

## STRATEGIES FOR IMPLEMENTING LOCAL CONTENT REGULATIONS IN FIBER OPTIC CABLE MANUFACTURE: A CASE STUDY OF PT ZTT INDONESIA

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### Abstract

Local Content Requirement (LCR) policies are widely implemented to strengthen domestic industries, enhance value added, and support national economic development. In Indonesia, the mandatory minimum 40% LCR significantly affects strategic sectors, including the fiber optic cable industry, which plays a crucial role in national digital infrastructure. However, structural challenges persist, particularly the dependence on imported raw materials and the limited competitiveness of domestic suppliers. This study aims to analyze the benefits of LCR implementation, identify key challenges faced by PT ZTT Indonesia, and formulate strategic solutions to improve LCR compliance. This research adopts a qualitative case study approach using primary and secondary data, including interviews, observations, and company reports, analyzed through Fishbone and PDSA frameworks. The findings indicate that LCR implementation enhances access to government procurement, strengthens competitiveness, and fosters backward industrial linkages with local suppliers. However, major constraints include limited availability and quality of domestic raw materials, higher production costs, regulatory complexity, technological limitations, and logistical challenges. These factors create operational inefficiencies and hinder optimal LCR achievement. To address these challenges, strategic improvements are proposed, including supplier capacity development, technology upgrading, process optimization, and increased investment in research and development. Strengthening collaboration between industry, government, and suppliers is also essential to improve ecosystem readiness. In conclusion, effective LCR implementation requires an integrated and adaptive approach that aligns policy frameworks with industrial capabilities. Future policies should emphasize flexibility, innovation, and sustainable industrial development to ensure long-term competitiveness and reduced dependency on imports

**Keywords:** Local Content Requirement (LCR), Fiber Optic Cable, Industrial Policy, Supply Chain

### INTRODUCTION

Local Content Requirements (LCR) policy has a long history and continues to be widely implemented, particularly in semi-industrialized economies (Grossman, 1981). The use of local content is closely linked to the broader process of industrialization and economic development. During industrialization, many countries experience an increase in raw material imports, which reduces the domestic value added of manufactured products (Grossman, 1981). This condition is especially prevalent in countries applying tiered tariff structures that impose higher tariffs on advanced goods than on raw materials. Consequently, LCR policies emerged as a strategic instrument to indirectly protect domestic industries.

LCR policies are designed to promote the use of domestic inputs within industrial and manufacturing processes (Aswicahyono et al., 2022; Kuntze & Moerenhout, 2012). These policies have significantly influenced the sustainability and competitiveness of national industries. Although not a new concept, LCR policies experienced renewed global attention following the 2008 Global Financial Crisis (Aswicahyono et al., 2022; Kuntze & Moerenhout, 2012; OECD, 2019). Both developed and developing countries have adopted such measures as part of their economic strategies. Policymakers often view LCR as a fiscally neutral mechanism to stimulate domestic industry and employment (OECD, 2019).

According to the Global Trade Alert database, several countries actively implement LCR policies, including Argentina, Brazil, China, India, Indonesia, Russia, Saudi Arabia, and the United States (Deringer et al., 2018). Among these, India is recognized as the most intensive user of LCR, contributing a significant portion of global implementation. Brazil also plays a major role, particularly after 2008, by expanding LCR across multiple sectors.

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These sectors include ICT, energy, health, and oil and gas industries. This widespread adoption highlights the strategic importance of LCR in national industrial policy frameworks. In Indonesia, LCR policies have long been integrated into national industrial development strategies (Aswicahyono et al., 2022). The policy dates back to the 1950s and was more systematically implemented in 1974, particularly in the automotive sector. However, it was temporarily halted during the 1998 Asian Financial Crisis. The government later reintroduced LCR through Law Number 3 of 2014 on Industry. This regulation mandates the use of domestic products to strengthen national industry and support employment creation.

LCR policies significantly affect the cable and telecommunications industries in Indonesia. The ICT and telecommunications sector accounts for the largest share of LCR regulations, followed by energy and manufacturing industries. This demonstrates the broad impact of LCR on sectors that rely heavily on cable products. However, challenges remain in implementation, particularly in the cable industry. According to the Indonesian Cable Factory Association (2025), while low-voltage cables can achieve high local content levels, other types still depend on imported materials.

The reliance on imported raw materials, such as XLPE insulation and aluminum-clad steel, limits the achievable local content to approximately 20–25 percent. These materials are not yet produced domestically, creating dependency on foreign suppliers. Additionally, regulatory constraints, such as inappropriate HS code classifications, further complicate import processes. As a result, essential inputs for cable production face restrictions that disrupt supply chain stability. This situation poses a significant challenge to achieving LCR targets.

Government procurement regulations in Indonesia further reinforce LCR implementation through mandatory domestic content requirements. Presidential Regulation Number 16 of 2018, as amended by Regulation Number 46 of 2025, requires a minimum LCR value of 40% in government procurement. At the same time, demand for fiber optic cables continues to grow due to national infrastructure development. Fiber optic technology plays a crucial role in enabling high-speed and reliable digital connectivity. Therefore, the availability of domestically produced cables becomes increasingly important.

Despite progress in digital infrastructure, Indonesia still faces limitations in broadband penetration and network quality (Kominfo RI, 2023). The expansion of fiber optic networks remains uneven, highlighting gaps in national connectivity. Within the Golden Indonesia Vision 2045 framework, fiber optic infrastructure is a critical backbone for future digital transformation. However, the implementation of LCR in this sector faces structural challenges due to reliance on imported materials and limited domestic capacity. Thus, a more adaptive and collaborative LCR strategy is required to align industrial readiness with national development goals.

## Business Issue

As a company engaged in the production of fiber optic cables, PT ZTT Indonesia is recognized as one of the market leaders in Indonesia. Its products have been widely utilized in various government and national strategic projects, directly supporting telecommunications infrastructure development. These contributions also play a significant role in accelerating network access across the country. In line with regulatory requirements, PT ZTT Indonesia must comply with Local Content Requirement (LCR) policies in Indonesia. Based on Phase I certification data covering 39 types of fiber optic cables, the company achieved an average local content level of 28.74 percent. This figure increased to 49.24 percent in Phase II certification, indicating measurable progress while also highlighting opportunities for further improvement.

Despite this progress, dependence on imported raw materials remains a critical issue for PT ZTT Indonesia. This challenge is particularly significant given the strong growth prospects of the global cable industry. The global cable and wire market reached USD 267.8 billion in 2024 and is projected to grow at a CAGR of 7.3 percent between 2025 and 2034 (GMI, 2024). Additionally, key materials such as Cross-Linked Polyethylene (XLPE), which are still imported, are expected to dominate 39.7 percent of the global market share in 2025 and grow annually by 6.3 percent until 2035 (Future Market Insight, 2025). These trends indicate the increasing importance of strengthening domestic industrial capabilities. Therefore, it is essential to analyze the factors influencing LCR achievement and identify strategies to optimize compliance in alignment with global market dynamics and national industrial policies.

Table 1. PT ZTT Indonesia Imported and Local Material Purchases

Year	2020	2021	2022	2023	2024
% Local Materials	32.27	44.78	50.18	43.8	50.35
% Imported Materials	67.73	55.22	49.82	56.2	49.65

Source : PT ZTT Indonesia, 2025

From these data, it can be concluded that PT ZTT Indonesia is still dependent on the use of import raw materials for its production process. In the structure of fiber optic cables, the cable jacket or sheathing represents a major component, accounting for approximately 35%–45% of the total material composition. This component typically utilizes polyethylene (PE)-based materials, including HDPE, MDPE, and XLPE, which serve as mechanical protection against environmental pressure, humidity, and other external disturbances. Due to its substantial proportion, the cable jacket plays a critical role in determining the overall material requirements of fiber optic cables. Consequently, the availability of polyethylene raw materials becomes a key factor in achieving the required local content levels. In practice, although manufacturing and assembly processes are conducted domestically, the supply of high-quality PE materials from local producers remains limited. This limitation forces manufacturers to rely on imported materials to meet stringent technical specifications. As a result, dependence on imported polyethylene continues to constrain the optimization of local content in fiber optic cable production.

