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Influence of technology and government regulations on the competitiveness of the textile industry: Case study of Indonesia

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This paper promotes supply chain performance, sustainability, and Industry 4.0 integration to boost competitiveness. Indonesia's textile industry's competitiveness depends on many factors. Indigenous factors, technology, vertical integration, and global supply networks drive competitiveness. This study uses descriptive data to examine 143 textile workers in Indonesia and provides important context for the sector. It demonstrates that various factors, such as native elements, technical readiness, vertical integration, and global supply chain participation, impact the competitiveness of Indonesia's textile sector. The findings suggest that policymakers and industry leaders should take strategic actions to enhance competitiveness, including encouraging collaboration, technical advancement, and local enterprise, as well as investing in technology, vertical integration, and global networking. Despite its cross-sectional approach and contextual complexity, the study is believed to enhance the competitiveness of the global textile industry. Our guidelines help stakeholders make strategic decisions that utilize regional strengths, adopt cutting-edge technologies, and integrate into global supply networks. Subsequent studies can examine industry differences and how these links change. This research helps Indonesian textile industry stakeholders make competitive decisions.

1. Introduction

A few years ago, Indonesia's textile and textile product industry emerged as a significant sector in the national economy. The 2012–2035 National Industrial Development Plan's master plan paper contained it. Furthermore, it emerged as a key industry for fostering economic expansion. In the second quarter of 2021, the textile and textile product industry accounted for 6.1% of the processing industry's overall contribution. The textile and textile product industry has a labor absorption of 3.96 million people, spanning from upstream to downstream (Indonesian Textile Association, 2021). Furthermore, the textile industry constantly enhances the country's foreign exchange revenues by means of exports, which amounted to USD 10.55 billion (Indonesian Textile Association, 2021). The textile and textile product business has a significant impact on the national economy, as it contributes to foreign exchange through non-oil exports, provides employment opportunities, and meets local apparel demands (Susanto et al., 2017).

One strategy for obtaining the maximum utilization of domestic products is to follow the steps taken by the government to protect the national textile and textile product industry. This policy aims to increase import substitution, which refers to trade and economic policies that support the replacement of imported goods with domestically produced goods (Lee, 2005). Various countries also apply this policy to their respective sectors. For instance, developed economic countries like Australia, Canada, and several European nations implement a local content requirement strategy in the automotive industry. (Veloso, 2006). This policy sets local component proportions for final products. This policy is also capable of supporting the strategic programs of

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the government, such as the development of the textile and textile product industry. Nagar (2016) stated that the major objective of the local content requirement policy is to protect domestic producers, create jobs, and increase product exports. In addition, the local content requirement policy for manufactured products can increase technology use, create added value, increase welfare, and create a value chain for the domestic industry (Ernst & Young, 2013; Ovadia, 2016; Ramdoo, 2016; Stone, 2015).

Bangladesh serves as a notable example of a nation that has achieved considerable progress in advancing its textile and textile product industry. According to Weiss & Seric (2021), the adoption of the local content requirement policy played a crucial role in significantly enhancing the performance of the textile sector in Bangladesh. This is evident in the substantial increase in the share of textile product exports, rising from 4% in 1983/1984 to 82% in 2015/2016. Morgan & Nauwelaers (1999) and OECD (2013) have confirmed a direct correlation between the local content requirement policy and technological progress. There is an expectation of a boost in domestic technology development as businesses aim to meet the escalating demand for local products. However, contrasting opinions exist, with some experts contending that there is no link between the local content requirement legislation and technological advancement. Shearmur and Bonnet (2011) argued that the growth of indigenous technology is not correlated with the production of local goods. Factors such as market access, industrial structure, and a country's economic scale significantly influenced the expansion of local content.

Moreover, the advantage is not solely dependent on a single component for achieving competitiveness. It is essential to consider other factors that may have a significant impact, such as technical readiness, vertical integration, and the global supply chain. Dosi and Soete (1983) argued that the overall structure and limits of economic processes are strongly influenced by the technological landscape, which refers to the disparities in accessible production techniques and product technologies on an international scale. Also, Dosi and Soete (1983) suggested that technological gaps are the prevailing characteristic of an international economic system characterized by the process of technological learning, innovation, and imitation along the paths of technological progress. This concept consistently resulted in the more effective utilization of labor and capital, as well as the introduction or enhancement of items in the realm of consumption.

Entities with more advanced technology can gain a competitive advantage by effectively optimizing vertical integration. For example, Balakrishnan and Wernerfelt (1986) suggested that the frequency of technical development and the intensity of competition interact to determine the most suitable level of integration. Various countries and organizations have developed their own methods for assessing technological readiness, such as the Technology Readiness Level (TRL) established by NASA, the Technology Readiness Level specified in the Regulation of the Minister of Education of the Republic of Indonesia Number 42 2016, and the Singapore Smart Industry Readiness Index created by the Singapore Economic Development Board. Vertical integration is a significant factor in determining levels of competitiveness. Hart and Tirole (1988) observed that vertical integration changes the dynamics of competition in both upstream and downstream sectors, providing a significant competitive advantage.

Lin et al. (2014) also affirmed the significant significance of vertical integration. The authors stated that vertical integration allows a manufacturer to expand its operating scope to include product selling, thus strengthening its control over the demand side. The global supply chain is another influential aspect in influencing the level of competitiveness. Kiyota et al. (2017) found that countries that effectively address challenges in their supply chain can significantly improve their competitiveness and create employment opportunities, leading to higher real income levels. Global supply chain participants have the potential to operate with high efficiency. Bhatnagar and Himani (2012) defined global supply chain management as the efficient distribution of goods and services across a network of transnational firms (TNCs) aimed at maximizing profit and minimizing waste. They explored the relationship between local components, vertical integration, and technology readiness level (TRL) within the context of the global supply chain. The study also examined the impact of global supply chain intervention on competitiveness.

