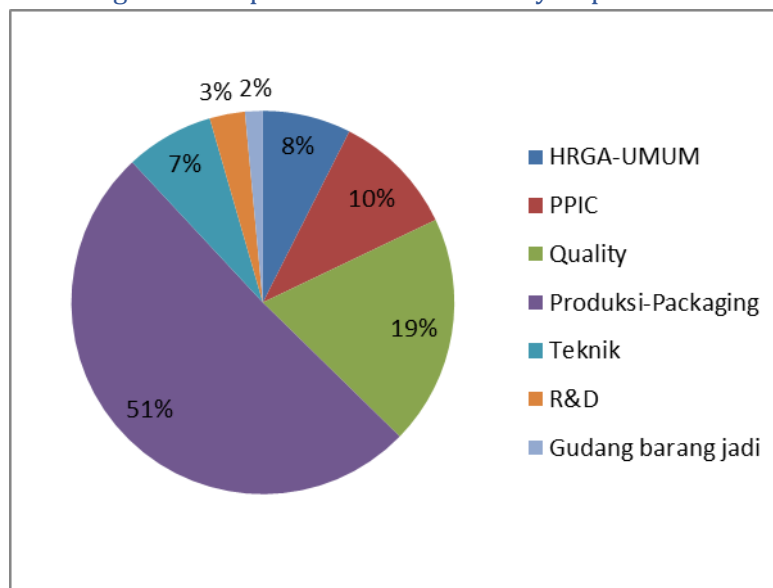


Figure 4. Distribution of respondents according to department.

Source: Authors' survey data, 2026.

3.1.3. Descriptive Statistics

Descriptive analysis was conducted to identify the respondents' perceptions of Supply Chain, Human Capital, Technology, Corporate Culture, and Productivity. The analysis used the mean score and the percentage of the respondent achievement level (TCR) as reported in the original dataset.

3.3.1. Supply Chain

Table 4. Descriptive Statistics of Supply Chain

No.	Indicator	Mean	TCR (%)	Category
1	Timely management of inventory, raw materials, and packaging materials	3.49	69.85	Good
2	Effective supplier partnership	3.82	76.42	Good
3	Efficient and smooth distribution	3.73	74.63	Good
4	Effective information flow and interdepartmental coordination	3.77	75.52	Good
Average		3.70	74.00	Good

Source: Authors' survey data, 2026.

The overall mean score for Supply Chain was **3.70**, corresponding to a TCR of **74.00%**, categorized as good. The highest-rated indicator was supplier partnership (mean = 3.82; TCR = 76.42%), followed by information flow and interdepartmental coordination (mean = 3.77; TCR = 75.52%). These findings indicate that respondents generally perceived the company's supply chain practices positively, although inventory and procurement timeliness received the lowest score (mean = 3.49).

3.3.2. Human Capital

Table 5. Descriptive Statistics of Human Capital

No.	Indicator	Mean	TCR (%)	Category
1	Constructive performance evaluation by supervisors/HR	3.43	68.65	Good
2	Fair opportunities for training and seminars	3.67	73.43	Good
3	Inclusive, safe, and comfortable working environment	3.86	77.31	Good
4	Compensation consistent with experience, workload, and responsibility	3.61	72.24	Good
Average		3.64	72.85	Good

Source: Authors' survey data, 2026.

Human Capital obtained an overall mean of **3.64** and a TCR of **72.85%**, indicating a good overall assessment. The highest-rated indicator was the creation of an inclusive, safe, and comfortable work environment (mean = 3.86; TCR = 77.31%). The lowest score concerned constructive performance evaluation (mean = 3.43; TCR = 68.65%).

3.3.3. Technology

Table 6. Descriptive Statistics of Technology

No.	Indicator	Mean	TCR (%)	Category
1	Effectiveness and ease of use of ERP and related systems	3.70	74.02	Good
2	Technology supports work-time efficiency	3.91	78.21	Good
3	Information systems facilitate access to required data	3.94	78.81	Good
4	Employee adaptability to newly implemented information technology	4.03	80.60	Good
Average		3.89	77.90	Good

Source: Authors' survey data, 2026.

Technology recorded a mean score of **3.89** and a TCR of **77.90%**, placing it in the good category. Employee adaptability to newly implemented information technology received the highest score (mean = 4.03; TCR = 80.60%). The results indicate that respondents perceived themselves as relatively capable of adapting to technological changes introduced by the company.

3.3.4. Corporate Culture

Table 7. Descriptive Statistics of Corporate Culture

No.	Indicator	Mean	TCR (%)	Category
1	Organizational support for new ideas and initiatives	3.61	72.23	Good
2	Completion of tasks according to expected quality standards	4.36	87.16	Very Good
3	Prioritization of organizational interests	4.01	80.30	Good
4	Leadership demonstrates disciplined behavior	3.79	75.82	Good
Average		3.94	78.85	Good

Source: Authors' survey data, 2026.

Corporate Culture achieved an overall mean of **3.94** and a TCR of **78.85%**. The highest-rated indicator was employees' commitment to completing tasks according to expected quality standards (mean = 4.36; TCR = 87.16%). This finding suggests a relatively strong orientation toward quality and task standards among employees.

3.3.5. Productivity

Table 8. Descriptive Statistics of Productivity

No.	Indicator	Mean	TCR (%)	Category
1	Completing core tasks according to agreed schedules	4.33	86.57	Very Good
2	Achieving assigned work targets	4.28	85.67	Very Good
3	Producing work with minimal errors and according to quality standards	4.37	87.46	Very Good
4	Possessing skills required to complete work efficiently	4.30	85.97	Very Good
Average		4.32	86.40	Very Good

Source: Authors' survey data, 2026.

Productivity obtained the highest overall descriptive assessment among the study constructs, with a mean of **4.32** and a TCR of **86.40%**, categorized as very good. The highest-rated indicator was the ability to produce work with minimal errors and according to quality standards (mean = 4.37; TCR = 87.46%). The results indicate that employees generally perceived their productivity as high.