*Table 2. PE Import Data through Tanjung Priok and Tanjung Perak Ports*

<b>PE (3901.20.00)</b>	<b>2022 (Kg)</b>	<b>2023 (Kg)</b>	<b>2024 (Kg)</b>
<b>China</b>	2,946,018	4,400,862	7,418,390
<b>United Arab Emirates</b>	24,679,082	18,796,275	30,116,129
<b>United States</b>	950,668	1,325,350	2,466,178
<b>Total</b>	28,575,768	24,522,487	40,000,697

Source : Badan Pusat Statistik, 2025

Import data for polyethylene (PE) under HS Code 3901.20.00 indicates that the primary material required for fiber optic cable jacket or sheathing remains heavily dependent on foreign supply. In 2022, total PE imports reached 28.58 million kg, followed by a decline to 24.52 million kg in 2023. However, imports increased sharply to 40.00 million kg in 2024, reflecting a significant surge in demand. This increase is closely associated with the acceleration of national fiber optic network development. In addition to limited domestic production capacity, trade policy dynamics further demonstrate the continued reliance on imported PE materials. In early 2024, the government implemented Minister of Trade Regulation Number 36 of 2023, which categorized polyethylene under HS 3901.20.00 as a restricted import commodity. This policy aimed to protect domestic industries and regulate import flows, although its impact on industrial supply chains quickly became evident.

Within approximately three months, the government revised the policy by removing HS 3901.20.00 from the restricted import list, indicating the urgency of industrial demand for PE materials. This revision highlights that domestic production has not yet been able to fully meet industry requirements, particularly in strategic sectors such as fiber optic cable manufacturing. The policy adjustment implicitly confirms that dependence on imported PE remains a structural characteristic of the national industrial supply chain. In the context of Local Content Requirement (LCR) compliance, this condition suggests that limited local content in cable jacket components is not due to a lack of industrial commitment. Instead, it reflects constraints in the availability and quality of domestic raw materials. Overall, achieving LCR targets in the fiber optic cable industry, particularly at PT ZTT Indonesia, is influenced by these structural limitations. The cable jacket component, which accounts for approximately 35%–45% of total material composition, remains highly dependent on imported PE materials such as HDPE, underscoring the need for strengthening domestic upstream industries.

Currently, approximately 88% of the HDPE used by PT ZTT Indonesia is sourced from imported suppliers, while only 12% is fulfilled by local suppliers, reflecting the limited capacity and inconsistent quality of domestic raw material providers. This condition indicates that local suppliers have not yet been able to fully meet industry standards and technical requirements. At the same time, regulatory pressures to comply with Local Content Requirement (LCR) policies in government procurement continue to increase. In parallel, the demand for fiber optic cables is rising significantly due to national digital infrastructure development targets. Consequently, PT ZTT Indonesia faces a complex challenge in balancing competitiveness, regulatory compliance, and long-term business sustainability. Therefore, this research focuses on analyzing and formulating strategic approaches that can enable the company to improve LCR achievement in a sustainable manner despite constraints in local raw material availability. Through a comprehensive examination, this study is expected to provide practical recommendations for PT ZTT Indonesia while also contributing policy insights for the broader development of the national fiber optic cable industry.

### **Research Questions and Research Objectives**

In examining this research topic, several research questions are formulated to gain a deeper understanding of the key aspects of local content implementation at PT ZTT Indonesia. This study seeks to explore the potential benefits that may arise from increasing local content value within the company's operations. It also aims to analyze the key challenges faced by the company, particularly those related to regulatory requirements, supply chain limitations, and manufacturing constraints in complying with the minimum 40% local content requirement in fiber optic cable production. Furthermore, the research investigates how these challenges influence the company's ability to achieve optimal compliance. In addition, attention is given to identifying strategic solutions that can address these issues effectively. The formulation of these strategies is expected to support both operational efficiency and regulatory alignment. Ultimately, the research questions are designed to provide a comprehensive understanding of how local content performance can be improved.

This research focuses on examining the implications and implementation of local content requirements in the production of fiber optic cables at PT ZTT Indonesia. Although local content implementation involves multiple stakeholders, this study adopts a manufacturing perspective to ensure a focused and in-depth analysis. The first objective is to examine the potential benefits of increasing LCR value, particularly in relation to regulatory compliance, competitiveness, and long-term business sustainability. The second objective is to identify the key challenges faced by the company in meeting the minimum LCR threshold and improving local content performance. The study also aims to analyze the underlying factors contributing to these challenges within the production and supply chain processes. Furthermore, it seeks to formulate strategic solutions that can effectively address these constraints. Finally, the research aims to develop an implementation framework that can be applied by PT ZTT Indonesia to enhance local content value in a sustainable manner.

### **Research Scope and Limitation**

This research is limited to the assessment of potential benefits, strategic solutions, and implementation approaches aimed at increasing Local Content Requirement (LCR) value within PT ZTT Indonesia, without extending to broader macroeconomic or cross-industry policy evaluations. The study is conducted specifically at PT ZTT Indonesia as a case study within the fiber optic cable manufacturing industry. Consequently, the findings are context-specific and may not be fully generalizable to other manufacturers or industries with different operational, regulatory, or supply chain conditions. The analysis focuses primarily on the manufacturing and supply chain perspectives in implementing local content requirements. Therefore, the data and findings are largely derived from internal processes, certifications, and operational practices within the company. In addition, the research is confined to the regulatory framework governing local content requirements during the study period. Any future changes in regulations or policy adjustments fall outside the scope of this research.

## **LITERATURE REVIEW**

### **1. The Theory of Local Content Policy/Requirements**

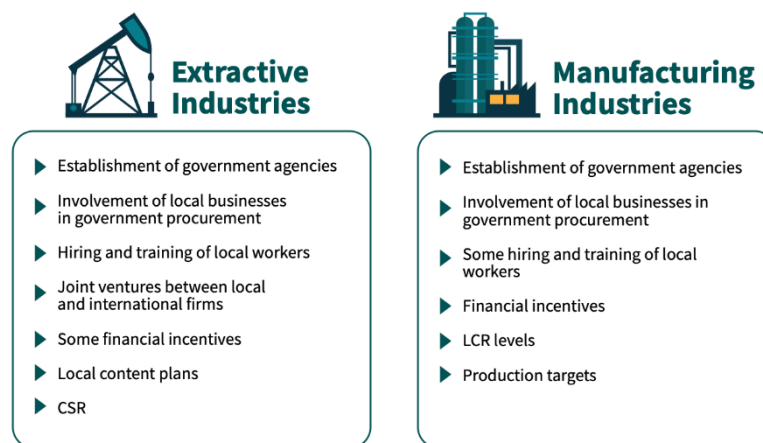
The Local Content Requirement (LCR) policy is closely associated with the theory of effective protection introduced by Corden (1971), which emphasizes the actual level of protection received by producers rather than nominal tariff rates. This theory highlights that protection should be measured based on the value added generated after accounting for input costs. In this context, producers may experience different levels of protection depending on their flexibility in sourcing inputs and factors of production. Reflecting this perspective, LCR policies function as a form of industrial protection by encouraging the use of domestic inputs. Corden (1987) further noted that import protection in industrialized countries increased over time, particularly through non-tariff barriers that were difficult to quantify. These measures often affected specific sectors such as manufacturing, especially under arrangements like the Multifiber Arrangement in 1986. Consequently, LCR can be understood as part of broader protectionist strategies aimed at strengthening domestic industrial structures.

