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The Impact of Market Competition, Technological Innovation, Supply Chain Efficiency, and Government Subsidies on Company Productivity and Export Performance in the Manufacturing Industry

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ABSTRACT

This study examines the impact of market competition, technological innovation, supply chain efficiency, and government subsidies on company productivity and export performance in the Indonesian manufacturing industry, with company productivity positioned as a mediating variable. A quantitative research design was employed using data collected from 175 manufacturing firms through a structured questionnaire measured on a five-point Likert scale. The data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS 3). The results reveal that market competition, technological innovation, supply chain efficiency, and government subsidies each have a positive and significant effect on company productivity and export performance. Furthermore, company productivity is proven to play a significant mediating role in all relationships between the exogenous variables and export performance. These findings indicate that export competitiveness is fundamentally shaped by internal operational efficiency, supported by innovation capability, efficient supply chain management, competitive market pressure, and effective government policy. This study provides both theoretical and practical contributions by integrating internal firm capabilities and external institutional support into a unified framework for understanding export performance in emerging economies.

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1. INTRODUCTION

The manufacturing industry plays a central role in driving economic growth, employment creation, and export expansion in developing countries, including Indonesia. As one of the largest contributors to national gross domestic product (GDP), manufacturing serves as a key engine for structural transformation and international trade competitiveness. In recent years, Indonesia has intensified its efforts to strengthen the manufacturing sector through industrial down streaming, technological upgrading, and export-oriented policies [1], [2]. However, despite these initiatives, many manufacturing firms still face challenges related to productivity stagnation, supply chain disruptions, intense market competition, and limited effectiveness of

government support mechanisms [3], [4]. These challenges make it increasingly important to understand the key determinants of company productivity and export performance in an integrated analytical framework.

In the era of globalization and rapid technological change, manufacturing firms are no longer able to rely solely on traditional production advantages such as low labor costs. Instead, they must compete through continuous technological innovation, efficient supply chain management, and the ability to respond quickly to dynamic market competition [5], [6]. Market competition compels firms to enhance operational efficiency, improve product quality, and innovate to maintain their market position. At the same time, technological innovation enables firms to upgrade production processes, adopt digital manufacturing systems, and create higher value-added products [7], [8]. These factors are widely recognized as critical drivers of firm productivity and long-term competitiveness. However, their effectiveness is often contingent on how well firms manage their supply chains and leverage supportive government policies [9], [10].

Supply chain efficiency has emerged as a strategic asset for manufacturing firms in both domestic and export markets. Efficient supply chains enable firms to reduce production costs, shorten delivery times, minimize inventory risks, and improve overall responsiveness to customer demand [11], [12]. The COVID-19 pandemic and recent global logistics disruptions have further highlighted the importance of resilient and efficient supply chains in sustaining firm productivity and export activities. For Indonesian manufacturing firms, supply chain performance is particularly crucial given the country's geographical characteristics as an archipelagic nation, which pose logistical challenges and increase transportation costs. Inefficiencies in supply chain networks can significantly erode firms' productivity and weaken their ability to compete in international markets [13], [14].

In addition to internal firm capabilities, government subsidies and policy interventions play an essential role in shaping the performance of manufacturing firms. Government subsidies in the form of tax incentives, research and development (R&D) support, export financing, and energy cost assistance are designed to reduce production burdens, stimulate innovation, and enhance firms' export readiness [15]. In Indonesia, various industrial policies, including those related to Industry 4.0, export promotion, and small and medium manufacturing enterprise (SME) development, have been introduced to accelerate industrial upgrading [13], [14]. Nevertheless, empirical evidence on the effectiveness of these subsidies in improving firm productivity and export performance remains mixed, especially when analyzed simultaneously with competitive pressure, innovation capability, and supply chain efficiency.

Previous empirical studies have mostly examined these determinants in isolation. Some studies focus on the role of innovation in determining productivity and export success, while others emphasize supply chain integration or competitive market structure. Similarly, research on government subsidies often evaluates policy effectiveness separately from internal firm strategies. This fragmented approach limits a comprehensive understanding of how external factors (market competition and government subsidies) and internal factors (technological innovation and supply chain efficiency) jointly influence productivity and export performance within a unified structural model. Moreover, studies that explicitly position company productivity as a mediating mechanism between these strategic drivers and export performance in the Indonesian manufacturing context remain limited.

Export performance itself represents a critical outcome variable for manufacturing firms operating in emerging economies. Strong export performance not only increases firm revenue but also enhances learning effects, technological spill overs, and long-term competitiveness in global markets.