3.1.4. Measurement Model Assessment

The measurement model was evaluated using PLS-SEM through SmartPLS 4. The analysis assessed convergent validity, discriminant validity, construct reliability, and collinearity before evaluating the structural relationships.

Figure 5. PLS-SEM Measurement Model

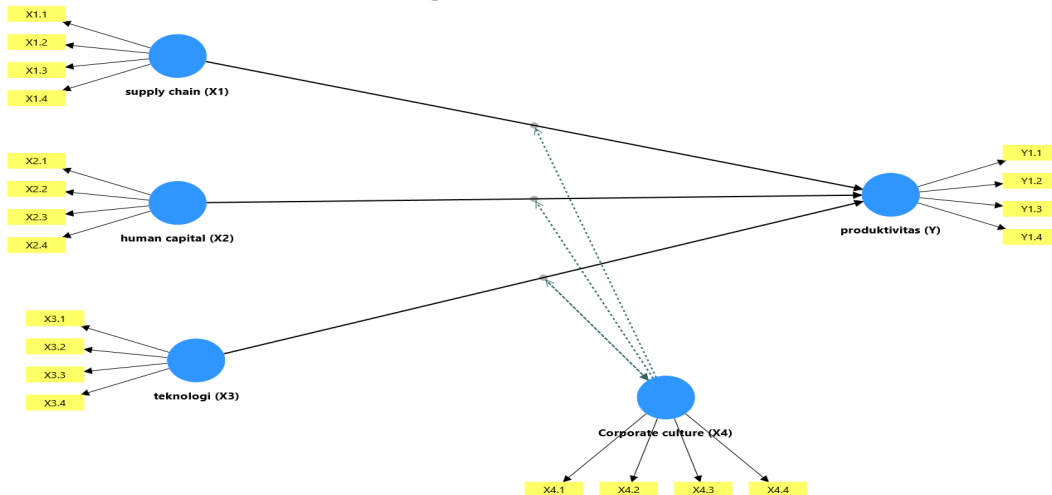


Figure 5. Measurement model estimated using SmartPLS 4.
Source: SmartPLS 4 output, 2026.

3.4.1. Convergent Validity

Convergent validity was assessed using indicator outer loadings. The results reported in Table 9 show that all indicators retained in the measurement model have outer loadings above the commonly applied threshold of 0.70.

Table 9. Convergent Validity Results

Construct	Indicator	Outer Loading	Assessment
Supply Chain	X1.1	0.876	Valid
	X1.2	0.919	Valid
	X1.3	0.888	Valid
	X1.4	0.816	Valid
Human Capital	X2.1	0.777	Valid
	X2.2	0.850	Valid
	X2.3	0.871	Valid
	X2.4	0.772	Valid
Technology	X3.1	0.845	Valid
	X3.2	0.879	Valid
	X3.3	0.909	Valid
	X3.4	0.820	Valid
Corporate Culture	X4.1	0.753	Valid
	X4.2	0.867	Valid
	X4.3	0.990	Valid
	X4.4	0.826	Valid
Productivity	Y.1	0.926	Valid
	Y.2	0.942	Valid
	Y.3	0.942	Valid
	Y.4	0.894	Valid

Source: SmartPLS 4 output, 2026.

The outer loadings ranged from **0.753 to 0.990**, indicating that the retained indicators demonstrated satisfactory convergent validity based on the criterion applied in this study.

3.4.2. Discriminant Validity

Discriminant validity was evaluated using the heterotrait-monotrait ratio (HTMT). The initial assessment identified a high HTMT value between Productivity and Corporate Culture (**HTMT = 0.923**), exceeding the 0.90 criterion used in the study.

Table 10. Initial HTMT Assessment

Construct Pair	HTMT	Assessment
Human Capital ↔ Corporate Culture	0.727	Accepted
Productivity ↔ Corporate Culture	0.923	Above threshold
Productivity ↔ Human Capital	0.569	Accepted
Supply Chain ↔ Corporate Culture	0.510	Accepted
Supply Chain ↔ Human Capital	0.849	Accepted
Supply Chain ↔ Productivity	0.317	Accepted
Technology ↔ Corporate Culture	0.768	Accepted
Technology ↔ Human Capital	0.898	Accepted
Technology ↔ Productivity	0.590	Accepted
Technology ↔ Supply Chain	0.876	Accepted

Source: SmartPLS 4 output, 2026.

The initial result indicated a potential discriminant validity problem between Productivity and Corporate Culture. According to the original analysis, indicator X4.2 was subsequently removed and the measurement model was re-estimated.

Figure 6. Revised Measurement Model After Indicator Removal

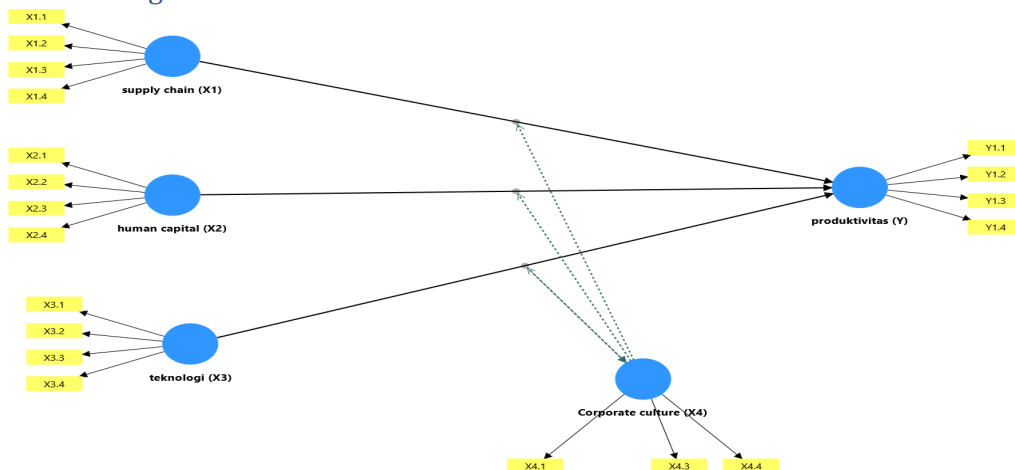


Figure 6. Revised PLS-SEM measurement model after the specified indicator was removed.