Despite the persistence of protectionist measures, markets in industrial countries remained relatively open during the 1980s, with a significant proportion of imports entering without non-tariff barriers (Corden, 1987). However, protection was still concentrated in key sectors such as agriculture, textiles, and steel, alongside government procurement policies favoring domestic producers. LCR policies have continued to evolve, particularly in semi-industrial economies, as part of industrialization strategies. During industrialization, increased imports of raw materials often reduce domestic value added, especially in countries with tiered tariff structures (Grossman, 1981). In response, LCR policies emerged as indirect mechanisms to protect intermediate production stages while avoiding resistance associated with direct tariffs. Grossman (1981) explains that LCR schemes require a minimum

proportion of domestic value added, with penalties imposed for non-compliance. In competitive markets, LCR increases demand for domestic inputs but may also raise production costs, potentially reducing overall market efficiency and contradicting its initial objectives (Aswicahyono et al., 2022; Grossman, 1981).

In the contemporary global trade environment, tariff rates have significantly declined due to the expansion of multilateral and regional trade agreements (Fernando & Ing, 2022). As a result, governments increasingly rely on non-tariff measures, including LCR, to protect domestic industries. According to OECD (2019), LCR is part of broader localization policies aimed at prioritizing domestic production and reducing dependence on foreign inputs. These policies gained renewed importance after the 2008 global financial crisis as tools to support employment, innovation, and industrial growth. However, their long-term effectiveness depends on the ability of protected industries to become competitive and sustainable. The OECD (2019) emphasizes that policy focus should shift toward improving the overall business environment rather than selectively protecting specific sectors. In practice, LCR implementation varies across sectors, with manufacturing emphasizing quantitative targets and extractive industries adopting broader qualitative requirements such as local partnerships and workforce development (Aswicahyono et al., 2022).

Figure 1. Differences between Manufacturing and Oil and Gas LCR



Source: CSIS, 2022

## 2. The Objectives and Benefits of LCR Policy

Local Content Requirement (LCR) policies are designed to achieve multiple objectives simultaneously, including promoting industrial development and enhancing economic growth (Aswicahyono et al., 2022). In many cases, such as in Indonesia, these policies primarily aim to strengthen domestic industries while also contributing to broader economic welfare. During periods of economic crisis, LCR policies have been used as instruments to stimulate employment and job creation, as seen during the 2008 global financial crisis. Similar approaches were also reflected in policies such as the “Buy American” initiative in the United States (The White House, 2021). Fundamentally, LCR policies are rooted in the objective of protecting domestic products from competition with imported goods. Corden, (1987) emphasizes that LCR plays a crucial role in shielding domestic markets, a view supported by OECD (2019) and Fernando & Ing, (2022), who highlight its contribution to industrial development. Moreover, LCR policies can enhance value added, improve competitiveness, and increase demand for domestically produced intermediate inputs, thereby encouraging the expansion of local production (Fernando & Ing, 2022; Grossman, 1981).

Beyond their direct impact on industrial development, LCR policies also generate broader economic and business benefits. The International Finance Corporation (2011), notes that LCR can reduce operational risks, ensure regulatory compliance, and create sustainable business opportunities. These outcomes are consistent with findings from (Aswicahyono et al., 2022), which indicate that LCR strengthens economic self-reliance, improves the effectiveness of government spending, and supports long-term industrial growth. In addition, LCR policies foster business linkages between economic actors, both upstream and downstream, thereby enhancing collaboration within the industrial ecosystem (Macatangay, 2016; White, 2017). Such linkages contribute to workforce development, facilitate the use of foreign investment, and strengthen connections with local enterprises. In sectors such as mining, LCR has been shown to increase local procurement, employment, and processing capacity while enhancing the capabilities of domestic actors (Cosbey & Ramdoo, 2018). Furthermore, LCR policies support the development of

small and medium-sized enterprises by enabling technology transfer, improving managerial capabilities, and integrating SMEs into supply chains, ultimately strengthening their competitiveness (Unam et al., 2022).

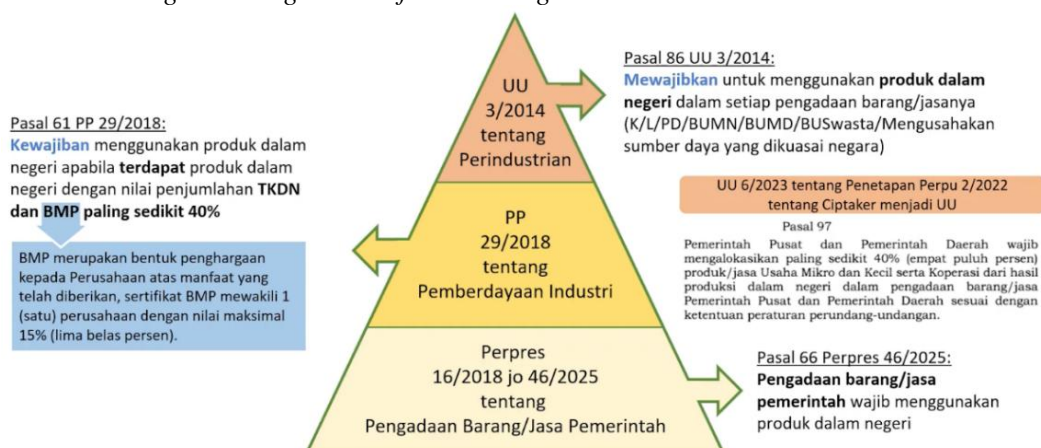
### 3. Evolution of LCR Policy in Indonesia

Local Content Requirements (LCR) are policies designed to encourage the use of domestic inputs in industrial production processes (Aswicahyono et al., 2022). These policies function as economic instruments to protect developing domestic industries and to promote employment generation (Fernando & Ing, 2022). LCR has been widely implemented across both developed and developing countries, including the United States, Canada, Russia, European Union countries, China, India, and Brazil. The policy is applied across various sectors such as oil and gas, minerals, automotive, renewable energy, pharmaceuticals, and medical devices. In Indonesia, LCR is not a new concept and has been embedded in industrial policy since the 1950s (Fernando & Ing, 2022). Early initiatives such as the Benteng Program aimed to strengthen indigenous entrepreneurs and reduce foreign economic dominance (Negara, 2016). These historical efforts illustrate the long-standing role of LCR in supporting national industrial development.

During the New Order era, the government implemented the “deletion program” between 1974 and 1993 to increase the use of domestically produced components in manufacturing (Negara, 2016). However, this program faced significant challenges, including low technological capabilities of local suppliers and limited economies of scale (Wie, 2012). The program operated under a protectionist import-substitution regime but was eventually discontinued due to trade liberalization pressures. It was later replaced with an incentive-based approach that linked tariff reductions to local content usage. In 1996, the National Car Program further strengthened LCR implementation by requiring increasing levels of local content to access lower import tariffs (Fernando & Ing, 2022; Negara, 2016). Nevertheless, the program faced legal challenges at the WTO and was ultimately discontinued following the 1998 Asian Financial Crisis. These experiences highlight both the potential and limitations of LCR policies in Indonesia’s industrial development.

In the 21st century, LCR policies were reintroduced as part of government procurement requirements and gained renewed importance after the 2008 global economic crisis (Aswicahyono et al., 2022; Fernando & Ing, 2022). The Indonesian government implemented programs such as P3DN through Presidential Instruction No. 2 of 2009 to promote the use of domestic products (Limenta & Ing, 2022). This policy framework is further reinforced by Law No. 3 of 2014 on Industry and Government Regulation No. 29 of 2018, which mandate minimum local content thresholds. These regulations require the use of domestic products in government-funded projects and provide incentives such as price preferences and administrative support. Additionally, Law No. 6 of 2023 emphasizes the role of MSMEs by requiring a minimum allocation of domestic products in procurement. Presidential Regulation No. 46 of 2025 further strengthens this obligation by mandating the use of domestic products in government spending. Overall, the regulatory framework demonstrates Indonesia’s commitment to strengthening domestic industry, enhancing economic resilience, and achieving sustainable industrial development.