2. Literature Review and Hypothesis Development

The choice to use local components in supply chain management is a strategic measure taken by a corporation to ensure the sourcing of raw materials from the local region. Nguyen et al. (2020) highlight the significance of supply chain management in meeting the origin criteria of commodities, which has a substantial impact on operational efficiency, especially within the supply chain framework. In the textile business, it is essential to follow supply chain management strategies that encourage supply chain integration to successfully enter the global market and become part of the global supply chain. This will enhance their operational efficiency and overall performance, ultimately leading to sustainable development. Gereffi (1999) in (Smakman, 2003) research that engaging in global commodity chains is a crucial measure for enhancing the industry, as it enables enterprises and economies to benefit from a potentially dynamic learning process. Trade patterns are influenced by global, regional, and local (business and political) forces. Nevertheless, in order to partake in worldwide networks and supply chains, local businesses and industries must undertake certain measures to enhance their quality standards initially, so as to fulfill the essential criteria set by major corporations (such as international standards and minimal requirements).

The textile and textile product sector has transformed into a technologically advanced industry on a global scale. Therefore, it must focus on transitioning towards producing products with better value-added features in order to effectively compete in international markets (Gunathilake & Mel, 2016). According to Shearmur and Bonnet (2011), technological innovation in the textile and textile product business is an essential and beneficial component of government strategy. Nevertheless, the textile and textile product business necessitate a significant amount of cash, making it essential to engage in cutting-edge technology in order to attain a state of technological preparedness. Furthermore, to attain technological preparedness in the textile and textile product business, it is imperative to not only secure investment but also facilitate knowledge transfer from industrialized nations. Lan and Young (1996) identified a factor that impedes the transfer of hardware technology, thereby hindering technological readiness. This factor is the limited access of local companies to information about their product/equipment and suppliers, resulting from their isolation from international networks. This obstacle is associated with impediments to accessing information. Hence, the absence of technological expertise in the development of indigenous components will result in suboptimal technological preparedness.

Ivarsson and Alvstam (2005) argue that technology transfer mostly revolves around inter-firm ties between business partners within specific local settings. This situation necessitates empirical research that specifically examines the transfer of technology to local suppliers. This transfer occurs because of the routine manufacturing and assembly activities carried out by foreign multinational corporations (TNCs) in the developing countries where they are operating. Most local purchases are made by suppliers who are closely connected to the original source. The transfer of knowledge from developed countries to developing countries primarily occurs through the links formed between local enterprises during routine production operations. Moreover, fostering the growth of local components can also serve as a catalyst for vertical integration. According to Hamdaoui and Bouayad (2019), vertical integration refers to a company's inclination to adopt the most effective organizational structure for coordinating production. The motivation for vertical integration is to enhance economic efficiency by internalizing tasks, which leads to significant cost savings. Vertical integration often leads to improved economic efficiency by addressing market failures.

According to Hamdaoui and Bouayad (2019), the term of vertical integration encompasses several interpretations that corporations frequently choose to internalize specific operations rather than relying on external parties. This integration takes place when the structure comprises two production steps. Specifically, all production that occurs earlier in the process is utilized as input for the subsequent step, and the earlier stage fulfills all the requirements of the later stage. Many major corporations now recognize that managing pricing for their products may be more effectively achieved through vertically integrated operations rather than relying on an independent clothes manufacturer. Backward integration can help reduce reliance on imported raw materials by producing inputs domestically, thus taking advantage of the industry's maturity. While the development of local components can promote vertical integration and allow businesses to control costs at various points in the supply chain, maintain profitable margins, and meet consumer price expectations, it is crucial to acknowledge the potential drawbacks and challenges that come with this strategy. Vertical integration can result in heightened competition and the possibility for abuse of market power, as companies strive to broaden their market reach and obtain a competitive edge. Furthermore, the effectiveness of vertical integration relies on the sector and the level of regulatory oversight it faces. Within the framework of worldwide supply chains, manufacturers may encounter political and competitive forces that compel them to augment local production, expand job opportunities in their respective nations, and diminish reliance on sources that are viewed as precarious. These criteria indicate that whereas local components and vertical integration might provide certain benefits, they also entail possible hazards and obstacles that require careful consideration (Gunathilake & Mel, 2016).

2. Research methodology

2.1 Design and sample

The objective of this study, which employs a quantitative research approach, is to gather empirical data in order to assess the local component and vertical integration to the global supply chain of the Indonesian textile industry's global competitiveness. Quantitative approaches provide rigorous statistical analysis that yields meaningful results by allowing numerical data to accumulate. The owners of textile businesses in Indonesia are the subject of this study. These companies were chosen through purposeful sampling according to a set of standards, which included: (1) Indonesian industry participation, (2) Taking part in import and export, and (3). The author is aided in gathering data by enumerators who are trained beforehand to equalize perceptions. The author uses both offline and online questionnaires as part of the random sample approach employed in this study's survey procedure. The areas of each province with a textile industry—Jakarta, Bandung, Semarang, Purwakarta, Subang, Tangerang, and Bali—were the subject of offline surveys. In the meantime, provinces and regions where offline surveys were not conducted did online questionnaires. The author spoke with experts in economics and entrepreneurship who have a wealth of indexed research, including Scopus, before distributing the questionnaire. There were two iterations to this discussion. Data on vertical integration, technological preparedness, local component utilization, competitiveness perceptions, and global supply chain were gathered using a standardized questionnaire. A Likert scale ranging from 1 to 5 was employed to measure attitudes and perceptions, while closed-ended questions were utilized to enable quantitative analysis. Questionnaires for the study were distributed beginning on November 10, 2022, and finished on March 03, 2023. Ultimately, 143 data were obtained because of the diligent work of the writers and enumerators.