Source: SmartPLS 4 output, 2026.

Table 11. Revised HTMT Assessment

Construct Pair	HTMT	Assessment
Human Capital ↔ Corporate Culture	0.751	Accepted
Productivity ↔ Corporate Culture	0.848	Accepted
Productivity ↔ Human Capital	0.569	Accepted
Supply Chain ↔ Corporate Culture	0.529	Accepted
Supply Chain ↔ Human Capital	0.849	Accepted

Supply Chain ↔ Productivity	0.317	Accepted
Technology ↔ Corporate Culture	0.808	Accepted
Technology ↔ Human Capital	0.898	Accepted
Technology ↔ Productivity	0.590	Accepted
Technology ↔ Supply Chain	0.876	Accepted

Source: SmartPLS 4 output, 2026.

Following the re-estimation reported in the original analysis, all HTMT values were below 0.90. The highest value was observed for Technology and Human Capital (0.898), followed by Supply Chain and Technology (0.876). Based on the 0.90 criterion, the revised measurement model demonstrated acceptable discriminant validity.

3.4.3. Construct Reliability

Construct reliability was assessed using Cronbach's alpha, rho_A, composite reliability (rho_C), and AVE.

Table 12. Reliability and Convergent Validity

Construct	Cronbach's Alpha	rho_A	rho_C	AVE	Assessment
Productivity	0.938	0.939	0.956	0.843	Reliable
Supply Chain	0.898	0.903	0.929	0.767	Reliable
Human Capital	0.839	0.862	0.890	0.670	Reliable
Technology	0.888	0.924	0.922	0.746	Reliable
Corporate Culture	0.825	0.843	0.895	0.739	Reliable

Source: SmartPLS 4 output, 2026.

All constructs demonstrated satisfactory internal consistency, with Cronbach's alpha, rho_A, and composite reliability values exceeding 0.70. The AVE values also exceeded 0.50, providing evidence of adequate convergent validity at the construct level.

3.4.4. Collinearity Assessment

Collinearity was assessed using the Variance Inflation Factor (VIF). The results are presented in Table 13.

Table 13. Collinearity Assessment

Structural Relationship	VIF	Assessment
Corporate Culture → Productivity	2.610	Acceptable
Corporate Culture × Human Capital → Productivity	5.109	Acceptable
Corporate Culture × Supply Chain → Productivity	4.866	Acceptable
Corporate Culture × Technology → Productivity	7.558	Acceptable
Human Capital → Productivity	2.986	Acceptable
Supply Chain → Productivity	2.886	Acceptable
Technology → Productivity	4.724	Acceptable

Source: SmartPLS 4 output, 2026.

All VIF values were below 10. The highest VIF was observed for the Technology × Corporate Culture interaction term (7.558). Based on the criterion applied in this study, the structural model did not exhibit critical multicollinearity.

3.1.5. Structural Model Assessment

The structural model was evaluated using the coefficient of determination (R^2) and the significance of the structural paths.

Table 14. Coefficient of Determination

Endogenous Construct	R^2	Adjusted R^2
Productivity	0.693	0.657

Source: SmartPLS 4 output, 2026.

The model produced an **R^2 value of 0.693** for Productivity, with an adjusted R^2 of **0.657**. Thus, approximately **69.3% of the variance in Productivity** can be explained by Supply Chain, Human Capital, Technology, Corporate Culture, and the specified interaction effects included in the model. The remaining variance is attributable to factors outside the model.

3.6. Hypothesis Testing

Hypotheses were evaluated based on the path coefficient, standard deviation, t-statistic, and p-value obtained from the SmartPLS bootstrapping procedure. The study applied a 5% significance level.

Table 15. Structural Path and Moderating Effects

Relationship	β (O)	SD	t-statistic	p-value	Decision
Supply Chain $\rightarrow$ Productivity	-0.310	0.140	2.211	0.014	Supported
Human Capital $\rightarrow$ Productivity	0.240	0.132	1.820	0.034	Supported
Technology $\rightarrow$ Productivity	0.280	0.177	1.581	0.057	Not supported
Corporate Culture $\rightarrow$ Productivity	0.418	0.108	3.885	<0.001	Supported
Supply Chain $\times$ Corporate Culture $\rightarrow$ Productivity	0.283	0.205	1.380	0.084	Not supported
Human Capital $\times$ Corporate Culture $\rightarrow$ Productivity	-0.430	0.251	1.716	0.043	Supported
Technology $\times$ Corporate Culture $\rightarrow$ Productivity	-0.021	0.231	0.090	0.464	Not supported

Source: SmartPLS 4 output, 2026.

3.6.1. Effect of Supply Chain on Productivity

The Supply Chain $\rightarrow$ Productivity path produced a coefficient of **-0.310**, with a t-statistic of **2.211** and a p-value of **0.014**. Because the p-value is below 0.05, the relationship is statistically significant. However, the negative coefficient indicates that the relationship is **negative rather than positive**. Therefore, the hypothesis is statistically supported only if it is formulated as a significant relationship without imposing a positive direction.

3.6.2. Effect of Human Capital on Productivity

Human Capital had a positive and statistically significant relationship with Productivity ($\beta =$ **0.240**, $t =$ **1.820**, $p =$ **0.034**). The positive coefficient indicates that higher Human Capital is associated with higher Productivity. Thus, H2 is supported.

3.6.3. Effect of Technology on Productivity

Technology showed a positive but statistically insignificant relationship with Productivity ($\beta =$ **0.280**, $t =$ **1.581**, $p =$ **0.057**). Because the p-value exceeds 0.05, the relationship does not meet the study's significance criterion. Therefore, H3 is not supported.