Figure 2. Legal Basis for the Obligation to Use Domestic Products



Source: Ministry of Industry, 2025

In 2025, Indonesia's Local Content Requirement (LCR) policy attracted international attention, particularly from the United States, which viewed it as a trade barrier. In early April 2025, the US government proposed a reciprocal tariff of 32 percent on Indonesian products due to a trade deficit influenced by both tariff and non-tariff barriers. The 2025 National Trade Estimate Report on Foreign Trade Barriers identified several concerns, including import policies, technical regulations, government procurement, and LCR. The United States Trade Representative (USTR) specifically argued that Indonesia's LCR policy in technology and information sectors restricts US companies. Consequently, the US government urged Indonesia to revise or remove these regulatory constraints. In response, President Prabowo instructed that LCR regulations be made more flexible and realistic to maintain global competitiveness. This directive led to the issuance of Minister of Industry Regulation Number 35 of 2025, which introduced reforms emphasizing incentives, simplification, facilitation, and faster certification processes. These reforms aim to balance domestic industrial protection with international trade considerations while improving the efficiency and attractiveness of LCR implementation.

#### **4. Challenges of LCR Implementation in Indonesia**

Based on a study conducted by CSIS, the implementation of Local Content Requirement (LCR) policy in Indonesia faces several structural challenges related to the broader industrial ecosystem. These challenges include the limited availability of production inputs, the quality and readiness of human resources, infrastructure constraints, and weak innovation capacity. One of the main issues lies in the availability of local inputs, as downstream industries are required to substitute imported materials with domestically produced ones. However, local and imported inputs are not always perfectly substitutable in terms of quality and standards (Aswicahyono et al., 2022). Firms must meet strict production standards to remain competitive in global value chains, and failure to do so may reduce product quality and harm consumers. In some cases, the inability to meet these standards could even lead to the cessation of production activities. Therefore, ensuring the readiness of domestic industries, particularly upstream sectors, is essential before enforcing strict LCR policies.

In addition to quality concerns, the price of domestic inputs also presents a significant challenge in LCR implementation. Even when local raw materials meet comparable quality standards, higher production costs may lead to increased prices of finished goods, thereby reducing consumer demand and market competitiveness. To address this, the government must ensure that domestic upstream industries can supply inputs at competitive prices without disrupting production efficiency. Policies such as price preference margins in public procurement, which currently allow up to 25 percent, may serve as a mitigating mechanism. However, these challenges are closely linked to broader structural issues, including the quality of human resources, infrastructure limitations, and insufficient research capacity (CSIS, 2022). Indonesia's human capital remains relatively uncompetitive, as reflected in low PISA scores and limited representation of universities in global rankings. This condition constrains both industrial productivity and the ability to conduct research and development activities. As a result, industries face difficulties in scaling up production and improving the competitiveness of local inputs.

Infrastructure and logistics also play a critical role in shaping the effectiveness of LCR policies in Indonesia. Inadequate infrastructure contributes to higher production and distribution costs, which are further exacerbated by LCR requirements. Although improvements have been made, logistical inefficiencies persist, such as prolonged cargo dwell times and limited container availability. Imported goods still require several days for port clearance, creating delays that affect supply chain reliability. Furthermore, weak innovation policies hinder the development of domestic industrial capabilities. Indonesia's research and development expenditure remains low, accounting for only 0.28 percent of GDP in 2020, far below that of advanced economies (Aswicahyono et al., 2022). This lack of investment limits technological advancement and the ability of industries to produce high-quality domestic inputs. Consequently, strengthening innovation, infrastructure, and human capital is essential to support effective and sustainable LCR implementation.

#### **5. International Practice of LCR**

Local Content Requirements (LCR) are widely regarded by governments as politically attractive instruments for promoting domestic industrial growth across various sectors, including oil and gas, automotive, renewable energy, pharmaceuticals, and medical devices. Countries such as the United States have implemented such policies through initiatives like the "Buy American" and "Made in America" executive orders (The White House, 2021). In the automotive sector, Thailand introduced LCR policies as early as the 1960s by imposing high import tariffs and later mandating minimum local content levels of 45 percent in 1982 and 54 percent in 1986. These policies also required foreign firms to establish joint ventures with local partners. However, policy shifts occurred in the 1990s

due to commitments under the TRIMs Agreement, economic reforms, and the Asian Financial Crisis (Fernando & Ing, 2022). The need to attract foreign investment and changes in exchange rates further encouraged Thailand to liberalize its policies. By 2000, Thailand abolished LCR requirements for final assemblers, marking a turning point that transformed the country into a major global automotive manufacturing hub. This case illustrates how LCR policies can evolve in response to global trade dynamics and domestic economic needs.

China and India provide additional examples of LCR implementation across different sectors and policy contexts. China introduced comprehensive automotive policies in 1994, emphasizing domestic industry development through high tariffs, import quotas, and local content requirements of around 40 percent (Fernando & Ing, 2022; Gao, 2013). Beyond automotive, China successfully applied LCR in the renewable energy sector, particularly in wind energy development, through phased requirements and incentive-based programs (Aswicahyono et al., 2022; Kuntze & Moerenhout, 2012). LCR levels increased progressively from 20 percent in 1997 to 70 percent in 2004, with compliance linked to eligibility for large-scale government projects. The integration of LCR into bidding mechanisms further ensured its effective implementation. Meanwhile, India implemented LCR policies in the electronics and telecommunications sectors by requiring the use of domestically produced goods in government procurement and strategic industries. Although these policies faced scrutiny from the United States, they were not formally challenged at the WTO dispute level. Overall, these international experiences demonstrate that LCR policies can serve as strategic tools for industrial development while also reflecting complex interactions between domestic priorities and global trade rules.

## **6. The Strategy to Maintain Quality for Local Component Suppliers**

The success of Local Content Requirement (LCR) policies fundamentally depends on strong support from the domestic industrial ecosystem. Countries that have successfully implemented LCR policies tend to prioritize capacity building and value-added enhancement rather than merely focusing on local ownership (Fernando & Ing, 2022). These countries also invest significantly in research and development and human capital development to strengthen industrial competitiveness. In such contexts, domestically produced goods are able to compete effectively in terms of both price and quality. Conversely, weak competitiveness among local suppliers can undermine the core objectives of LCR policies. In Indonesia, LCR implementation has not yet been fully supported by a comprehensive industrial ecosystem (Aswicahyono et al., 2022). Excessive restrictions on imported inputs, without sufficient domestic capacity, may negatively affect industrial performance and reduce overall efficiency. Therefore, careful assessment of domestic capabilities is essential to ensure that LCR policies contribute positively to industrial development.

LCR policies must also be designed to avoid creating long-term dependency or complacency among local suppliers. While protection from international competition can support domestic industries, prolonged protection may hinder capability upgrading and innovation (Macatangay, 2016). In this regard, LCR policies should function as a dynamic monitoring mechanism to evaluate supplier performance over time. If local suppliers demonstrate continuous improvement, their competitiveness and production capacity will increase, enabling them to supply larger volumes efficiently. However, if progress remains stagnant, policy adjustments or termination may be necessary to prevent inefficiencies. The effectiveness of LCR policies also depends on the ability of local suppliers to capture new business opportunities and generate additional economic value (Macatangay, 2016). Strengthening supplier capacity requires strategic interventions such as training, access to financing, and collaboration with industry players (Aswicahyono et al., 2022). Ultimately, enhancing human resources, innovation, and technological capabilities is crucial to ensure that LCR policies support sustainable and competitive industrial growth (Unam et al., 2022).