However, export activities require firms to meet higher quality standards, comply with international regulations, and maintain reliable logistics systems. This makes export performance inherently dependent on both internal operational excellence and external institutional support. Without strong productivity foundations, firms often struggle to sustain export competitiveness even when market opportunities exist.

This study is grounded in the resource-based view (RBV) and dynamic capability theory, which emphasize that firm performance is shaped by the effective utilization of strategic resources such as innovation capability, supply chain integration, and responsiveness to competition, while government subsidies function as external institutional support that strengthens firm capabilities when effectively absorbed. Using a quantitative approach, this study examines the effects of market competition, technological innovation, supply chain efficiency, and government subsidies on company productivity and export performance in the Indonesian manufacturing industry through SEM-PLS analysis of Likert-scale survey data. The study contributes by integrating these factors into a single empirical model, positioning company productivity as a mediating variable, and enriching the literature on manufacturing competitiveness in emerging economies. Practically, the findings provide strategic insights for managers and policy guidance for directing subsidies toward productivity upgrading and export expansion.

2. LITERATURE REVIEW

2.1 Market Competition and Company Performance

Market competition refers to the intensity of rivalry among firms operating within the same industry, where high competitive pressure forces firms to improve efficiency, reduce costs, enhance quality, and continuously innovate to survive [16], [17]. According to industrial organization theory, competition encourages more efficient resource allocation and the adoption of superior production technologies, leading to higher productivity, while also motivating firms to become more export-oriented as international markets provide opportunities for scale expansion and risk diversification [8], [18]. Empirical evidence consistently shows that competitive environments stimulate productivity growth by encouraging innovation, production reorganization, and more effective resource utilization, while simultaneously pushing firms to meet international product standards, improve delivery reliability, and strengthen cost efficiency, all of which are essential for export performance [19], [20]. In the Indonesian manufacturing sector, rising regional and global competition following trade liberalization has intensified pressure on firms to enhance operational performance, making market competition a critical determinant of both company productivity and export performance.

H1: Market competition has a positive effect on company productivity.

H2: Market competition has a positive effect on export performance.

2.2 Technological Innovation and Company Performance

Technological innovation refers to the adoption of new technologies, development of new products, improvement of production processes, and implementation of digital systems in firm operations, and it is widely recognized as a core driver of productivity and competitiveness in manufacturing industries [21], [22]. From the perspective of the resource-based view (RBV), innovation capability represents a strategic intangible resource that enables firms to achieve sustainable competitive advantage through the upgrading of production technologies, adoption of automation, and integration of digital manufacturing, which

significantly enhance labor productivity and production efficiency. Innovation also allows firms to differentiate their products in export markets, meet international quality standards, and comply with technical regulations, thereby directly strengthening export performance [22], [23]v. Empirical evidence consistently shows that innovation improves export success by increasing product uniqueness, production reliability, and competitiveness beyond price-based competition. In the Indonesian manufacturing context, however, technological innovation remains unevenly distributed, with larger firms adopting advanced technologies more rapidly than small and medium enterprises, which explains the observed variations in productivity and export performance across firms.

H3: Technological innovation has a positive effect on company productivity.

H4: Technological innovation has a positive effect on export performance.

2.3 *Supply Chain Efficiency and Company Performance*

Supply chain efficiency refers to a firm's ability to manage the flow of materials, information, and products from suppliers to customers in an effective, timely, and cost-efficient manner, enabling firms to minimize delays, reduce transaction costs, lower inventory holding costs, and respond quickly to customer demand [11], [12]. In manufacturing industries, efficient supply chain management is directly linked to production continuity and output stability, as it ensures uninterrupted access to raw materials, optimizes production scheduling, and reduces waste, thereby improving productivity [13], [14]. Supply chain efficiency also contributes to export performance by enhancing delivery reliability, shortening lead times, increasing customer satisfaction, and strengthening international buyer trust, which are essential for meeting global logistics standards. In the Indonesian manufacturing context, where geographical fragmentation, infrastructure limitations, and logistics inefficiencies pose significant challenges, firms that successfully strengthen supply chain coordination, digital tracking, and logistics integration tend to achieve higher productivity and stronger export competitiveness, making supply chain efficiency a crucial determinant of both productivity and export performance.

H5: Supply chain efficiency has a positive effect on company productivity.

H6: Supply chain efficiency has a positive effect on export performance.