3.6.4. Direct Effect of Corporate Culture on Productivity

Corporate Culture demonstrated a positive and statistically significant relationship with Productivity ($\beta = 0.418$, $t = 3.885$, $p < 0.001$). This result indicates that stronger Corporate Culture is associated with higher Productivity.

3.6.5. Moderating Effect of Corporate Culture on the Supply Chain–Productivity Relationship

The interaction between Supply Chain and Corporate Culture produced a positive coefficient of **0.283**, but the relationship was not statistically significant ($t = 1.380$, $p = 0.084$). Therefore, the analysis does not provide sufficient evidence that Corporate Culture significantly moderates the relationship between Supply Chain and Productivity.

3.6.6. Moderating Effect of Corporate Culture on the Human Capital–Productivity Relationship

The interaction between Human Capital and Corporate Culture produced a negative and statistically significant coefficient ($\beta = -0.430$, $t = 1.716$, $p = 0.043$). The significant negative interaction indicates that Corporate Culture **weakens the positive relationship between Human Capital and Productivity**. Thus, Corporate Culture acts as a significant negative moderator of the Human Capital–Productivity relationship.

3.6.7. Moderating Effect of Corporate Culture on the Technology–Productivity Relationship

The Technology $\times$ Corporate Culture interaction was statistically insignificant ($\beta = -0.021$, $t = 0.090$, $p = 0.464$). Consequently, the analysis does not support a moderating effect of Corporate Culture on the Technology–Productivity relationship.

3.1.7. Summary of Hypothesis Testing

Table 16. Summary of Hypothesis Testing

Hypothesis	Proposed Relationship	β	p-value	Result
H1	Supply Chain $\rightarrow$ Productivity	-0.310	0.014	Supported; significant negative effect
H2	Human Capital $\rightarrow$ Productivity	0.240	0.034	Supported
H3	Technology $\rightarrow$ Productivity	0.280	0.057	Not supported
H4	Supply Chain $\times$ Corporate Culture $\rightarrow$ Productivity	0.283	0.084	Not supported
H5	Human Capital $\times$ Corporate Culture $\rightarrow$ Productivity	-0.430	0.043	Supported; negative moderation
H6	Technology $\times$ Corporate Culture $\rightarrow$ Productivity	-0.021	0.464	Not supported

Source: Authors' analysis based on SmartPLS 4 output, 2026.

Overall, the findings indicate that **Human Capital and Corporate Culture have positive significant relationships with Productivity**, whereas Supply Chain demonstrates a statistically significant but negative relationship. Technology does not demonstrate a statistically significant direct effect. Regarding moderation, Corporate Culture significantly moderates the Human Capital–Productivity relationship in a negative direction but does not significantly moderate either the Supply Chain–Productivity or Technology–Productivity relationship.

3.2. Discussion

3.2.1. The Effect of Supply Chain on Productivity

The results demonstrate that Supply Chain has a statistically significant effect on Productivity at PT Mensana Aneka Satwa, with a path coefficient of $\beta = -0.310$, $t = 2.211$, and $p = 0.014$. Although the relationship is statistically significant, the negative coefficient indicates that improvements in the measured supply chain practices are associated with lower productivity. This finding does not support the proposed hypothesis, which expected a positive relationship between Supply Chain and Productivity. The negative relationship may indicate that the company's supply chain processes have not yet been implemented in a sufficiently efficient and responsive manner. In particular, inventory management and procurement may not consistently meet operational requirements in terms of timing and quantity. Delays in procurement, inaccurate inventory planning, or ineffective stock-control practices may result in either stock-outs or overstocking. Stock-outs can interrupt operational activities because required products or materials are unavailable when needed, whereas overstocking can increase storage costs and create risks associated with excessive inventory accumulation. Both conditions may reduce operational efficiency and consequently constrain productivity.

Another possible explanation concerns supplier relationships. The findings suggest that supplier partnerships may not yet provide optimal support for supply chain continuity. Potential challenges include delivery delays, inconsistent product quality, ineffective communication, and excessive dependence on particular suppliers. This issue is particularly relevant because PT Mensana Aneka Satwa reportedly relies on a single supplier for each item. Such a supplier structure may increase operational vulnerability when a supplier experiences delays or is unable to meet the company's requirements according to the agreed schedule. Consequently, production and distribution activities may become less efficient, ultimately affecting productivity. Theoretically, the finding can be interpreted through the supply chain perspective proposed by Christopher (2016), which views supply chain management as an integrated network of activities encompassing procurement, operations, and distribution. Heizer, Render, and Munson (2017) further emphasize that organizational productivity is closely associated with the effectiveness of operational resource management. Effective coordination among suppliers, inventory systems, and distribution activities should facilitate more efficient resource utilization and improve productivity.

However, the negative coefficient observed in this study suggests that the supply chain system at PT Mensana Aneka Satwa may still contain operational inefficiencies that prevent the expected productivity benefits from being realized. Thus, the statistical significance of the relationship should not be interpreted as evidence that stronger supply chain practices automatically improve productivity. Instead, the finding indicates that the quality, efficiency, and implementation of supply chain practices are critical determinants of whether supply chain activities translate into productivity gains. Overall, Supply Chain significantly affects Productivity, but in a negative direction. This finding highlights the need for PT Mensana Aneka Satwa to improve inventory accuracy, procurement timeliness, supplier diversification, supplier coordination, and distribution efficiency. Strengthening these areas may enable the supply chain system to contribute more effectively to sustainable productivity improvement.