## **7. Previous Empirical Studies**

Numerous studies have examined the implementation of Local Content Requirement (LCR) policies across different countries and sectors, yielding diverse conclusions. The OECD (2019), using the METRO trade model, found that LCR policies tend to increase production costs for domestic producers, which subsequently reduce exports and increase imports in non-targeted sectors. As production costs rise, firms may shift from domestic suppliers to more competitive foreign suppliers. These policies also negatively affect employment, particularly in non-targeted sectors where low-skilled jobs decline significantly compared to skilled jobs. Furthermore, LCR policies create inefficiencies that reduce competitiveness and innovation in targeted industries over time (OECD, 2019). These inefficiencies generate broader economic spillovers, including higher prices, reduced diversification, and lower levels of competition. Similar findings were reported by Aswicahyono et al. (2022), which showed that LCR policies in Indonesia often fail to achieve their primary objective of strengthening local industries. The study indicates that mandatory use of less competitive domestic inputs reduces downstream industrial output and overall competitiveness

in global markets. In addition, LCR policies do not always succeed in reducing import dependency, as imports of components may increase even when finished goods imports decline. The ineffectiveness of LCR policies is partly attributed to unclear policy objectives, as they are often designed to address multiple issues simultaneously without clear prioritization. Uniform implementation across industries without considering sector-specific characteristics further limits policy effectiveness. The absence of robust monitoring and evaluation mechanisms based on performance indicators such as productivity and exports also weakens policy outcomes. Moreover, Indonesia's industrial environment still faces challenges in attracting foreign investment and fostering sustainable growth. Studies suggest that improving productivity and investment attractiveness may be more effective than relying solely on LCR policies (Aswicahyono et al., 2022). Supporting this view, Negara (2016) found that LCR implementation in manufacturing did not significantly reduce dependence on imported inputs. Despite extensive research, there remains a significant gap in studies focusing specifically on LCR implementation in the fiber optic cable industry, highlighting the need for further investigation in this strategic sector.

## **METHOD**

### **Research Design**

This research adopts a qualitative approach to explore and understand the meanings individuals or groups assign to social or human problems (Creswell & Creswell, 2017). Qualitative research involves flexible procedures that evolve during the study, with data typically collected in natural settings and analyzed inductively. The researcher plays a central role in interpreting the meaning of the data, emphasizing an inductive style of inquiry and focusing on individual perspectives. Unlike quantitative approaches that rely on numerical data and statistical analysis, qualitative research prioritizes meaning and interpretation (Dey, 1993). It seeks to understand socially constructed realities rather than merely collecting textual data. This approach is particularly useful when key variables are not yet clearly identified (Creswell & Creswell, 2017). As a result, qualitative research enables a deeper and more comprehensive understanding of complex phenomena.

Qualitative research methods differ significantly from quantitative approaches in terms of data collection, analysis, and interpretation. These methods typically involve purposive sampling, open-ended data collection, and analysis of textual or visual data, with findings presented through descriptive narratives, figures, or tables. The research process is inherently flexible and evolves over time, allowing adjustments in research questions, data sources, and field locations. Researchers must also reflect on their own roles, as their backgrounds and experiences can influence data interpretation and the development of themes. This reflexivity is an essential component of qualitative inquiry. Among various qualitative designs, this study employs a case study approach focusing on PT ZTT Indonesia. A case study enables an in-depth examination of a specific case, such as a process, activity, or organization, to generate a holistic understanding of the research problem.

### **Data Collection Method**

According to (Dey, 1993), qualitative data encompass a very broad and rich spectrum of cultural and social artifacts. Qualitative methods represent a different approach to scientific inquiry compared to quantitative research methods (Creswell & Creswell, 2017; Dey, 1993). Although the processes share some similarities, qualitative methods rely on textual and visual data, have distinctive analytical steps, and employ various research designs. Qualitative researchers typically collect multiple forms of data—such as interviews, observations, documents, and audiovisual materials—rather than relying on a single data source. Researchers then review all data, make sense of them, and organize them into categories or themes that cut across all data sources. This research uses data and information collected from both primary and secondary sources. The following sections explain these methods.

#### *Secondary Data*

Secondary data are sources of information that are not provided directly to the data collector (Sugiyono, 2010). During the research process, researchers may collect qualitative documents (Creswell & Creswell, 2017). These documents may include public documents, such as newspapers, meeting minutes, and official reports. In addition, secondary data may also be obtained from private documents, such as journals, personal diaries, letters, and emails. The data required for this study are as follows:

*Table 3. List of Data Requirements*

<b>Objectives</b>	<b>Data</b>	<b>Sources</b>
Identifying Key Business Issues	Company Profile	PT ZTT Indonesia
	Local Content Level Dataset	PT ZTT Indonesia
	Input Material Procurement Data	PT ZTT Indonesia
	Input Material Import Data	PT ZTT Indonesia

*Source: Author, 2025*

*Primary Data*

According to Sugiyono (2010), primary data are obtained directly from first-hand sources, and in qualitative research, data collection typically occurs in natural settings where participants experience the issues being studied (Creswell & Creswell, 2017). Researchers interact directly with participants rather than relying on artificial environments or standardized instruments. This direct engagement allows researchers to observe behaviors and gather in-depth insights through real-life contexts. Primary data in this study are collected through interviews and observations, which are central to qualitative inquiry. The interviews conducted are semi-structured, allowing flexibility while maintaining focus on key research themes. Such interviews enable deeper exploration of topics compared to structured formats. As a result, researchers can capture nuanced perspectives and contextual understanding of the research problem. This approach emphasizes continuous interaction between researchers and participants to ensure data richness.

Before conducting interviews, researchers must carefully determine the selection of informants using appropriate sampling techniques. In qualitative research, purposive sampling is used to select respondents based on the researcher’s judgment, while snowball sampling relies on recommendations from initial participants (Sugiyono, 2010). This study involves multiple key informants, including representatives from PT Surveyor Indonesia, internal divisions such as production, purchasing, quality control, and sales, as well as suppliers. Each informant provides specific insights related to LCR policy, supply chain dynamics, regulatory challenges, and industrial competitiveness. The diversity of informants allows for a comprehensive understanding of the research problem from multiple perspectives. Information gathered includes views on policy implementation, supplier capacity, raw material sourcing, and business strategies. Additionally, insights into collaboration, logistics, and market challenges are explored. This approach ensures that the data collected reflects both internal and external stakeholder perspectives.

In addition to interviews, this study also employs direct observation at PT ZTT Indonesia as part of qualitative data collection. Observation involves recording behaviors and activities of individuals within the research setting (Creswell & Creswell, 2017). Researchers document these observations through field notes, which may be structured or semi-structured based on guiding questions. The role of the researcher in observation can vary from non-participant to full participant depending on the research context. Observations are generally open-ended, allowing participants to express their views freely without rigid constraints. This method complements interview data by providing contextual and behavioral insights. It also enables researchers to validate and enrich findings obtained through interviews. Overall, the combination of interviews and observations enhances the depth and credibility of the qualitative analysis.

**Data Analysis Method**

*Fish Bone Analysis*

The fishbone diagram, also known as the Ishikawa diagram, is a graphical tool used to identify and display the various causes of a particular problem or phenomenon (Coccia, 2018). It was popularized by Kaoru Ishikawa in the 1960s as part of quality management practices in industrial settings (Luca, 2016). This diagram is widely used for cause-and-effect analysis to explore complex relationships among factors contributing to a problem (Coccia, 2018; Ilie & Ciocoiu, 2010). It serves as an effective method for conducting root cause analysis by visually organizing potential causes. The fishbone diagram is particularly useful in brainstorming sessions, where it helps

structure ideas and categorize contributing factors. Compared to other methods such as the Five Whys, it offers a more systematic and comprehensive approach. In this diagram, the main problem is positioned at the “head,” while the contributing causes are arranged along the “bones.” This structure enables a clearer understanding of how different factors interact to produce a specific outcome.

Originally developed as a quality control tool, the fishbone diagram is used to identify sources of variation that lead to a particular effect (Coccia, 2018). Each identified cause represents a potential factor influencing the problem and is grouped into broader categories to facilitate analysis. These categories commonly include aspects such as people, methods, machines, materials, measurements, and environment, which together provide a comprehensive framework for investigation. The application of this tool generally follows several steps, including identifying the problem, determining the main contributing factors, identifying possible causes, and analyzing the resulting diagram. By structuring causes into categories, the diagram helps uncover relationships that may not be immediately apparent. It also supports systematic evaluation of both direct and indirect influences on the problem. As a result, the fishbone diagram is an effective tool for analyzing multifaceted issues involving interconnected variables. Its visual and structured approach enhances the clarity and depth of problem analysis in various research and industrial contexts.