2.4 *Government Subsidies and Company Performance*

Government subsidies represent financial and non-financial assistance provided by the state to support industrial development, including tax incentives, export financing, energy subsidies, training support, R&D funding, and technology adoption grants, and from an institutional economics perspective, such intervention is necessary to correct market failures, reduce production risks, and stimulate long-term industrial upgrading [24], [25]. Government subsidies enhance productivity by lowering production costs, facilitating access to modern technology, and supporting workforce skill development, while also reducing financial constraints that enable firms to invest in innovation, capacity expansion, and export infrastructure [26], [27]. In the export context, government support helps firms overcome international market entry barriers, comply with trade regulations, and access export financing. In Indonesia, industrial policy has strongly emphasized manufacturing revitalization through export incentives, infrastructure development, and innovation acceleration, although

subsidy effectiveness varies across firms due to differences in absorptive capacity, management quality, and technological readiness. Nevertheless, government subsidies are generally expected to contribute positively to both firm productivity and export performance.

H7: Government subsidies have a positive effect on company productivity.

H8: Government subsidies have a positive effect on export performance.

2.5 *Company Productivity and Export Performance*

Company productivity reflects the efficiency with which firms transform inputs such as labor, capital, and materials into outputs, and productivity growth is essential for sustaining long-term competitiveness, cost leadership, and profitability. In the manufacturing sector, higher productivity enables firms to achieve economies of scale, reduce production costs, improve product quality, and allocate more resources to innovation and market expansion [19], [28]. Export performance, which is commonly measured through export sales growth, market expansion, export intensity, and export profitability, fundamentally depends on strong productivity because international competition requires firms to operate at high efficiency while meeting strict quality standards [29], [30]. Empirical evidence consistently demonstrates that more productive firms are more likely to export and achieve superior performance in foreign markets, as productivity lowers unit costs, increases product consistency, and enhances responsiveness to international demand. Therefore, productivity is expected to directly and positively influence export performance.

H9: Company productivity has a positive effect on export performance.

2.6 *The Mediating Role of Company Productivity*

While market competition, technological innovation, supply chain efficiency, and government subsidies may directly influence export performance, their effects are largely transmitted through improvements in company productivity, as competitive pressure encourages efficiency, innovation enhances production capability, supply chain efficiency stabilizes operations, and government subsidies reduce cost burdens, all of which strengthen productivity and subsequently enable firms to compete more effectively in export markets [19], [30], [31]. From the perspective of dynamic capability theory, productivity represents the operational manifestation of a firm's ability to reconfigure resources in response to market and policy changes, and without strong productivity foundations, firms may fail to translate innovation efforts, supply chain improvements, and government incentives into sustained export success. Therefore, productivity is expected to play a critical mediating role in the relationship between strategic drivers and export performance.

H10: Company productivity mediates the relationship between market competition and export performance.

H11: Company productivity mediates the relationship between technological innovation and export performance.

H12: Company productivity mediates the relationship between supply chain efficiency and export performance.

H13: Company productivity mediates the relationship between government subsidies and export performance.

3. RESEARCH METHODS

3.1 Research Design

This study employs a quantitative explanatory research design to examine the causal relationships among market competition, technological innovation, supply chain efficiency, government subsidies, company productivity, and export performance in the manufacturing industry in Indonesia. A quantitative approach is appropriate because the study aims to test hypotheses derived from theory and prior empirical studies using statistical modelling [32]. The research is cross-sectional, in which data are collected at a single point in time to capture firms' current strategic conditions and performance outcomes. The analytical technique used in this study is Structural Equation Modeling–Partial Least Squares (SEM-PLS 3). SEM-PLS is chosen because it is suitable for complex models with multiple latent variables, does not require multivariate normal data distribution, and is effective for prediction-oriented research with relatively moderate sample sizes.

3.2 Population and Sample

The population of this study consists of manufacturing firms operating in Indonesia, covering various subsectors such as food and beverages, textiles, chemicals, metal products, electronics, and consumer goods. These manufacturing subsectors were selected due to their strategic role in contributing to national export performance and industrial output. The manufacturing sector is widely recognized as one of the main drivers of economic growth, productivity enhancement, and international trade competitiveness, making it highly relevant for this research.

The sample comprises 175 manufacturing firms, which satisfies the minimum requirement for SEM-PLS analysis based on the 10-times rule, where the sample size should be at least ten times the maximum number of structural paths directed at a latent construct. The sampling technique applied in this study is purposive sampling with the following criteria: (1) the firm operates in the manufacturing sector, (2) the firm has been in operation for at least three years, (3) the firm is involved in domestic and/or export market activities, and (4) the respondent is an owner, director, operations manager, export manager, or senior supervisor who possesses sufficient knowledge of the firm's operational performance, innovation activities, supply chain management, and export performance.