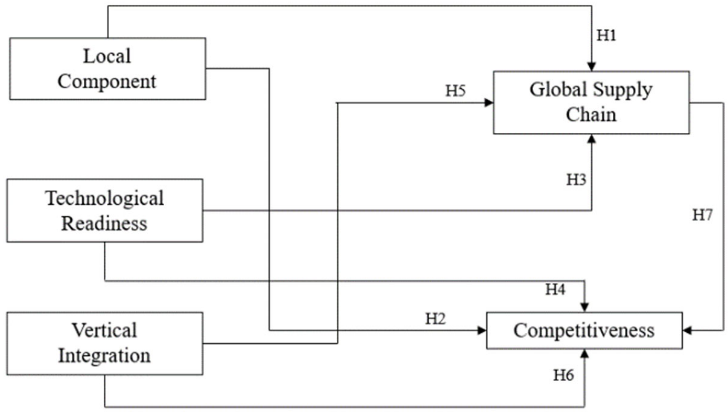

Fig. 1. Research Framework and Hypotheses

The study data were analyzed using partial least squares (PLS-SEM), a statistical method that combines structural equation modeling with partial least squares. The PLS-SEM analysis was performed using SMARTPLS version 4. The Confirmatory Factor Analysis (CFA) approach was used to validate the study's findings. This study ensures the strength and reliability of the model design and latent variable indicators by utilizing a solid theoretical framework that has been proven in previous research. An essential step in the two-stage analysis process of the PLS-SEM approach is to carefully examine both the outer and inner models. The validity and coherence of the constructs used to create the survey instrument indicators were verified using various statistical analyses in the outer model. The data provided was evaluated and validated by experts in the field. The feedback forms were scrutinized to further assess the study's validity and reliability. This study assessed both the discriminant and convergent validity, as well as examined the variance inflation factor (VIF), Heterotrait-to-Monotrait ratio (HTMT), and average variance extracted (AVE). In addition, the data's reliability was evaluated using Cronbach's alpha and composite reliability. The study's instruments showed a satisfactory level of reliability. The literature reports a dependability level of 0.7 (Hair et al., 2017; Ringle et al., 2012). According to the current investigation, the reliability value of each item is above the predetermined criterion. An internal or structural review was conducted to assess the accuracy of the conceptual model in estimating the variance of the independent variables. This was achieved by utilizing four measurement analyses. The R-square (R^2) value, which measures the coefficient of determination, was used to assess the significance of the combined impact of the exogenous and endogenous factors. A subset of 5,000 individuals underwent the bootstrap technique to determine the statistical significance of the direct and indirect path coefficients. A result below 0.1 in this assessment signifies a statistically significant correlation between latent variables. The t-statistic, commonly known as the p-value, is used to assess the degree of significance. The Goodness of Fit analysis was utilized to assess the accuracy and effectiveness of both the comprehensive measurement and the structural model. This study assessed the resilience of the Chi-Square ratio, NFI (Normed Fit Index), and SRMR (Standardized Root Mean Square Residual) values.

3. Results

3.1 Exemplary Standards in SEM-PLS

The research commenced by employing descriptive statistics to characterize the 143 individuals that constituted the sample for this study. The sample's demographic profile provides crucial contextual information for examining the study's findings. The insights obtained are likely to reflect the overall situation of the Indonesian textile industry because of the diverse representation of gender, age, educational background, work function, experience, and company size. The study's robustness is strengthened by the inclusivity of its demographics, making its findings more relevant to the broader industry. A total of 143 textile industries were selected for this study, following the recommendation by Hair et al. (2018) to increase the number of indicators by a factor of five to ten to enhance the statistical power and reliability of the analysis. A decision was made to increase the total number of indicators in this study by a factor of 10, resulting in a minimum sample size of 120. Among the initial sample of 150 individuals who were given a questionnaire, 7 individuals did not provide cooperative responses, while the remaining 143 individuals answered all the questions cooperatively. The sample population exhibited a heterogeneous gender distribution, with 45% of respondents identifying as female and 55% identifying as male. The ages of the responders varied significantly among the divisions. Among the participants, a significant majority (38%) were aged between 30 and 40, but a considerable number fell between the age ranges of 41 to 50 (28%) and 51 to 60 (20%). Based on the educational backgrounds of the respondents, the sample consisted of individuals with a high level of education, with the majority having obtained bachelor's degrees (45%) and master's degrees (30%). The participants in the study have diverse employment profiles, with 22% of the sample consisting of R&D professionals and the largest group (42%) holding managerial positions. Approximately 40% of the participants possess a tenure ranging from 10 to 20 years, whereas an additional 30% have accumulated over 20 years of experience, as indicated by the distribution of years of experience within the textile industry. The represented organizations in the sample varied in size: large corporations constituted 40% of the sample, while medium-sized companies accounted for 25%, and small and medium-sized enterprises (SMEs) made up 35%.