### *PDCA/PDSA Analysis: Deming Cycle*

The PDSA (Plan–Do–Study–Act) cycle is a systematic method designed to generate learning and support continuous improvement in products, processes, or services. This model, also known as the Deming Cycle, was introduced to Dr. Deming by Walter Shewhart in 1950, although its conceptual roots can be traced back to earlier scientific approaches developed by Galileo and Francis Bacon. Over time, the model has evolved into a widely used framework for quality improvement. According to the Deming Institute (2020), PDSA is a refinement of the earlier PDCA (Plan–Do–Check–Act) cycle. The key distinction lies in the “Study” stage, which emphasizes learning and evaluation rather than merely checking success or failure. Deming focused on comparing actual outcomes with predicted results to refine underlying theories. This approach highlights the importance of continuous learning and adaptation in improvement processes. As a result, PDSA provides a more analytical and reflective framework compared to PDCA.

The PDSA cycle consists of four iterative stages that support systematic problem-solving and improvement (Swamidass, 2000). The process begins with planning, which involves analyzing the current situation, collecting relevant data, and designing improvement strategies. This is followed by implementation on a small scale to test the proposed changes. The study phase then evaluates the outcomes by comparing actual results with expectations and identifying areas for further improvement. Finally, the act stage involves implementing successful changes and standardizing improvements across the system. Deming emphasized that this cycle should be applied continuously across all stages of production to identify variations and improve performance. According to Isniah et al. (2020), the PDSA cycle is widely used in various sectors, including manufacturing, services, and organizational management. Its flexible, logical, and forward-looking nature makes it an effective tool for achieving sustainable and continuous improvement.

## **RESULTS AND DISCUSSION**

### **1. Potential Benefits of Increasing Local Content Requirements for PT ZTT Indonesia**

By complying with Local Content Requirement provisions under Minister of Industry Regulation No. 35 of 2025, PT ZTT Indonesia can obtain significant benefits, particularly in accessing government and state-owned enterprise procurement opportunities. This compliance enhances the company’s competitiveness against imported products while strengthening local manufacturing capacity. It also contributes to job creation and reduces dependence on imported materials. Interviews with key informants indicate that LCR compliance enables the company to meet tender eligibility requirements and improve its position in procurement scoring systems. As a result, PT ZTT Indonesia can secure purchase orders and maintain alignment with customer requirements related to local content policies. The company is actively involved in telecommunications and power infrastructure projects, including collaborations with SOEs such as PT Telkom Indonesia and PLN subsidiaries. Through this participation, PT ZTT Indonesia achieves greater business stability as a preferred domestic supplier. These findings are consistent with previous studies emphasizing that LCR policies support domestic production and enhance participation in public procurement (Aswicahyono et al., 2022; Corden, 1987; Fernando & Ing, 2022; Grossman, 1981; OECD, 2019). Despite these benefits, PT ZTT Indonesia also faces several challenges in implementing LCR within government and SOE projects. The company highlights issues such as delays in imported material delivery, complex tender

procedures, strict regulatory requirements, and administrative inefficiencies. Additional challenges include changes in internal regulations within SOEs and potential delays in project payments. Moreover, inconsistencies in LCR enforcement during tender processes have been observed, where some suppliers without certification are still able to participate. This situation indicates the need for stronger government supervision and consistent policy enforcement. The company also notes that sectors dependent on unavailable domestic materials may experience increased costs and operational inefficiencies. These constraints can affect project timelines and overall productivity. Therefore, while LCR enhances market access, it also introduces operational complexities that require careful management.

The implementation of LCR policy also generates backward industrial linkages by encouraging the growth of domestic suppliers. PT ZTT Indonesia collaborates with multiple suppliers that provide various supporting materials and services, including consumables, packaging, and manufacturing inputs. However, domestic suppliers still face limitations in providing high-technology components required for fiber optic production. To address this, PT ZTT Indonesia requires suppliers to possess LCR certification and actively promotes certification among its partners. The company also implements rigorous selection processes, including product testing, facility audits, and trial procurement stages to ensure quality and reliability. These practices contribute to strengthening supplier capacity and improving supply chain performance. As a result, LCR compliance stimulates upstream industry development. This finding aligns with previous studies highlighting the role of LCR in fostering industrial linkages and supplier integration (Grossman, 1981; Macatangay, 2016; Unam et al., 2022).

Collaboration with PT ZTT Indonesia provides tangible benefits for suppliers, including increased sales, improved quality standards, and enhanced market access. Suppliers also experience greater demand stability, enabling them to expand their workforce and improve operational efficiency. In addition, partnerships with PT ZTT Indonesia strengthen supplier credibility and customer trust. Although direct financial support is limited, timely payments from PT ZTT Indonesia contribute to supplier financial stability. The company also provides technical support through its Quality Control and Research and Development teams. These teams conduct regular visits, offer guidance, and facilitate knowledge transfer to improve supplier performance. Such initiatives support continuous improvement in product quality and operational processes. Consequently, supplier relationships contribute to the overall resilience of the industrial ecosystem.

In addition to supplier collaboration, PT ZTT Indonesia engages with Micro, Small, and Medium Enterprises through partnerships facilitated by the Ministry of Investment. This collaboration aims to promote inclusive industrial development and strengthen linkages between large enterprises and smaller businesses. These partnerships are structured through long-term contractual arrangements to ensure sustainability. Through such initiatives, MSMEs gain access to stable demand and opportunities for capability development. This approach supports government programs aimed at enhancing SME participation in industrial supply chains. It also contributes to job creation and regional economic development. The integration of MSMEs into the supply chain reflects the broader impact of LCR policies on local economic ecosystems. Therefore, LCR implementation extends beyond firm-level benefits to broader industrial development outcomes.

The overall implementation of LCR policy at PT ZTT Indonesia demonstrates its role in strengthening both forward and backward linkages within the industry. Forward linkages are reflected in the company's ability to supply products to major infrastructure projects, while backward linkages are evident in the development of local suppliers. These linkages contribute to the creation of a more integrated and resilient industrial ecosystem. However, the effectiveness of these linkages depends on the readiness and capability of domestic suppliers. Limitations in technology and production capacity remain key challenges that need to be addressed. Continuous support, capacity building, and policy alignment are essential to maximize the benefits of LCR. Without such efforts, the potential advantages of LCR may not be fully realized. Therefore, a balanced approach is required to ensure sustainable industrial growth.

Overall, the findings indicate that LCR policy provides significant opportunities for PT ZTT Indonesia to enhance competitiveness, expand market access, and strengthen supply chain linkages. At the same time, the policy introduces challenges related to operational efficiency, regulatory complexity, and supplier readiness. These dynamics highlight the importance of aligning policy implementation with industrial capabilities. Strengthening domestic supplier capacity and improving regulatory enforcement are critical to achieving optimal outcomes. The experiences of PT ZTT Indonesia confirm that LCR can serve as a strategic tool for industrial development when supported by an enabling ecosystem. This conclusion is consistent with previous literature emphasizing the role of LCR in fostering domestic industry and economic linkages. Therefore, continuous evaluation and adaptive policy design are necessary to ensure the long-term success of LCR implementation.

## **2. Challenges in Complying with the 40% Local Content Requirement at PT ZTT Indonesia**

PT ZTT Indonesia's compliance with the minimum 40% Local Content Requirement under Presidential Regulation No. 16 of 2018 represents not only a legal obligation but also a multidimensional operational challenge. Based on structured responses from five respondents, the company faces interconnected constraints involving raw materials, regulation, supply chain maturity, technology, logistics, and business competition. To identify the root causes of these issues, this study applies Fishbone (Ishikawa) Analysis as a tool for visualizing cause-and-effect relationships. Through this method, the contributing factors are grouped into several key dimensions that explain the complexity of LCR compliance. The findings show that these dimensions do not operate independently but instead reinforce one another. As a result, the challenge of meeting LCR requirements cannot be addressed through a single intervention. Rather, it requires a comprehensive understanding of structural and operational constraints across the company's industrial ecosystem.