3.2.2. The Effect of Human Capital on Productivity

The findings indicate that Human Capital has a positive and statistically significant effect on Productivity at PT Mensana Aneka Satwa, with $\beta = 0.240$, $t = 1.820$, and $p = 0.034$. This result confirms that employees' knowledge, skills, experience, and capabilities constitute important organizational resources for improving productivity. The finding is consistent with the human capital perspective introduced by Becker (1993), which conceptualizes education, training, skills, and experience as forms of investment that increase individuals' productive capacity. From this perspective, employees with stronger competencies are better positioned to perform tasks efficiently, solve operational problems,

reduce errors, and contribute to organizational objectives. Heizer, Render, and Munson (2017) similarly emphasize the importance of effectively utilizing organizational resources in achieving higher productivity.

In the context of PT Mensana Aneka Satwa, employee competence, work experience, training, and adaptability are particularly relevant to operational performance. Employees with appropriate knowledge and practical experience are more capable of responding to operational challenges and completing their responsibilities efficiently. Human capital therefore functions not merely as a supporting resource but as an important organizational capability that facilitates effective execution of business processes. This finding is also consistent with Siregar, Pantas, and Sudirman (2024), who reported that improvements in human capital contribute positively to organizational performance. The consistency between the present finding and previous research reinforces the argument that investment in employee capabilities can generate measurable organizational benefits. The positive and significant coefficient further indicates that improvements in human capital are associated with improvements in productivity. Accordingly, PT Mensana Aneka Satwa should prioritize continuous employee development through structured training, competency development, knowledge enhancement, and opportunities for professional learning. Overall, the findings establish Human Capital as a significant positive determinant of Productivity. Strengthening employee capabilities is therefore an important strategic pathway through which the company can improve operational efficiency and achieve sustainable productivity growth.

3.2.3. The Effect of Technology on Productivity

The results indicate that Technology does not have a statistically significant effect on Productivity at PT Mensana Aneka Satwa, with $\beta = 0.280$, $t = 1.581$, and $p = 0.057$. Although the coefficient is positive, the p-value exceeds the conventional 5% significance threshold. Therefore, the evidence is insufficient to conclude that technology significantly influences productivity in the observed organizational context. This finding suggests that the availability or implementation of technology alone may not automatically generate productivity improvements. Brynjolfsson and Hitt (2003) argue that the productivity benefits of information technology depend not only on technological investment but also on complementary organizational changes and human capabilities. Consequently, technology may produce limited measurable benefits when employees lack the necessary competencies or when technological systems are not adequately integrated into organizational processes.

Several organizational conditions may explain the insignificant relationship. First, employees may not yet possess sufficient technological competencies to exploit the full capabilities of the systems available to them. Second, technological systems may not be fully integrated across operational functions, resulting in fragmented information flows. Third, existing work processes may not have been sufficiently redesigned to take advantage of technological capabilities. The finding can also be interpreted through the Technology Acceptance Model (TAM) developed by Davis (1989). TAM emphasizes the importance of perceived usefulness and perceived ease of use in determining technology acceptance and utilization. When employees perceive a system as difficult to use or insufficiently beneficial, actual utilization may remain limited. Consequently, the existence of technological infrastructure does not necessarily translate into improved productivity.

Therefore, the insignificant relationship should not be interpreted as evidence that technology is inherently irrelevant to productivity. Rather, it indicates that, within the current organizational context, technology has not yet been translated into measurable productivity improvements. The effectiveness of technology depends on user competence, organizational readiness, system integration, and the alignment between technological applications and operational requirements. PT Mensana Aneka Satwa should consequently strengthen employee digital competencies, improve system

integration, and regularly evaluate the effectiveness and usability of technological applications. Such measures may increase the likelihood that future technological investments will generate measurable productivity benefits.

3.2.4. The Moderating Effect of Corporate Culture on the Supply Chain–Productivity Relationship

The results show that Corporate Culture does not significantly moderate the relationship between Supply Chain and Productivity, with $\beta = 0.283$, $t = 1.380$, and $p = 0.084$. Although the interaction coefficient is positive, the relationship is statistically insignificant at the 5% level. Thus, the findings do not provide sufficient evidence that Corporate Culture strengthens or weakens the effect of Supply Chain on Productivity. Theoretically, organizational culture can influence coordination, cooperation, communication, and strategic implementation. Robbins and Judge (2017) argue that a strong organizational culture can guide employee behavior and facilitate organizational effectiveness, while Schein (2010) emphasizes that organizational culture develops through shared learning and becomes embedded in organizational assumptions, values, and behavioral patterns. An adaptive culture should therefore create conditions that facilitate collaboration and organizational responsiveness.

Nevertheless, the insignificant moderating effect found in this study suggests that Corporate Culture has not yet become a sufficiently influential mechanism connecting supply chain practices with productivity at PT Mensana Aneka Satwa. One possible explanation is that supply chain activities are primarily governed by operational procedures and established standard operating procedures (SOPs), meaning that employees' supply chain-related behavior may be more strongly determined by formal systems than by cultural values. The characteristics of the company's operations may also contribute to this finding. As an organization involved in the distribution of animal health products, operational continuity requires accuracy in procurement, inventory management, and distribution. These activities may therefore depend more heavily on technical procedures, supplier coordination, and logistics systems than on organizational culture.

This result differs from the findings of Fitri Rezeki, Nany Librianty, and Rizqon Jamil Farhas (2023), who reported a positive relationship between organizational culture and work productivity through organizational commitment. The difference may be attributable to differences in research context, respondents, variables, and analytical models. In the previous study, organizational culture was positioned as an independent variable, whereas the present study examines Corporate Culture as a moderating variable. Consequently, the role of culture is conceptually different across the two studies. Overall, the findings indicate that Corporate Culture does not significantly alter the Supply Chain–Productivity relationship. The company should nevertheless strengthen collaborative communication, shared responsibility, and continuous improvement because these cultural characteristics may provide an organizational foundation for more effective supply chain management in the future.