Table 1
Measurement Model Test

Variable	Indicators	Code	Loading Factor	Outer VIF
Local Component (LCP)	Cronbach's Alpha 0.846, Composite Reliability 0.896 and AVE 0.684.			
	Domestic Component	LCP.1	0.794	1.5.84
		LCP.2	0.867	2.414
	Overseas Component	LCP.3	0.873	2.498
		LCP.4	0.769	1.730
Technological Readiness (TCR)	Cronbach's Alpha 0.844, Composite Reliability 0.894 and AVE 0.677.			
	Application of Digitalization,	TCR.1	0.841	2.184
	Intelligent Machine Usage	TCR.2	0.833	2.169
	Network Connectivity	TCR.3	0.808	1.635
	Cyber Security Guarantee	TCR.4	0.810	1.739
Vertical Integration (VCI)	Cronbach's Alpha 0.882, Composite Reliability 0.919 and AVE 0.740.			
	Input has been fulfilled from within the country	VCI.1	0.851	2.627
		VCI.2	0.919	1.630
	Control of Finished Goods distribution Channels	VCI.3	0.863	2.382
		VCI.4	0.804	1.846
Global Supply Chain (GSC)	Cronbach's Alpha 0.919, Composite Reliability 0.934 and AVE 0.639.			
	Connect with many Buyers and Suppliers on Global Level	GSC.1	0.825	2.285
		GSC.2	0.845	1.860
	Able to send various types of goods	GSC.3	0.717	1.795
		GSC.4	0.839	2.267
	Healthy Requests and Offers	GSC.5	0.810	2.640
		GSC.6	0.772	2.177
	Sending Goods at optimal Speed	GSC.7	0.825	2.472
		GSC.8	0.753	2.174
Competitiveness (COM)	Cronbach's Alpha 0.890, Composite Reliability 0.916 and AVE 0.646.			
	Net Exports and International Market Growth	COM.1	0.776	1.893
		COM.2	0.791	1.918
	Innovation and Technology	COM.3	0.745	1.737
		COM.4	0.856	2.551
	Product Quality and Sustainability	COM.5	0.856	2.668
		COM.6	0.794	2.060

Source : Data processing results from the author (2023)

The validity and reliability of the measurement model were assessed using Confirmatory Factor Analysis (CFA). This study examined the relationship between measurable variables and their corresponding concepts. The findings validated the appropriateness of the chosen measurement model, as evidenced by notable factor loadings (>0.70) and satisfactory levels of convergent and discriminant validity, as demonstrated by an AVE (>0.50). For each construct, Cronbach's alpha and Composite Reliability values indicated satisfactory internal consistency when they exceeded 0.70. The study analyzed several indicators, such as Competitiveness (COM), Global Supply Chain (GSC), Technology Readiness (TCR), Vertical Integration (VCI), and Domestic and Overseas Components. This analysis involved examining the variance inflation factor (VIF), Heterotrait-to-Monotrait ratio (HTMT), factor loadings, outer VIF, local component (LCP), Cronbach's Alpha, composite reliability, and average variance extracted (AVE). The data shows that the LCP had factor loadings ranging from 0.769 to 0.873, showing a high correlation with each component. The TCR exhibited strong internal consistency and reliability, as evidenced by its average variance extracted (AVE) of 0.677, composite dependability of 0.894, and Cronbach's Alpha of 0.844. The VCI displayed strong reliability and validity, as indicated by its composite reliability score of 0.919, average variance extracted (AVE) of 0.740, and Cronbach's Alpha coefficient of 0.882. The GSC had strong internal consistency and reliability, as seen by its Average Variance Extracted (AVE) value of 0.639, composite reliability of 0.934, and Cronbach's Alpha coefficient of 0.919. The validity and reliability of the COM measure were demonstrated by its composite dependability of 0.916, average variance extracted (AVE) of 0.646, and Cronbach's Alpha coefficient of 0.890.

Table 2
Internal Variable Index

Variable	Global Supply Chain	Competitiveness
Local Component	2.124	1.983
Technological Readiness	1.827	2.212
Vertical Integration	1.938	1.832
Global Supply Chain		2.012

Source : Data processing results from the author (2023)

According to (Jarvis et al., 2003), a desirable result is obtained when the outer VIF statistic obtained from the measurement model is below the threshold of 5, demonstrating the absence of considerable multicollinearity. The results have verified the appropriateness of the chosen measurement model, as evidenced by substantial factor loadings (>0.70) and good levels of both convergent and discriminant validity, with an average variance extracted (AVE) exceeding 0.50. The study also assessed the internal VIF values to address multicollinearity issues and found that the variables did not exhibit statistically significant multicollinearity. The analysis included various indicators such as Competitiveness, Global Supply Chain, Technology Readiness, Vertical Integration, and Local Component Utilization, and the results demonstrated satisfactory outcomes for each component, including strong factor loadings, reliability, and validity.

The model presented in this study demonstrates satisfactory convergent validity. The internal VIF values, presented in Table 2 and below 3.00, indicate no significant multicollinearity. The HTMT ratio, used to assess discriminant validity, shows robust pairwise correlations at the top of each column, indicating a significant level of discriminant validity (Hair et al., 2018). This finding aligns with the Fornell/Larcker criterion (Hair et al., 2017; Sarstedt & Wilczynski, 2009). The results of the investigations related to HMTH are presented in Table 3.

Table 3
Discriminant Validity

	COM	GSC	LCP	TCR	VCI
COM					
GSC	0.423				
LCP	0.329	0.373			
TCR	0.343	0.339	0.412		
VCI	0.329	0.438	0.398	0.357	

Source : Data processing results from the author (2023)

The study findings suggest that corporate competencies, the external business environment, and organizational performance all positively and significantly influence the co-creation strategy. The results support the conclusions of prior research, which found that having excellent corporate skills is crucial for companies to achieve higher levels of performance and efficiently navigate the external business environment. The study findings suggest that the corporate competencies, external business environment, and organizational performance all exert a positive and substantial influence on the co-creation approach. The results of this study support the conclusions of prior research, which found that having excellent corporate skills is crucial for companies to achieve higher levels of performance and efficiently navigate the external business environment.