Raw materials constitute one of the most critical dimensions affecting PT ZTT Indonesia's ability to comply with LCR requirements. In the fiber optic cable industry, a substantial portion of product value depends on raw materials with high technical specifications and precision manufacturing requirements. However, interviews with respondents reveal that domestic raw material readiness remains limited in terms of availability, quality, price, and supplier capacity. One major issue is the continued dependence on imported preform, which remains the main raw material for optical fiber production and indicates insufficient domestic technological capability (R1 – Surveyor). In addition, supporting materials such as HDPE and steel wire are still difficult to source locally because the number of suppliers and their production capacities remain limited (R3 – PT ZTT Indonesia). These conditions structurally constrain efforts to increase local content because a significant share of the product's value still comes from imported inputs. Therefore, strengthening the domestic upstream raw material industry is essential for improving LCR performance in the fiber optic cable sector.

Beyond availability, the economic and technical characteristics of local raw materials also create significant challenges for PT ZTT Indonesia. Respondents noted that most local raw materials are less price-competitive than imported alternatives, especially those sourced from China (R2 – PT ZTT Indonesia). Local materials are also often associated with lower quality and may require additional equipment or process adjustments to produce finished goods that meet required standards (R3 – PT ZTT Indonesia). This creates a difficult trade-off because the company must increase local content while maintaining cost competitiveness in highly price-sensitive projects. PT ZTT Indonesia indicated that local materials may be considered only if the price gap does not exceed 5 percent, yet in practice the difference is often much larger (R2 – PT ZTT Indonesia). Furthermore, some local raw materials still do not meet the required specifications, creating risks for production efficiency and final product quality (R4 – PT ZTT Indonesia). Thus, raw material constraints are not limited to domestic availability alone but also involve systemic issues of competitiveness, consistency, and technical compliance.

Dependence on imported raw materials also exposes PT ZTT Indonesia to lead-time risks and broader external disruptions. Imported materials require longer delivery times and are vulnerable to delays caused by customs procedures, including red-channel inspections and administrative obstacles (R2; R3 – PT ZTT Indonesia). Shipping time from China to Indonesia may take approximately 10 to 14 days, excluding any licensing or clearance delays, which directly affects production continuity (R3 – PT ZTT Indonesia). In addition, global trade tensions between the United States and China have created further procurement uncertainty through tariff wars, export restrictions, and policy changes affecting international shipments (R3 – PT ZTT Indonesia). Exchange rate volatility and the strengthening of the Chinese Yuan against the Indonesian Rupiah have also increased the company's financial burden. Although imported materials usually offer more stable quality, respondents noted that the claim process for quality problems is often difficult and time-consuming (R3 – PT ZTT Indonesia). Consequently, both local and imported raw materials carry distinct risks that must be carefully managed in order to sustain production and compliance.

Regulation forms another major dimension influencing the effectiveness of LCR compliance at PT ZTT Indonesia. Respondents explained that Minister of Industry Regulation No. 35 of 2025 requires primary raw materials to comply with relevant Directorate General regulations, but those implementing regulations do not yet cover all cable product types (R1 – Surveyor). One major challenge concerns the obligation to obtain Import Approval for certain materials such as steel wire, which requires coordination with both the Ministry of Industry and the Ministry of Trade (R3 – PT ZTT Indonesia). In practice, the licensing process is not merely administrative but also technical and systemic, particularly because the government's online system often experiences disruptions at the beginning of the year when applications accumulate (R3 – PT ZTT Indonesia). These disruptions create verification queues, quota limitations, and delays that affect import schedules and production planning. Respondents

## STRATEGIES FOR IMPLEMENTING LOCAL CONTENT REGULATIONS IN FIBER OPTIC CABLE MANUFACTURE: A CASE STUDY OF PT ZTT INDONESIA

Zhao Haiwei and Noorhan Firdaus Pambudi

also described Indonesia's customs regulations as manageable but complex and time-consuming, with direct implications for production schedules and customer delivery (R3 – PT ZTT Indonesia). Therefore, the regulatory environment contributes significant uncertainty to the company's efforts to meet LCR obligations efficiently.

Tariff structures and certification procedures further intensify the regulatory burden faced by PT ZTT Indonesia. High import duties, especially for HDPE, increase production costs when the company is unable to use the Free Trade Agreement scheme due to documentation or HS Code issues (R3 – PT ZTT Indonesia). Administrative misclassification also creates additional problems, as materials such as PBT, aramid, and certain yarns are categorized under the garment industry despite having different technical specifications for cable production (R4 – PT ZTT Indonesia). On the certification side, respondents reported that the LCR verification process involves multiple institutions and layers of approval, particularly for panel products, which can delay certificate issuance (R4 – PT ZTT Indonesia). Such delays are highly consequential because LCR certificates are essential prerequisites for participating in government and SOE tenders. Field findings also show that some SOEs have not consistently enforced LCR requirements, allowing uncertified suppliers without domestic production facilities to participate in major projects (R4 – PT ZTT Indonesia). Overall, these regulatory issues demonstrate that LCR compliance is shaped not only by company readiness but also by the consistency, efficiency, and enforceability of the broader policy framework.

Production and technology capability are equally important in supporting LCR compliance in the fiber optic cable industry. This industry requires precision manufacturing, strict material specifications, and advanced technological mastery, making production readiness a strategic determinant of local content improvement. Respondents indicated that one of the key problems is the limited domestic capability to produce core raw materials such as preforms because of insufficient mastery of high technology and advanced machinery (R1 – Surveyor). Even where some components can technically be produced domestically, their production is not always economically viable because scale inefficiencies make costs higher than those of imported goods (R1 – Surveyor). Local suppliers also tend to have limited technological capacity, which affects product variety, consistency, and quality improvement (R3 – PT ZTT Indonesia). In the manufacturing process, the use of unstable raw materials may require machine adjustments, increase scrap rates, and reduce the quality of the final product. Therefore, the challenge of increasing local content is not only about substituting imported inputs but also about upgrading the domestic industrial base technologically and economically.

The distribution and logistics dimension also presents practical challenges for PT ZTT Indonesia's operations. According to the interview results, inter-island shipments, particularly to Sumatra, still suffer from limited traceability because many areas cannot yet fully utilize containers due to infrastructure limitations (R3 – PT ZTT Indonesia). Weather conditions such as rain and heavy rainfall frequently disrupt loading activities and may also affect product safety and quality. The company evaluates logistics performance through indicators such as on-time delivery, delivery cost, material handling, truck arrival time, and truck suitability (R3 – PT ZTT Indonesia). Additional unloading costs arise when customers do not have their own unloading teams, further increasing distribution expenses. Furthermore, the availability of suitable trucks from transport vendors is sometimes limited, which affects delivery smoothness and reliability. Unpredictable schedules also create difficulties in logistics planning and coordination with customers. As a result, logistics challenges add another layer of operational complexity that can undermine production continuity and customer satisfaction.

Despite these constraints, PT ZTT Indonesia views the future of the fiber optic cable industry in Indonesia as highly promising. Demand is expected to remain strong due to the continued expansion of telecommunications infrastructure, the implementation of 5G networks, the development of fiber-to-the-home services, and the growth of data centers (R2 – PT ZTT Indonesia). Government initiatives to expand internet and telecommunication access to more than 2,500 villages are also expected to increase fiber optic cable demand. However, this strong market potential is accompanied by very intense competition, with around 13 fiber optic cable factories estimated to operate in Indonesia, including major competitors such as YOFC, Furukawa, CCSI, and MBG (R4 – PT ZTT Indonesia). PT ZTT Indonesia nevertheless considers itself competitive due to its manufacturing capability, product quality, and compliance with TKDN requirements, and it even emerged as a market leader in 2023–2024 (R4 – PT ZTT Indonesia). Still, the influx of lower-priced imported products reduces the ability of local manufacturers to fully benefit from market growth and may weaken production capacity utilization (R2 – PT ZTT Indonesia). This condition shows that market opportunity and market pressure coexist within the same industrial landscape.