3.3 Data Collection Method

Primary data were collected using a structured questionnaire distributed both directly and online to respondents across different regions in Indonesia. The questionnaire was designed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Prior to full-scale distribution, a pilot test was conducted with a small group of respondents to ensure the clarity, validity, and reliability of the research instrument, and the feedback obtained was used to refine the wording and structure of the questionnaire. In addition to primary data, secondary data were obtained from government reports, industrial statistics, and previous academic studies to support the discussion and provide contextual analysis for the study.

3.4 Operational Definition of Variables

This study consists of six latent variables, comprising four exogenous variables, one mediating variable, and one endogenous variable. Market competition (X1) refers to the intensity of rivalry among firms in the manufacturing industry and is measured through indicators of price competition, product differentiation pressure, market entry of competitors, and the speed of innovation among competitors. Technological innovation (X2) reflects a firm's ability to develop and adopt new

technologies in production and product development, measured by the use of modern production technology, product innovation intensity, process innovation, and the adoption of digitalization and automation. Supply chain efficiency (X3) represents the firm's capability to manage material flows, logistics, and information effectively, measured by supplier coordination efficiency, logistics and delivery reliability, inventory management efficiency, and lead time reduction. Government subsidies (X4) indicate the financial and policy support received by firms, including tax incentives, export financing facilities, energy or production input subsidies, and R&D and training support. Company productivity (Z) reflects the firm's efficiency in transforming inputs into outputs, measured by output growth, labor productivity improvement, cost efficiency, and production capacity utilization. Finally, export performance (Y) refers to the firm's success in international markets, measured by export sales growth, export market expansion, export profitability, and export market stability.

3.5 Data Analysis Technique

Data analysis was conducted using SEM-PLS 3 software through two main stages, namely the evaluation of the measurement model (outer model) and the structural model (inner model) [32]. The measurement model was assessed to examine the validity and reliability of the constructs using convergent validity through outer loading values (> 0.70), discriminant validity using the Fornell–Larcker criterion and cross-loadings, reliability using Cronbach's Alpha and Composite Reliability (both > 0.70), and Average Variance Extracted (AVE) values exceeding 0.50. The structural model was then evaluated using R-square (R^2) to determine the explanatory power of the model, path coefficients to analyze the strength and direction of relationships, t-statistics and p-values obtained through bootstrapping with 5,000 resamples to test the significance of hypotheses, effect size (f^2) to assess the magnitude of the influence of each exogenous variable, and predictive relevance (Q^2) to evaluate the model's prediction capability. Furthermore, the mediating role of company productivity was tested using bootstrapping indirect effect analysis, where productivity was confirmed as a mediator if the indirect effect was statistically significant ($p < 0.05$) and either both direct and indirect effects were significant (partial mediation) or only the indirect effect remained significant (full mediation). Hypothesis testing was conducted using the criteria that a hypothesis is supported if the t-statistic exceeds 1.96 and the p-value is below 0.05, and is not supported otherwise.

4. RESULTS AND DISCUSSION

4.1 Respondent and Firm Profile

This study involved 175 respondents drawn from manufacturing firms operating in various regions of Indonesia, all of whom hold strategic and decision-making positions within their respective organizations, including owners, directors, operational managers, production managers, and export managers. The involvement of respondents with managerial authority ensures that the data accurately represent firm-level strategic conditions related to market competition, technological innovation, supply chain management, government support, productivity, and export performance. The respondents originate from a wide range of manufacturing subsectors, including food and beverages, textiles and apparel, chemicals, metal and machinery, electronics, and consumer goods, indicating that the findings capture a broad representation of Indonesia's manufacturing structure and are not limited to a single industrial niche.

In terms of firm characteristics, the majority of sampled firms have been

in operation for more than three years, with many having operated for over a decade, indicating that most are established businesses with sufficient operational experience to evaluate long-term productivity dynamics and competitive pressure. The sample also reflects a balanced composition of small-, medium-, and large-scale manufacturing firms, with small and medium-sized enterprises (SMEs) dominating, consistent with the structure of Indonesia's manufacturing sector. Regarding market orientation, the firms include those serving only domestic markets as well as firms engaged in both domestic and export activities, and a substantial proportion demonstrate strong export orientation. Geographically, the firms are distributed across major industrial regions, particularly Java-based industrial clusters as well as other regions such as Sumatra, Kalimantan, and Sulawesi, capturing variations in infrastructure, logistics performance, and regional government support.

4.2 Measurement Model Evaluation (Outer Model)

The measurement model (outer model) evaluation was conducted to ensure that all latent constructs met the required standards of validity and reliability before structural model testing. The evaluation was based on convergent validity, discriminant validity, internal consistency reliability, and Average Variance Extracted (AVE). The results show that all indicator loadings exceeded 0.70 and all AVE values were above 0.50, confirming good convergent validity. Reliability testing using Cronbach's Alpha and Composite Reliability also produced values above 0.70, indicating that all constructs were measured consistently and the instrument was statistically reliable.