3.2.5. The Moderating Effect of Corporate Culture on the Human Capital–Productivity Relationship

The findings demonstrate that Corporate Culture significantly moderates the relationship between Human Capital and Productivity, with $\beta = -0.430$, $t = 1.716$, and $p = 0.043$. The negative interaction coefficient indicates that Corporate Culture weakens the positive relationship between Human Capital and Productivity. This finding is theoretically important because it suggests that the contribution of employee knowledge, skills, and experience to productivity depends partly on the organizational cultural environment in which employees operate. Human capital may be strong, but its productive value can be constrained when organizational norms and practices do not adequately support learning, collaboration, innovation, and employee participation.

Schein (2010) explains that organizational culture consists of shared values, beliefs, and underlying assumptions that guide employee behavior. An adaptive culture can create an environment

that supports learning and innovation, whereas a less adaptive culture may constrain employees' ability to apply and develop their competencies. Robbins and Judge (2017) similarly emphasize that organizational culture influences how employees behave and interact within organizations.

In the context of PT Mensana Aneka Satwa, the negative moderating effect may indicate that employees possess relevant knowledge, skills, and experience, but the organizational environment does not always provide sufficient opportunities for these capabilities to be fully utilized. Possible organizational conditions include limited cross-functional communication, insufficient knowledge sharing, restricted employee participation in decision-making, or limited encouragement of innovation. The finding therefore provides an important managerial insight: simply increasing employee competence may not be sufficient to maximize productivity. The organization must simultaneously establish cultural conditions that allow employees to apply their competencies effectively. Human capital development and cultural development should consequently be treated as complementary organizational strategies. Overall, Corporate Culture significantly moderates the Human Capital–Productivity relationship, but its negative coefficient indicates a weakening effect. PT Mensana Aneka Satwa should therefore develop a more adaptive and supportive culture through stronger communication, collaboration, continuous learning, knowledge sharing, and employee participation. Such changes may enable the organization to convert its human capital more effectively into productivity gains.

3.2.6. The Moderating Effect of Corporate Culture on the Technology–Productivity Relationship

The findings show that Corporate Culture does not significantly moderate the relationship between Technology and Productivity, with $\beta = -0.021$, $t = 0.090$, and $p = 0.464$. The interaction coefficient is close to zero and statistically insignificant, indicating that Corporate Culture does not meaningfully alter the relationship between Technology and Productivity in the studied organization. Theoretically, the finding contrasts with the perspective of Schein (2010), which emphasizes the role of organizational culture in shaping employee responses to organizational change. An adaptive culture may encourage openness to innovation and technological transformation. However, the present findings suggest that the existing cultural environment at PT Mensana Aneka Satwa has not yet reached a level at which it significantly changes the productivity consequences of technology utilization.

The result is also relevant to the Technology Acceptance Model proposed by Davis (1989), which emphasizes perceived usefulness and perceived ease of use as important determinants of technology acceptance. If employees do not perceive technology as useful or easy to operate, organizational culture alone may be insufficient to produce meaningful productivity effects. The finding can further be interpreted using the Technology–Organization–Environment (TOE) framework proposed by Tornatzky and Fleischer (1990). The framework emphasizes that successful technology implementation is influenced by technological, organizational, and environmental conditions. Thus, technological availability and organizational culture represent only parts of a broader implementation system. Weaknesses in employee capability, technological integration, organizational readiness, or external conditions may limit the productivity benefits of technology.

For PT Mensana Aneka Satwa, the insignificant moderation effect suggests that the company needs to focus not only on cultural development but also on digital competency, technology usability, system integration, and organizational readiness. Corporate Culture should encourage continuous learning and innovation, while technological systems should be aligned with employees' actual work requirements. Overall, Corporate Culture does not significantly moderate the Technology–Productivity relationship. The company should therefore adopt an integrated approach combining technological development, digital competency enhancement, employee training, and cultural readiness to ensure that technology can contribute more effectively to productivity.

3.3. Managerial Implications

3.3.1. Managerial Implications of Supply Chain on Productivity

The significant but negative effect of Supply Chain on Productivity indicates that PT Mensana Aneka Satwa needs to improve the efficiency and reliability of its supply chain processes. Three strategic actions are particularly important. First, the company should strengthen inventory planning and procurement management. Demand forecasting, inventory monitoring, reorder-point determination, and procurement scheduling should be improved to minimize stock-outs and overstocking. Inventory performance should be monitored using measurable indicators such as inventory accuracy, stock-out frequency, inventory turnover, and order fulfillment time.

Second, the company should strengthen supplier relationship management. Supplier performance should be evaluated periodically based on delivery reliability, product quality, responsiveness, and compliance with agreed schedules. Greater supplier diversification should also be considered where operationally feasible to reduce excessive dependence on a single supplier. Third, management should establish supply chain Key Performance Indicators (KPIs). Relevant indicators may include on-time delivery, product availability, inventory accuracy, order fulfillment time, supplier lead time, and distribution efficiency. Regular monitoring of these indicators will allow management to identify supply chain bottlenecks and implement corrective actions promptly. These initiatives can help the company transform its supply chain from a potential source of operational inefficiency into a strategic capability that supports sustainable productivity improvement.

3.3.2. Managerial Implications of Human Capital on Productivity

The significant positive effect of Human Capital demonstrates that employee capability is an important driver of productivity. Management should therefore develop a systematic human capital strategy. First, the company should implement continuous education and training programs that are aligned with employees' functional responsibilities. Training should address technical skills, operational procedures, problem-solving capabilities, and emerging competencies required by the organization. Second, the company should establish a transparent career development system based on performance evaluation, competency development, promotion opportunities, and individual potential. A clear career pathway may increase employee motivation and encourage stronger commitment to organizational objectives. Third, management should create a supportive learning and collaboration environment. Knowledge sharing, teamwork, employee participation, and innovation should be encouraged as part of everyday organizational practices. Such an environment can increase employee engagement and facilitate the effective application of individual competencies. These initiatives reinforce the role of Human Capital as a strategic organizational asset and may strengthen the company's capacity to achieve sustained productivity improvements.