3.2 Model Fit Evaluation

Fit indices are utilized to evaluate the overall adequacy of the structural equation model. The model's adequacy was evaluated using several indices, such as the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Normed Fit Index (NFI). The results indicated a satisfactory fit, with NFI, TLI, and CFI scores surpassing the recommended thresholds, and RMSEA falling below the recommended threshold. The structural equation model effectively captures the correlation between the utilization of local components, technical readiness, vertical integration, and global competitiveness in the Indonesian textile sector, as evidenced by the significant values of many fit indices. These results offer confidence in the model's projected precision and the relevance of the research to a broader spectrum of sectors. The R-squared number provides an indication of the proportion of variance accounted for by the endogenous constructs in the structural equation model. A higher R-squared value indicates that the model has a greater ability to account for fluctuations in the dependent variable. The R-squared score of 0.544 for global supply chain utilization suggests that 54% of the variability in local component usage can be accounted for by the external factors incorporated in the model. The competitiveness variable exhibits an R-squared value of 0.63, signifying that the exogenous factors included in the model account for 63% of the variation seen in vertical integration. The Q^2 metric is employed to evaluate the predictive validity and durability of the structural model. A positive Q^2 score signifies the model's ability to accurately forecast outcomes. The positive Q^2 value of 0.48 for the global supply chain indicates the model's predictive relevance. The positive Q^2 score of 0.392 for competitiveness demonstrates the model's predictive efficacy.

3.3 Trial of Bootstrapping

Bootstrapping was employed in the process of inner model analysis to validate assumptions. To assess the applicability of the structural model while maintaining data stability, a total of 5,000 subsamples were analyzed (Hair et al., 2017). The exploratory study utilized significant levels ranging from 5% to 10%, which are widely recognized as meaningful thresholds in the field of management and economics research.

Table 4
Hypothesis Examination

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic	p-Values
LCP → GSC	0.475	0.499	0.111	4.263	0.000
LCP → COM	0.215	0.221	0.090	2.557	0.004
TCR → GSC	0.234	0.239	0.082	2.619	0.003
TCR → COM	0.627	0.618	0.086	7.296	0.000
VCI → GSC	0.276	0.289	0.074	3.745	0.000
VCI → COM	0.415	0.415	0.079	5.286	0.000
GSC → COM	0.941	0.957	0.085	11/033	0.000

Source : Data processing results from the author (2023)

The study included a total of seven hypotheses. As shown in Table 4, all the t statistics have values exceeding 1.96, indicating that the outcomes are reliable (Hair, 2019). Here are the summarized points:

1. A p-value of 0.000, which is less than the conventional significance level of 0.05, indicates a statistically significant association. The calculated t-statistic value of 4.263 shows a significant difference between the sample mean and the hypothesized population mean, supporting the idea that the utilization of local components contributes to the overall efficiency of the global supply chain.
2. A p-value of 0.004 is considered statistically significant when it is smaller than 0.05. The sample mean significantly deviates from the hypothesized population mean, as evidenced by the positive t-statistic (2.557), supporting the notion that the incorporation of indigenous components enhances competitiveness.
3. A p-value of 0.003 is considered statistically significant because it is below the threshold of 0.05. The positive t-statistic (2.619) provides evidence for the idea that technical preparation has a significant positive effect on global supply chains.
4. A p-value of 0.000 is considered statistically significant when it is smaller than 0.05. Technical readiness has a significant impact on competitiveness, as indicated by the positive t-statistic (7.296).
5. A p-value of 0.000 is considered statistically significant when it is smaller than 0.05. The positive t-statistic (3.745) provides evidence for the notion that vertical integration has a significant positive impact on global supply chains.
6. A p-value of 0.000 is considered statistically significant when it is smaller than 0.05. The idea that vertical integration improves competitiveness is well supported by the t-statistic of 5.286.
7. A p-value of 0.000 is considered statistically significant when it is smaller than 0.05. The notion that a firmly structured worldwide supply network enhances competitiveness is strongly corroborated by the positive t-statistic (11.033).

All hypotheses yielded statistically significant findings when the p-values were below 0.05. The calculated t-statistic value is positive, indicating a significant difference between the sample mean and the anticipated population mean. These results provide a strong basis for affirming the acceptance of hypothesis H1-H7 as stated in our conceptual model literature. Additionally, they illustrate the correlation between the utilization of local components, technological preparedness, vertical integration, global supply chain, and competitiveness within the Indonesian textile sector.

4. Discussion

4.1 Utilizing Local Components as a Major Competitive Advantage

The discussion on expanding the domestic industry is consistent with the positive impact of using local components on global supply chains and competitiveness. The indices of domestic and international component use, which are associated with the use of local components, support the findings of this study. Prior research, notably studies by Ghani et al. (2023) and Pratono (2023), has emphasized the importance of local sourcing in strengthening a nation's economic resilience. This supports the assertion that a strong local component base enhances the overall competitiveness of Indonesia's textile sector, as well as the global supply chain of the country. Indonesia's textile sector, which boasts a robust local component base, demonstrates a high level of competitiveness in general. The sector consists mainly of small and medium-sized firms (SMEs), which are regarded as the fundamental support of the Indonesian economy (Qurtubi et al., 2022). It is imperative to bolster the competitiveness of these small and medium-sized enterprises (SMEs) since they have a pivotal role in the nation's economic expansion and progress. The Indonesian textile sector, known for its strong local component base, is well-positioned to capitalize on the benefits of using local components in global supply chains and competitiveness. Improving supply chain performance is crucial since it governs the flow of commodities, information, and money within the supply chain (Chairiena, 2021). In addition, the Indonesian government has prioritized boosting domestic consumption by increasing the procurement of local products (Sarasi et al., 2023). In recent years, the sector has started to acknowledge and address sustainability issues, specifically in relation to small and medium-sized firms (SMEs) (Chatchawanchanchanakij et al., 2023). In addition, the textile industry has experienced advantages from the implementation of Industry 4.0 in relation to sustainable supply chain management (SSCM) (Suradi et al., 2020). Overall, improved supply chain efficiency, a strong local component base, and sustainable business practices contribute to the increased competitiveness of Indonesia's textile sector.