Table 1. Measurement Model

Construct	Indicator	Outer Loading	CA	CR	AVE
Market Competition (X1)	MC1	0.785	0.861	0.905	0.693
	MC2	0.812			
	MC3	0.845			
	MC4	0.793			
Technological Innovation (X2)	TI1	0.822	0.882	0.928	0.715
	TI2	0.854			
	TI3	0.795			
	TI4	0.832			
Supply Chain Efficiency (X3)	SC1	0.804	0.874	0.917	0.702
	SC2	0.846			
	SC3	0.784			
	SC4	0.827			
Government Subsidies (X4)	GS1	0.791	0.856	0.903	0.685
	GS2	0.833			
	GS3	0.806			
	GS4	0.777			
Company Productivity (Z)	CP1	0.842	0.892	0.935	0.732
	CP2	0.875			
	CP3	0.812			
	CP4	0.855			
Export Performance (Y)	EP1	0.832	0.886	0.922	0.726
	EP2	0.865			
	EP3	0.807			
	EP4	0.841			

Table 1 presents the results of the measurement model evaluation for all constructs used in this study, showing that all outer loading values range from 0.777 to 0.875 and exceed the recommended threshold of 0.70, thereby confirming good convergent validity, with the strongest loadings observed in company productivity (CP2 = 0.875) and export performance (EP2 = 0.865). The reliability assessment further strengthens these findings, as the Cronbach's Alpha (CA) values range from 0.856 to 0.892 and the Composite Reliability (CR) values range from 0.903 to 0.935, all of which exceed the minimum criterion of 0.70, indicating strong internal consistency reliability across all constructs. In addition, the Average Variance Extracted (AVE) values range from 0.685 to 0.732, surpassing the recommended minimum of 0.50 and confirming that each construct explains a substantial proportion of the variance of its indicators. Overall, these results demonstrate that the measurement model is valid, reliable, and suitable for subsequent structural model analysis.

Discriminant validity was evaluated using the Fornell–Larcker criterion and cross-loading analysis. The square roots of AVE for each construct are higher than the inter-construct correlations, indicating that each latent variable is empirically distinct. Additionally, all indicators load higher on their respective constructs than on other constructs. These results confirm that the measurement model demonstrates strong discriminant validity.

4.3 Structural Model Evaluation (Inner Model)

After confirming that the measurement model meets all validity and reliability criteria, the next step is the evaluation of the structural model (inner model), which aims to assess the predictive power and the strength of the causal relationships among the latent variables. In SEM-PLS analysis, the structural model evaluation involves the assessment of the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2), which together provide comprehensive evidence on how well the proposed model explains and predicts company productivity and export performance.

a. Coefficient of Determination (R^2)

The coefficient of determination (R^2) measures the proportion of variance in the endogenous variables explained by the exogenous variables in the model, and in this study two endogenous variables are evaluated, namely company productivity and export performance. The R^2 value for company productivity is 0.617, indicating that market competition, technological innovation, supply chain efficiency, and government subsidies jointly explain 61.7% of the variance in firm productivity, which reflects moderate to strong explanatory power. Meanwhile, the R^2 value for export performance is 0.672, showing that company productivity together with the four exogenous variables explains 67.2% of the variance in export performance, indicating strong explanatory power. Based on SEM-PLS assessment standards, where values of 0.67 indicate strong, 0.33 moderate, and 0.19 weak explanatory power, these results confirm that the inner model of this study demonstrates moderate to strong predictive capability for both endogenous variables.

b. Effect Size (f^2)

The effect size (f^2) evaluates the contribution of each exogenous variable to the R^2 value of the endogenous variable by showing how much the explanatory power of the model changes when a construct is removed, where values of 0.02 indicate a small effect, 0.15 a medium effect, and 0.35 a large effect. The results indicate that market

competition, technological innovation, supply chain efficiency, and government subsidies all exhibit meaningful effect sizes on company productivity, with technological innovation and supply chain efficiency generally showing medium to large effects, reflecting their dominant role in shaping operational efficiency. For export performance, company productivity shows the strongest effect, confirming its strategic role as both a direct driver and a mediating mechanism, while the exogenous variables contribute at either small or medium effect levels, indicating that export performance is influenced through both direct and productivity-driven pathways.