3.3.3. Managerial Implications of Technology on Productivity

Because Technology does not have a statistically significant effect on Productivity, PT Mensana Aneka Satwa should focus on improving the effectiveness rather than merely increasing the availability of technological systems. First, the company should strengthen employees' digital competencies through regular training and practical assistance. Training should focus on the actual systems and technologies used in employees' daily activities. Second, management should integrate technology with core business processes. Information systems should support activities such as inventory management, data processing, procurement, sales, and distribution. Greater integration can improve information flow and support faster and more accurate decision-making. Third, the company should conduct periodic technology effectiveness evaluations. Evaluation should consider system utilization, user satisfaction, process efficiency, error reduction, and the extent to which technology supports organizational

objectives. Technology investments should be assessed based on their actual contribution to operational improvement rather than simply on their availability. Through these measures, technology can become more closely aligned with employee capabilities and operational requirements, increasing its potential contribution to future productivity.

3.3.4. Managerial Implications of Corporate Culture in the Supply Chain–Productivity Relationship

Although Corporate Culture does not significantly moderate the Supply Chain–Productivity relationship, strengthening organizational culture remains relevant for supporting supply chain effectiveness. First, management should promote cross-departmental collaboration and communication among procurement, warehousing, sales, and distribution functions. Improved communication can reduce information gaps and operational errors. Second, organizational values such as discipline, accountability, teamwork, responsiveness, and customer orientation should be explicitly integrated into supply chain activities. Cultural values should be reflected in employee behavior rather than remaining merely formal organizational statements. Third, management should strengthen employee commitment to organizational objectives through transparent communication of organizational goals, recognition of employee contributions, and participation in operational problem-solving. Although the current statistical findings do not confirm a moderating effect, these initiatives may establish a stronger cultural foundation for future supply chain improvements.

3.3.5. Managerial Implications of Corporate Culture in the Human Capital–Productivity Relationship

The significant negative moderating effect of Corporate Culture on the Human Capital–Productivity relationship provides a critical managerial signal. The company needs to ensure that its organizational culture supports, rather than constrains, the utilization of employee capabilities. First, PT Mensana Aneka Satwa should develop a learning-oriented organizational culture that encourages employees to continuously acquire knowledge and improve their competencies. Second, organizational values should be aligned with human capital management practices. Professionalism, teamwork, discipline, accountability, learning, and innovation should be consistently reflected in recruitment, training, performance assessment, and career development. Third, management should increase employee engagement and participation through open communication, performance recognition, knowledge sharing, and involvement in work-related decision-making. These practices can create a more supportive environment in which employee capabilities can be translated into organizational productivity. The key managerial implication is that investment in human capital should be accompanied by cultural transformation. Developing employees without creating a supportive organizational environment may limit the productivity benefits of human capital.

3.3.6. Managerial Implications of Corporate Culture in the Technology–Productivity Relationship

The insignificant moderating effect of Corporate Culture on the Technology–Productivity relationship suggests that technological development should be accompanied by broader organizational and human factors. First, the company should develop a culture that is responsive to technological change. Employees should be encouraged to view technological transformation as part of continuous organizational improvement rather than merely as an additional operational requirement. Second, management should strengthen employees' digital capabilities through continuous training, practical assistance, and knowledge sharing. Employees need sufficient competence to use technological systems effectively in their daily work. Third, technology should be embedded into organizational work practices. Technological applications should become integrated with standard operating procedures, communication mechanisms, performance monitoring, and decision-making processes. This approach can position technology as an integral component of the organization's work system rather than simply

as an operational tool. Accordingly, PT Mensana Aneka Satwa should pursue technological implementation through an integrated combination of technology, employee capability, and organizational culture. Such alignment may increase the potential for technology to contribute meaningfully to future productivity improvements.

4. Conclusions

4.1. Main Findings and Conclusions

This study examined the effects of Supply Chain, Human Capital, and Technology on Productivity, as well as the moderating role of Corporate Culture at PT Mensana Aneka Satwa. The findings provide several important conclusions. First, Supply Chain has a statistically significant but negative effect on Productivity. This finding indicates that supply chain management remains an important determinant of productivity; however, its current implementation has not yet generated the expected productivity benefits. The negative relationship suggests the presence of potential inefficiencies in inventory management, procurement processes, supplier coordination, and distribution activities. Therefore, improving the quality and efficiency of supply chain practices is essential for enhancing organizational productivity. Second, Human Capital has a positive and statistically significant effect on Productivity. Employee knowledge, skills, experience, and competencies contribute directly to the company's ability to perform operational activities efficiently. This finding confirms that human capital represents an important organizational resource and that continuous investment in employee capabilities can support sustainable productivity improvement. Third, Technology does not have a statistically significant effect on Productivity. Although the relationship is positive, the statistical evidence is insufficient to confirm a significant effect. This result suggests that the availability of technological systems alone does not guarantee productivity improvement.

The benefits of technology depend on employee digital competencies, system integration, user acceptance, and the alignment between technological applications and operational requirements. Fourth, Corporate Culture does not significantly moderate the relationship between Supply Chain and Productivity. This finding suggests that the effectiveness of supply chain activities is currently more strongly associated with operational and technical factors than with the organizational culture surrounding those activities. Consequently, Corporate Culture has not yet demonstrated a significant role in changing the relationship between Supply Chain and Productivity. Fifth, Corporate Culture significantly moderates the relationship between Human Capital and Productivity, but the moderating effect is negative. This finding indicates that Corporate Culture currently weakens the positive contribution of Human Capital to Productivity. Thus, employee competencies, knowledge, and experience may not be fully translated into productivity when the prevailing organizational environment does not sufficiently support learning, collaboration, innovation, and employee participation. Sixth, Corporate Culture does not significantly moderate the relationship between Technology and Productivity. This finding indicates that the existing organizational culture has not yet played a significant role in strengthening or weakening the contribution of technology to productivity. Greater organizational readiness, digital competence, and cultural adaptability may therefore be required to maximize the benefits of technological implementation.