4.2 Technology as a Spark for Global Integration and Innovation

The study's beneficial effects on international supply chains and competitiveness are consistent with the indicators that show technological readiness as a significant determinant. These studies have looked at how technology is changing international industries and have emphasized how industries must keep up with technological advancements in order to remain competitive. The results further support the idea that industries hoping to be competitive and integrate into the global order must be technologically ready. It is not only a luxury. Industries that want to be competitive and integrate into the global order must be prepared technologically (Blut & Wang, 2020). The technology may not live up to the original hype, therefore it's critical to evaluate an organization's readiness for adoption before implementing it (Sharma & Venkatraman, 2023). One concept that aids in understanding people's inclination to embrace and utilize cutting-edge technologies is the technology readiness index (TR) (Kumari et al., 2022). Technology readiness level (TRL) is a technique that helps organizations make decisions regarding technology and product development by informing management about the readiness of technologies that are under development (Lavoie & Daim, 2018). Determining whether a technology can be manufactured and whether it satisfies quality standards are two aspects of evaluating technology readiness (Ardilio et al., 2015).

4.3 Vertical Integration as a Benefit to Operations

Vertical integration has several advantages, including increased industry capacity investment, consumer surplus, and overall welfare. It also leads to reduced internal competition and higher efficiency in capital allocation. Vertical integration is a strategic approach that enables a corporation to optimize its operations by directly acquiring and controlling different phases of its production process, instead of depending on external contractors or suppliers. Vertical integration can be accomplished by companies through the acquisition or establishment of their own suppliers, manufacturers, distributors, or retail outlets, instead of relying on outsourcing. Vertical integration enables a corporation to decrease expenses, enhance operational effectiveness, and exert greater authority over its supply chain. But it can also be an expensive mistake if it's done badly or without a clear reason (Brown & Sappington, 2022; Gedro et al., 2020). Furthermore, due to social preferences and limited reasoning, departures from theory may occur, resulting in competitors encountering confinement concerns (Devos & Li, 2021). Additionally, vertical integration has been considered a strategic mechanism that can improve cost efficiency and operational effectiveness, thereby strengthening the industry's position in the face of global competition (Tabim et al., 2021). The decision to participate in vertical integration is influenced by various factors, such as the substitutability of competing products and the potential effect on consumer surplus and societal welfare (Chou, 2021). Empirical evidence suggests a good correlation between vertical integration and global supply chain competitiveness.

4.4 Worldwide Supply Chain Links Various Markets

The role of global supply chain indicators in enhancing competitiveness has been demonstrated by several studies. These studies have emphasized the importance of global connectivity for businesses seeking sustainable growth. The advantages of robust global supply chains align with the broader discourse on global trade and economic interdependence (Białowąs & Budzyńska, 2022; Schianchi, 2023; Singh et al., 2023). Global supply networks foster interdependence by facilitating the exchange of people, capital, goods, and services across nations (Lavassani & Movahedi, 2021). Furthermore, they have influenced the structure of production networks in the worldwide economy by replacing traditional local networks with modernized global production networks (Baah et al., 2022). Moreover, in order to get a competitive edge in trade and improve the ability to sell goods abroad, it is crucial for rising countries in the agriculture industry to become part of global value-added networks. The literature generally acknowledges the role of global supply chains in enhancing competitiveness and promoting sustainable growth. The present study contributes to the existing knowledge on the determinants of competitiveness in the textile industry by integrating insights from previous studies and confirming their findings. Previous research has emphasized the importance of global connectivity for businesses seeking sustainable growth and has influenced the structure of global production networks in the global economy by substituting traditional local networks with modernized global production networks. The comparative study enables a deeper understanding of the specific setting of the Indonesian textile sector. The study revealed a favorable correlation between local sourcing, technical preparation, vertical integration, participation in global supply chains, and competitiveness. These findings align with patterns observed in analogous sectors worldwide.

5. Implication

This study's consequences are wide-ranging, offering information to scholars studying the Indonesian textile sector as well as policy makers and industry stakeholders.

1. Policy Implications: To promote local component development, foster technical preparedness, and enable strategic vertical integration, policymakers should think about developing and enacting relevant legislation. The industry's general level of competitiveness may be raised by these actions.
2. Global Integration Strategy: Businesses should take advantage of the correlation that exists between competitiveness and engagement in global supply chains. Developing global integration tactics, such expanding market presence and forming international relationships, might be essential for ongoing success.
3. Technology Adoption: The report underscores the potential for technological preparedness to revolutionize competitiveness and global supply chains. To remain at the forefront of technological advancements, industry stakeholders must prioritize investments in cybersecurity, the deployment of smart machines, and digitization.
4. Local Component Development: Collaboration between policymakers and business leaders is essential to enhance the local component ecosystem. Initiatives that promote domestic procurement, support small vendors, and encourage research and development can strengthen the foundation of the sector.