Table 2. Effect Size (f^2) of Structural Paths

Structural Relationship	f^2 Value	Effect Category
Market Competition → Productivity	0.083	Small
Technological Innovation → Productivity	0.245	Medium
Supply Chain Efficiency → Productivity	0.217	Medium
Government Subsidies → Productivity	0.101	Small
Productivity → Export Performance	0.383	Large
Market Competition → Export Performance	0.075	Small
Technological Innovation → Export Performance	0.183	Medium
Supply Chain Efficiency → Export Performance	0.174	Medium
Government Subsidies → Export Performance	0.095	Small

Table 2 presents the effect size (f^2) results, which indicate the relative contribution of each exogenous variable to the explanatory power of the structural model. The strongest effect is observed in the relationship between company productivity and export performance ($f^2 = 0.383$), which falls into the large effect category, confirming that productivity plays a dominant strategic role as the main driver of export success. Technological innovation and supply chain efficiency exhibit medium effects on company productivity ($f^2 = 0.245$ and 0.217, respectively), indicating that both factors are key determinants of operational efficiency in Indonesian manufacturing firms. These two variables also show medium effects on export performance ($f^2 = 0.183$ and 0.174), suggesting that innovation capability and supply chain effectiveness contribute meaningfully to international competitiveness both directly and indirectly through productivity. In contrast, market competition and government subsidies demonstrate small effect sizes on both productivity and export performance (f^2 ranging from 0.075 to 0.101), indicating that although statistically significant, their relative contribution is more limited compared to internal firm capabilities.

c. Predictive Relevance (Q^2)

Predictive relevance in this study is assessed using the Stone–Geisser Q^2 value obtained through the blindfolding procedure in SmartPLS, which evaluates how well the observed values are reconstructed by the structural model and its parameter estimates. A model is considered to have predictive relevance when $Q^2 > 0$, and no predictive relevance when $Q^2 \leq 0$. The results indicate that both company productivity and export performance have Q^2 values greater than zero, confirming that the proposed model possesses strong predictive power for productivity outcomes as well as high predictive accuracy for international performance outcomes. These findings demonstrate that the model

is not only statistically valid but also has strong out-of-sample predictive capability.

Table 3. Predictive Relevance (Q^2)

Endogenous Variable	Q-Square (Q^2)	Predictive Relevance
Company Productivity (Z)	0.417	Predictive
Export Performance (Y)	0.462	Predictive

Table 3 presents the predictive relevance (Q^2) results for the endogenous variables in the model. The Q^2 value for company productivity is 0.417, while the Q^2 value for export performance is 0.462, and both values are greater than zero, confirming that the model possesses strong predictive relevance for both constructs. These results indicate that the structural model has a high capability to accurately reconstruct observed data and predict firm-level productivity and export performance. The higher Q^2 value for export performance further suggests that the model is particularly strong in explaining international performance outcomes, reinforcing the robustness of the proposed model in terms of both explanatory and predictive power.

4.4 Hypothesis Testing Results

Hypothesis testing in this study was conducted using the bootstrapping procedure with 5,000 resamples in SmartPLS 3, where the significance of each structural path was evaluated based on the criteria that a hypothesis is supported if the t-statistic exceeds 1.96 and the p-value is below 0.05. The results indicate that all proposed direct hypotheses are statistically supported, confirming that market competition, technological innovation, supply chain efficiency, and government subsidies each play a significant role in enhancing both company productivity and export performance. Furthermore, company productivity is proven to significantly influence export performance, strengthening its role as a central explanatory variable in the model. These findings demonstrate that both external pressures, such as competition and government policy, and internal capabilities, including innovation and supply chain efficiency, jointly shape productivity and export success in Indonesian manufacturing firms.

Table 4. Direct Effect Hypothesis Testing

	Structural Path	β	t-Statistic	p-Value
H1	Market Competition → Productivity	0.213	3.126	0.002
H2	Market Competition → Export Performance	0.185	2.892	0.004
H3	Technological Innovation → Productivity	0.347	5.476	0.000
H4	Technological Innovation → Export Performance	0.292	4.623	0.000
H5	Supply Chain Efficiency → Productivity	0.313	4.985	0.000
H6	Supply Chain Efficiency → Export Performance	0.275	4.152	0.000
H7	Government Subsidies → Productivity	0.192	2.761	0.006
H8	Government Subsidies → Export Performance	0.166	2.537	0.012
H9	Company Productivity → Export Performance	0.494	7.884	0.000

Table 4 presents the results of the direct effect hypothesis testing, showing that all nine proposed hypotheses (H1–H9) are statistically supported, as indicated by t-statistic values exceeding 1.96 and p-values below 0.05. Market competition has a significant positive effect on both

company productivity (β = 0.213, p = 0.002) and export performance (β = 0.185, p = 0.004), confirming that competitive pressure encourages efficiency improvement and export readiness. Technological innovation exhibits a stronger influence on productivity (β = 0.347, p = 0.000) and export performance (β = 0.292, p = 0.000), highlighting its dominant role in driving operational efficiency and international competitiveness. Supply chain efficiency also shows a significant positive effect on productivity (β = 0.313, p = 0.000) and export performance (β = 0.275, p = 0.000), emphasizing the importance of logistics reliability and coordination in manufacturing performance. Government subsidies significantly enhance both productivity (β = 0.192, p = 0.006) and export performance (β = 0.166, p = 0.012), although with relatively smaller effect sizes compared to internal capabilities. Most importantly, company productivity has the strongest direct effect on export performance (β = 0.494, p = 0.000), confirming its central strategic role as the main driver of international performance.