Taken together, the findings indicate that Human Capital represents the most consistent positive organizational factor in explaining Productivity, whereas Supply Chain requires substantial operational improvement and Technology requires stronger organizational and human support. The findings also demonstrate that the role of Corporate Culture varies across organizational mechanisms and should not automatically be assumed to strengthen every relationship involving organizational resources.

4.2. Theoretical Contributions

This study contributes to the literature by providing empirical evidence regarding the interconnected roles of Supply Chain, Human Capital, Technology, and Corporate Culture in explaining organizational productivity. First, the significant negative relationship between Supply Chain and Productivity provides an important theoretical insight. Supply chain management does not necessarily generate productivity improvements when procurement, inventory, supplier relationships, and distribution processes are not sufficiently efficient. Thus, the effectiveness of supply chain management depends not only on the existence of supply chain practices but also on their quality and implementation. Second, the positive effect of Human Capital on Productivity reinforces the strategic resource perspective of employee knowledge, skills, experience, and competencies. The finding confirms that human resources can become an important organizational capability when employee competencies are effectively developed and utilized.

Third, the insignificant effect of Technology demonstrates that technological investment should not be considered an independent guarantee of productivity improvement. This finding supports a more contextual understanding of technology adoption in which technological infrastructure must be accompanied by employee competence, organizational readiness, and effective integration into business processes. Fourth, the moderating findings provide a more nuanced understanding of Corporate Culture. Corporate Culture did not significantly moderate the Supply Chain–Productivity and Technology–Productivity relationships, while it significantly moderated the Human Capital–Productivity relationship in a negative direction. These findings suggest that organizational culture does not have a uniform moderating function across organizational resources. Its influence depends on the specific relationship and organizational mechanism being examined. Overall, the study extends the discussion of productivity by demonstrating that organizational resources and cultural conditions interact in complex ways. The findings encourage future research to examine organizational culture not merely as a universally positive organizational factor but as a contextual mechanism whose effects may differ across strategic resources and operational processes.

4.3. Practical and Managerial Implications

The findings provide several practical implications for the management of PT Mensana Aneka Satwa. Regarding Supply Chain, management should improve inventory planning, procurement accuracy, supplier coordination, and distribution efficiency. The company should establish measurable supply chain performance indicators, including inventory accuracy, stock availability, supplier lead time, on-time delivery, and order fulfillment. Greater supplier diversification may also be considered to reduce operational dependence on individual suppliers. Regarding Human Capital, the company should continue investing in employee development through structured training, competency development, career planning, knowledge sharing, and performance-based development. Because Human Capital has a positive and significant relationship with Productivity, employee development should remain a strategic organizational priority.

Regarding Technology, management should focus on improving utilization rather than simply increasing technological investment. Digital training, system integration, user support, and periodic technology evaluation should be strengthened. Technological applications should be directly aligned with operational requirements so that employees can use them to improve efficiency and decision-making. Regarding Corporate Culture and Supply Chain, although the moderating effect is not statistically significant, management should continue strengthening communication, collaboration, accountability, and coordination among procurement, warehousing, sales, and distribution functions. A stronger collaborative culture can provide a supportive organizational environment for future supply chain improvements. Regarding Corporate Culture and Human Capital, the negative moderating effect

requires particular managerial attention. Management should develop a more adaptive and learning-oriented culture that supports knowledge sharing, innovation, employee participation, and cross-functional collaboration. The objective is to ensure that organizational culture facilitates rather than constrains the productive utilization of employee competencies.

Regarding Corporate Culture and Technology, the company should develop a culture that is more responsive to technological change. Continuous learning, digital capability development, innovation, and technology-oriented work practices should be incorporated into everyday organizational activities. Therefore, the central managerial implication of this study is that productivity improvement requires an integrated approach involving operational efficiency, employee capability, technological readiness, and organizational culture rather than relying on a single organizational factor.

4.4. Research Limitations

Several limitations should be considered when interpreting the findings of this study. First, the research was conducted at PT Mensana Aneka Satwa, which limits the extent to which the findings can be generalized to other organizations, industries, or geographical contexts. Organizational characteristics, operational systems, employee profiles, and management practices may differ across companies. Second, the study focuses on three primary explanatory variables—Supply Chain, Human Capital, and Technology—with Corporate Culture positioned as a moderating variable. Other factors that may influence Productivity were not incorporated into the analytical model. Third, the study captures relationships among the variables within the research context and does not provide sufficient evidence regarding how these relationships may develop over an extended period. Changes in organizational policies, employee competencies, technology adoption, supplier conditions, and organizational culture may produce different outcomes over time. These limitations should be considered when interpreting the statistical relationships and when applying the findings to other organizational settings.

4.5. Recommendations for Future Research

Future research should extend the present model by incorporating additional variables that may explain organizational productivity. Potential variables include leadership, work motivation, employee engagement, job satisfaction, organizational commitment, innovation capability, digital transformation, and operational efficiency. Future studies may also examine whether Corporate Culture functions differently as an independent, mediating, or moderating variable across different organizational contexts. Given the negative moderating effect identified in the Human Capital–Productivity relationship, further investigation is particularly important to identify which cultural dimensions may facilitate or constrain the utilization of employee capabilities.

In addition, future research should consider conducting comparative studies across different industries and organizational sizes to improve the generalizability of the findings. Research involving manufacturing, distribution, healthcare, services, and other sectors could provide broader evidence regarding the relationships identified in this study. Methodologically, future researchers may employ longitudinal designs to examine changes in productivity following improvements in supply chain practices, human capital development, technology adoption, and organizational culture. Mixed-method approaches combining quantitative analysis with interviews or qualitative observations may also provide deeper explanations for findings that cannot be fully explained by statistical relationships alone. Finally, future studies may consider larger samples and more diverse organizational settings to validate the present findings and develop a more comprehensive model of the determinants of organizational productivity.

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