6. Conclusion

Several variables impact the competitiveness of Indonesia's textile industry. Competitiveness strongly correlates with using indigenous resources, technological preparedness, vertical integration, and engagement in worldwide supply networks. Policy makers and business stakeholders should take note of the findings. The main priorities for policymakers should be to foster strategic alliances, encourage technical innovation, and assist regional businesses. It is recommended that industry leaders make technology investments, investigate avenues for vertical integration, and participate actively in international networks. This study adds to the conversation on global competitiveness in the textile industry despite certain limitations, such as its cross-sectional design and contextual specificity. These findings can be expanded upon in future studies by examining details unique to the industry and the dynamic nature of these connections over time. In summary, this research offers direction to those involved in the Indonesian textile sector, assisting them in formulating strategic choices that use regional advantages, adopt cutting-edge technologies, and effectively integrate into worldwide supply networks.

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References

Ardilio, A., Seidenstricker, S., & Schmitz, M. (2015). Measuring and Assessing Application-Specific Technology Readiness. *International Journal on Advanced Science, Engineering and Information Technology*, *5*(6), 475–480.
Baah, C., Acquah, I. S. K., & Ofori, D. (2022). Exploring the influence of supply chain collaboration on supply chain visibility, stakeholder trust, environmental and financial performances: a partial least square approach. *Benchmarking: An International Journal*, *29*(1), 172–193.
Balakrishnan, S., & Wernerfelt, B. (1986). Technical Change, Competition, and Vertical Integration. *Strategic Management Journal*, *7*(4), 347–359.
Bhatnagar, V., & Himani, G. (2012). An Environmental Protection Tool: Green Marketing and Its Effect on Consumer Behaviour. *International Journal of Emerging Research in Management and Technology*, 19–23.
Białowąs, T., & Budzyńska, A. (2022). The importance of global value chains in developing countries' agricultural trade development. *Sustainability*, *14*(3), 1389.
Blut, M., & Wang, C. (2020). Technology readiness: a meta-analysis of conceptualizations of the construct and its impact on technology usage. *Journal of the Academy of Marketing Science*, *48*, 649–669.
Brown, D. P., & Sappington, D. E. M. (2022). Vertical integration and capacity investment in the electricity sector. *Journal of Economics & Management Strategy*, *31*(1), 193–226.
Chairiena, A. (2021). *The Impact Of Country Of Origin Image And Consumer Ethnocentrism Toward Purchase Decision Of Casual Apparel In Young Adult*. Sekolah Tinggi Manajemen IPMI.
Chatchawanchanchanakij, P., Jermsittiparsert, K., Chankoson, T., & Waiyawuththanapoom, P. (2023). The role of industry 4.0 in sustainable supply chain: Evidence from the textile industry. *Uncertain Supply Chain Management*, *11*(1), 1–10.
Devos, E., & Li, H. (2021). Vertical integration to mitigate internal capital market inefficiencies. *Journal of Corporate Finance*, *69*, 101994.
Dosi, G., & Soete, L. (1983). Technology Gaps And Cost-Based Adjustment: Some Explorations On The Determinants Of International Competitiveness. *Metroeconomica*, *35*(3), 197–222.
Ernst, & Young. (2013). *Value of Sustainability Reporting. A study by Ernst & Young LLP and the Boston College Center for Corporate Citizenship*.
Gedro, J., Allain, N. M., De-Souza, D., Dodson, L., & Mawn, M. V. (2020). Flattening the learning curve of leadership development: reflections of five women higher education leaders during the Coronavirus pandemic of 2020. *Human Resource Development International*, *23*(4), 395–405.
Gereffi, G. (1999). International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics*, *48*(1), 37–70. https://doi.org/10.1016/S0022-1996(98)00075-0
Ghani, E. K., Hye, Q. M. A., Rehan, R., & Salahuddin, S. (2023). Examining Capital Structure Determinants for ASEAN Energy Firms. *International Journal of Energy Economics and Policy*, *13*(3), 129.
Gunathilake, M., & Mel, W. D. (2016). Cost benefit Perspectives of Backward Vertical Integration: an Empirial Study on The Textile and apparel Industry On Sri Lanka. *Proceedings in Management, Social Sciences and Humanities, 9th International Research Conference-KDU, Sri Lanka*, 265–271.
Hair, J. F., Ringle, C. M., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modelling (PLS-SEM). 2e Edition*. SAGE Publications.
Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2018). When to use and how to report the results of PLS-SEM. *European Business Review*, *30*(1), 514–538.
Hamdaoui, M., & Bouayad, B. (2019). Determinants and Effects of Vertical Integration on the Performance of Moroccan Manufacturing. *ATHENS JOURNAL OF MEDITERRANEAN STUDIES*, *5*(1), 57–78. https://doi.org/10.30958/ajms.5-1-4
Hart, O. D., & Tirole, J. (1988). Contract Renegotiation and Coasian Dynamics. *The Review of Economic Studies*, *55*(4), 509. https://doi.org/10.2307/2297403
Indonesian Textile Association. (2021). *Textile Industry In Indonesia*.
Ivarsson, I., & Alvstam, C. G. (2005). Technology transfer from TNCs to local suppliers in developing countries: A study of AB Volvo's truck and bus plants in Brazil, China, India, and Mexico. *World Development*, *33*(8), 1325–1344. https://doi.org/10.1016/j.worlddev.2005.04.011
Jarvis, C. B., Mackenzie, S. B., Podsakoff, P. M., Giliatt, N., & Mee, J. F. (2003). A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research. *Journal of Consumer Research*, *30*(2), 199–218. https://doi.org/10.1086/376806
Kiyota, K., Oikawa, K., & Yoshioka, K. (2017). The Global Value Chain and the Competitiveness of Asian Countries. *Asian Economic Papers*, *16*(3), 257–281. https://doi.org/10.1162/asep_a_00573

Kumari, A., Schiffner, S., & Schmitz, S. (2022). SMART: a Technology Readiness Methodology in the Frame of the NIS Directive. *ArXiv Preprint ArXiv:2201.00546*.