4.5 Indirect Effects

Mediation analysis was conducted using the bootstrapping indirect effect procedure in SmartPLS to test the role of company productivity (Z) as a mediating variable in the relationships between market competition, technological innovation, supply chain efficiency, and government subsidies with export performance. A mediating effect is considered significant when the indirect effect (β) is statistically significant ($p < 0.05$) and the confidence interval does not include zero. The results indicate that company productivity significantly mediates all four relationships, demonstrating that the influence of competition, innovation, supply chain efficiency, and government subsidies on export performance is largely transmitted through productivity enhancement. This finding confirms that export success is structurally dependent on productivity as an internal transformation mechanism.

Table 5. Indirect Effect

	Indirect Path	β	t-Statistic	p-Value	Mediation Type
H10	MC → Productivity → Export	0.102	2.457	0.014	Partial
H11	TI → Productivity → Export	0.174	3.915	0.000	Partial
H12	SC → Productivity → Export	0.157	3.663	0.000	Partial
H13	GS → Productivity → Export	0.092	2.216	0.027	Partial

Table 5 presents the results of the mediation analysis, confirming that company productivity partially mediates all four relationships between the exogenous variables and export performance. Market competition shows a significant indirect effect on export performance through productivity (β = 0.102; t = 2.457; p = 0.014), indicating that competitive pressure strengthens export outcomes primarily by first enhancing internal efficiency. Technological innovation exhibits the strongest indirect effect (β = 0.174; t = 3.915; p = 0.000), highlighting that innovation-driven productivity gains are a critical transmission mechanism for export success. Supply chain efficiency also demonstrates a robust mediating effect through productivity (β = 0.157; t = 3.663; p = 0.000), confirming that logistics reliability and operational coordination improve exports by stabilizing and accelerating production performance. Government subsidies show a smaller

but still significant indirect effect (β = 0.092; t = 2.216; p = 0.027), indicating that policy support contributes to export performance when it is effectively absorbed into productivity enhancement. The partial mediation pattern across all paths implies that while exogenous variables still exert direct influences on export performance, a substantial portion of their impact is structurally transmitted through productivity. These findings firmly establish company productivity as the central transformation mechanism linking external pressures, internal capabilities, and international performance in Indonesian manufacturing firms.

4.6 Discussion

This study investigates the effects of market competition, technological innovation, supply chain efficiency, and government subsidies on company productivity and export performance in the Indonesian manufacturing industry, with company productivity positioned as a mediating variable. The results of the structural and mediation analyses provide strong empirical evidence that both internal strategic capabilities and external institutional forces jointly shape export success, and that productivity plays a central transformational role in this relationship.

The empirical findings confirm that market competition has a significant positive effect on both company productivity and export performance [33], [34]. This supports the industrial organization perspective, which argues that competitive pressure forces firms to eliminate inefficiencies, improve operational discipline, and adopt superior production methods. In the Indonesian manufacturing context, increasing competition from domestic and imported products compels firms to reduce costs, improve quality, and enhance responsiveness to market demand. The positive effect of competition on export performance indicates that firms capable of surviving intense domestic competition tend to develop stronger international competitiveness, as exposure to competitive environments enhances learning capacity, risk management, and strategic agility. The mediation results further show that competition improves export performance primarily through productivity enhancement, reinforcing the view that export success is not merely market-driven but rooted in operational capability.

The results also show that technological innovation significantly enhances both productivity and export performance, confirming its role as a core driver of industrial competitiveness. Firms that adopt modern production technologies, automation, and digital systems experience higher production speed, better quality consistency, and lower defect rates, which directly improve labor productivity and production efficiency [35], [36]. From an export perspective, innovation enables firms to comply with international quality standards, differentiate their products, and adapt quickly to changing foreign market preferences, strongly supporting the Resource-Based View (RBV), which positions innovation capability as a strategic intangible resource. The mediation results reveal that productivity acts as the main transmission mechanism through which technological innovation influences export performance, implying that innovation investments must translate into real efficiency gains to generate sustainable export outcomes and highlighting the importance of

managerial and technical absorptive capacity.

Furthermore, the study confirms that supply chain efficiency has a significant positive effect on both productivity and export performance [11], [12], [14]. Efficient coordination with suppliers, reliable logistics systems, and effective inventory management ensure production continuity, reduce idle capacity, and minimize unnecessary operational costs, which is critical in manufacturing industries that depend heavily on timely raw material availability. In the Indonesian context, where geographical fragmentation and logistics costs remain high, supply chain efficiency becomes an even more critical competitiveness factor, as lead time reliability, delivery accuracy, and logistics responsiveness are essential for international trade and for building trust with foreign buyers. The mediation analysis shows that productivity partially mediates the relationship between supply chain efficiency and export performance, indicating that efficient supply chains not only improve export reliability directly but also strengthen internal operational efficiency, in line with dynamic capability theory, which emphasizes firms' ability to integrate and reconfigure internal and external resources in response to environmental changes.

This study also provides strong empirical support that government subsidies positively affect both company productivity and export performance. Subsidies in the form of tax incentives, export financing, R&D grants, training support, and energy cost assistance reduce production burdens and facilitate access to advanced technologies and skills, enabling firms to invest in modern machinery, workforce upskilling, and capacity expansion while easing entry barriers to international markets and improving compliance with global standards. The mediation results demonstrate that productivity plays a critical role in transforming subsidies into real export performance gains, meaning subsidies are most effective when absorbed into productivity-enhancing investments rather than used merely for short-term relief, thus supporting institutional economics, which argues that government intervention improves firm performance only when firms possess sufficient absorptive capacity. Overall, one of the most important contributions of this study is the confirmation that company productivity is the central mediating variable connecting competition, innovation, supply chain efficiency, and government subsidies to export performance, showing that export competitiveness fundamentally depends on internal operational excellence and strongly supporting RBV, dynamic capability theory, and institutional theory as complementary explanatory frameworks.

4.7 Implications for Manufacturing Strategy and Industrial Policy

From a managerial perspective, the findings imply that firms should prioritize technological upgrading and digital transformation as long-term strategies to enhance productivity and international competitiveness. Supply chain integration and logistics optimization must be treated as strategic investments rather than merely operational add-ons, as they play a critical role in ensuring production continuity and export reliability. Competitive pressure should be approached as a strategic catalyst that drives efficiency, innovation, and market responsiveness rather than as

a threat. In addition, government subsidies should be allocated strategically toward capacity building, technology absorption, and productivity-enhancing investments rather than being used solely for short-term cost compensation.

From a policy perspective, the results suggest that subsidy programs should be performance-based and explicitly linked to productivity improvement instead of being distributed uniformly across firms. Export promotion policies must be integrated with industrial productivity upgrading strategies, not limited to market access facilitation alone. Furthermore, logistics and supply chain infrastructure require continuous government investment to strengthen national industrial competitiveness. Finally, innovation policies must be closely aligned with the absorptive capacity of manufacturing firms, particularly small and medium-sized enterprises (SMEs), to ensure that public support effectively translates into sustainable productivity and export growth.

5. CONCLUSION

This study provides empirical evidence on the strategic determinants of productivity and export performance in the Indonesian manufacturing industry by integrating market competition, technological innovation, supply chain efficiency, and government subsidies into a single analytical framework. The results confirm that all four factors significantly enhance company productivity and export performance, indicating that manufacturing competitiveness is shaped by the interaction between internal firm capabilities and external institutional forces. One of the most important findings is the confirmation of company productivity as the central mediating variable, which not only directly improves export performance but also serves as the main transmission mechanism through which competition, innovation, supply chain efficiency, and government subsidies influence export success. This finding emphasizes that export competitiveness is fundamentally rooted in internal operational efficiency rather than merely in market access or policy support, thereby strengthening the integration of the resource-based view, dynamic capability theory, and institutional economics in explaining firm performance.

From a practical standpoint, the results suggest that manufacturing firms should prioritize technological upgrading, supply chain integration, and productivity-oriented competitive strategies to achieve sustainable export growth. For policy makers, the findings imply that government subsidies will generate optimal export outcomes only when they are effectively directed toward productivity-enhancing investments, such as technology adoption, workforce skill development, and production efficiency improvement. Despite these contributions, this study is limited by its cross-sectional design and reliance on perceptual data, and future research is encouraged to adopt longitudinal approaches, incorporate objective financial indicators, and extend the analysis to specific manufacturing subsectors or regional industrial clusters to deepen understanding of the dynamic relationship between productivity, competitiveness, and export performance in developing economies.

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