Lan, P., & Young, S. (1996). International technology transfer examined at technology component level: a case study in China. *Technovation*, *16*(6), 277–286. https://doi.org/10.1016/0166-4972(96)00005-3

Lavassani, K. M., & Movahedi, B. (2021). Firm-level analysis of global supply chain network: role of centrality on firm's performance. *International Journal of Global Business and Competitiveness*, *16*(2), 86–103.

Lavoie, J. R., & Daim, T. U. (2018). Technology readiness levels enhancing R&D management and technology transfer capabilities: Insights from a public utility in Northwest USA. *International Journal of Transitions and Innovation Systems*, *6*(1), 48–61.

Lee, Y.-S. (2005). The Agreement on Safeguards. In *The World Trade Organization: Legal, Economic and Political Analysis* (pp. 749–798). Springer US. https://doi.org/10.1007/0-387-22688-5_18

Lin, Y.-T., Parlaktürk, A. K., & Swaminathan, J. M. (2014). Vertical Integration under Competition: Forward, Backward, or No Integration? *Production and Operations Management*, *23*(1), 19–35. https://doi.org/10.1111/poms.12030

Morgan, K., & Nauwelaers, C. (1999). Regional innovation strategies: The challenge for less favored regions. *Psychology Press*.

Nagar. (2016). *Earnings Management Strategies During Financial Distress*. IIM.

Nguyen, X. H., Doan, T. D. U., & Hoang, V. N. (2020). The impact of global supply chain management on performance: Evidence from Textile and garment industry. *Uncertain Supply Chain Management*, *8*, 17–26.

OECD. (2013). *The Relationship between Local Content, Internet Development, and Access Prices*.

Ovadia, J. S. (2016). Local content policies and petro-development in Sub-Saharan Africa: A comparative analysis. *Resources Policy*, *49*, 20–30. https://doi.org/10.1016/j.resourpol.2016.04.003

Pratono, A. H. (2023). Multiple flexible suppliers and competitive advantage during market turbulence: the role of digital capabilities. *Journal of Enterprise Information Management*.

Qurtubi, Q., Yanti, R., & Maghfiroh, M. F. N. (2022). Supply chain performance measurement on small medium enterprise garment industry: application of supply chain operation reference. *Jurnal Sistem Dan Manajemen Industri*, *6*(1), 14–22.

Ramdoo, I. (2016). *Local content policies in mineral-rich countries: An overview*.

Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). A critical look at the use of PLS-SEM in MIS quarterly. *MIS Quarterly: Management Information Systems*, *36*(1).

Sarasi, V., Primiana, I., Harsanto, B., & Satyakti, Y. (2023). Sustainable supply chain of Indonesia's textile & apparel industry: opportunities and challenges. *Research Journal of Textile and Apparel*, *June*. https://doi.org/10.1108/RJTA-08-2022-0091

Sarstedt, M., & Wilczynski, P. (2009). More for less? A comparison of single-item and multi-item measures. *Die Betriebswirtschaft*, *69*(2), 211. http://scholar.google.de/scholar?q=marko+sarstedt&btnG=&hl=de&as_sdt=0%2C11#1

Schianchi, M. (2023). IoT-based framework for agile supply chain in FMCG indus-tries–a solution for (post-) pandemic times. *International Journal of Innovation in Engineering*, *3*(1), 63–70.

Sharma, A., & Venkatraman, S. (2023). Towards a Standard Framework for Organizational Readiness for Technology Adoption. In *Advances in Digital Manufacturing Systems: Technologies, Business Models, and Adoption* (pp. 197–219). Springer.

Shearmur, R., & Bonnet, N. (2011). Does local technological innovation lead to local development? A policy perspective. *Regional Science Policy & Practice*, *3*(3), 249–270. https://doi.org/10.1111/j.1757-7802.2011.01040.x

Singh, K., Kaur, S., & Shalu, K. (2023). Changing Pattern of World Trade and Role of Global Supply Chains: Evidences from Recent Literature. *Gyan Management Journal*, *17*(2), 16–22.

Smakman, F. (2003). *Local Industry in Global Networks: Changing Competitiveness, Corporate Strategies and Pathways of Development in Singapore and Malaysia's Garment Industry*. University of Utrecht.

Stone, D. L. (2015). The Influence of Technology on The Future of Human Resource Management. *Human Resource Management Review*, *25*(2), 216–213.

Suradi, S., Mahrinasari MS, M., & Hasnawati, S. (2020). The mediating effect of strategic agility in the relationship of supply chain management activities and firm performance of the textile industry of Indonesia. *International Journal of Supply Chain Management*, *9*(3), 649–656.

Susanto, A., Daryanto, A., & Sartono, B. (2017). Strategy Selection To Increase Competitiveness Of Textile Industry With Anp-Bocr Approach. *Arena Tekstil*, *32*(1), 9–16.

Tabim, V. M., Ayala, N. F., & Frank, A. G. (2021). Implementing vertical integration in the industry 4.0 journey: which factors influence the process of information systems adoption? *Information Systems Frontiers*, 1–18.

Veloso, F. M. (2006). Understanding Local Content Decisions: Economic Analysis and An Application To The Automotive Industry. *Journal of Regional Science*, *46*(4), 747–772. https://doi.org/10.1111/j.1467-9787.2006.00476.x

Weiss, J., & Seric, A. (2021). Industrial policy: Clarifying options through taxonomy and decision trees. *Development Policy Review*, *39*(5), 773–788. https://doi.org/10.1111/dpr.12522