The findings ultimately indicate that the business prospects of Indonesia's fiber optic cable industry remain highly favorable, yet the realization of these prospects depends on the ability to address structural barriers to LCR compliance. Competition is not only coming from domestic producers but also from imported products and firms

without local production facilities that are still able to access the market and even supply SOE projects (R4 – PT ZTT Indonesia). This situation threatens the sustainability and competitiveness of local manufacturers, especially when enforcement of LCR rules remains inconsistent. Therefore, respondents emphasize the need for stronger government commitment in supervising and tightening LCR implementation to protect domestic industry. At the same time, improvements are needed in upstream raw materials, licensing efficiency, technological capability, logistics systems, and certification mechanisms. The experience of PT ZTT Indonesia demonstrates that LCR compliance in the fiber optic cable industry is shaped by a combination of industrial readiness, policy coherence, and market competition. Accordingly, effective LCR implementation requires a more integrated and supportive ecosystem so that domestic manufacturers can compete sustainably while contributing to national industrial development.

### **3. Strategic Pathways for Enhancing Local Content Requirement at PT ZTT Indonesia**

The PDCA/PDSA cycle, also known as the Deming Wheel, is applied as a strategic framework for quality control and management improvement, particularly to ensure compliance with Local Content Requirements and support domestic industry development. This method enables continuous learning and improvement in processes, products, and services (Isniah et al., 2020). In this study, challenges identified through Fishbone Analysis serve as key inputs for formulating strategies at each stage of the PDSA cycle. The model emphasizes a structured and iterative approach to problem-solving. Deming recommended applying this cycle across all stages of production to achieve sustainable improvement. As a result, the PDSA framework becomes a relevant tool for addressing LCR-related challenges at PT ZTT Indonesia. The approach integrates planning, implementation, evaluation, and corrective action into a continuous loop.

At the planning stage, the focus is on understanding the current situation, collecting data, and designing improvement strategies (Swamidass, 2000; Isniah et al., 2000). PT ZTT Indonesia must prepare a structured plan that addresses short-, medium-, and long-term objectives. In the short term, the company needs to adjust to the latest regulatory framework under Minister of Industry Regulation No. 35 of 2025 and its technical guidelines. This is particularly important in preparation for the scheduled LCR recertification process. The company must also consider strategies to balance cost efficiency with operational benefits when using local raw materials. Establishing strategic contracts with local suppliers is necessary to maintain competitive pricing. Additionally, suppliers must be encouraged to obtain LCR certification as part of the company's compliance strategy.

In the medium term, PT ZTT Indonesia can enhance its LCR value by optimizing the Company Benefit Weight component. This component contributes significantly to the overall LCR score and includes indicators such as labor absorption, investment, supply chain partnerships, and human resource development. By improving performance across these areas, the company can strengthen both compliance and its contribution to the domestic economy. In the long term, investment in research and development becomes a key strategy. R&D activities provide additional LCR value and support technological advancement within the company. This approach also encourages innovation and strengthens domestic industrial capability. Therefore, long-term planning should focus on building sustainable competitive advantages through technology and knowledge development. Such strategies align regulatory compliance with broader industrial growth objectives.

The implementation stage involves executing the planned strategies on a practical level (Isniah et al., 2020; Swamidass, 2000). PT ZTT Indonesia must ensure consistent product quality while maintaining compliance with LCR requirements. The company is also required to improve production efficiency through better material utilization, upgraded machinery, and enhanced workforce competence. Maintaining competitive pricing remains essential, particularly in cost-sensitive projects. In addition, the company must ensure reliable delivery systems and strong after-sales services. Encouraging local suppliers to obtain certification and improving their capacity is also part of this stage. A balanced approach between local and imported materials is necessary to maintain operational stability. These efforts collectively support sustainable implementation of LCR strategies.

To mitigate risks arising from global supply chain disruptions, PT ZTT Indonesia can adopt strategies such as increasing inventory levels and implementing staggered delivery schedules. Bulk purchasing and proactive monitoring of global market trends are also important to ensure supply continuity. The company must also ensure that its products remain aligned with technological developments in the telecommunications sector. Environmental considerations are another critical aspect of implementation. PT ZTT Indonesia is required to comply with environmental regulations and adopt sustainable production practices. This includes waste management, resource efficiency, and compliance with environmental standards. Coordination with relevant agencies is necessary to ensure

proper waste classification and disposal. These measures ensure that operational improvements are aligned with sustainability objectives.

The evaluation stage focuses on assessing whether the implemented strategies have achieved the desired outcomes (Isniah et al., 2020; Swamidass, 2000). PT ZTT Indonesia must monitor import processes, including customs valuation and HS Code classification, to ensure regulatory compliance. The company should also track developments in Free Trade Agreements to optimize import costs through preferential tariffs. Product benchmarking is necessary to maintain competitiveness with both domestic and international competitors. In addition, supplier evaluation plays a crucial role in ensuring consistent quality and reliability. Regular audits and assessments of supplier performance are required to maintain standards. The company must also analyze price competitiveness and production capacity alignment. These evaluation activities help identify areas for further improvement.

At the action stage, PT ZTT Indonesia implements corrective measures and long-term improvements based on evaluation results (Isniah et al., 2020; Swamidass, 2000). The company can focus on developing raw materials through collaboration with both local and international suppliers. Exploring alternative sourcing options from countries with lower tariffs is also recommended. If necessary, the company may consider investing in domestic raw material production facilities. Strengthening long-term collaboration with suppliers through forecasting and integrated planning is essential for ensuring supply stability. Regular communication and coordination with suppliers support continuous improvement and efficiency. Additionally, collaboration with industry associations such as APKABEL can facilitate better alignment between industry needs and government policies. Through this integrated approach, PT ZTT Indonesia can enhance LCR compliance while supporting sustainable industrial development.

## **CONCLUSION AND RECOMMENDATION**

### **Conclusion**

This study finds that PT ZTT Indonesia's compliance with Local Content Requirement (LCR) regulations facilitates greater access to government procurement, particularly in projects involving state-owned enterprises in the telecommunications and electricity sectors. This is driven by regulatory obligations requiring SOEs to prioritize domestic products under Law No. 3 of 2014 on Industry. These findings are consistent with previous studies indicating that LCR policies enhance domestic firms' participation in public procurement markets (Aswicahyono et al., 2022; Cosbey & Ramdoo, 2018). In addition, LCR implementation encourages the formation of industrial linkages among suppliers within the supply chain. This aligns with theoretical perspectives that emphasize the role of LCR in integrating domestic firms and MSMEs into production networks (Grossman, 1981; Macatangay, 2016; White, 2017). As a result, LCR policies contribute not only to increased market access but also to the development of backward linkages that strengthen upstream industries. Therefore, LCR can be understood as a strategic instrument for deepening national industrial structures. However, these benefits are not fully realized due to limitations in the supporting industrial ecosystem.

Despite its advantages, the implementation of LCR at PT ZTT Indonesia faces several structural challenges related to raw materials, regulation, production capacity, logistics, and business competition. The availability of domestic raw materials remains limited in terms of quality, price competitiveness, and supply continuity, leading to continued dependence on imported materials, which account for approximately 70–80 percent of fiber optic cable inputs. This condition reflects the limited technological capability and production capacity of the domestic upstream industry. Moreover, local raw materials are often more expensive than imported alternatives, increasing production costs and reducing competitiveness, which is consistent with findings from CSIS (2022). At the same time, reliance on imported materials introduces risks such as long lead times, customs delays, and exposure to global economic uncertainties. Regulatory challenges further complicate operations, including complex import licensing procedures, high tariffs, and multi-layered LCR certification processes. These factors create administrative inefficiencies and may delay project implementation. As a result, the company must navigate a complex environment that affects both operational performance and compliance.

Additional challenges arise from limitations in production technology, logistics systems, and competitive market dynamics. The domestic industry still lacks sufficient technological capability to produce high-specification materials at competitive costs, resulting in continued reliance on foreign suppliers. Logistics constraints, such as limited inter-island shipment infrastructure, weather disruptions, and delivery uncertainties, further affect operational efficiency. Meanwhile, the fiber optic cable industry in Indonesia shows strong growth potential driven by digital infrastructure expansion, including 5G networks, data centers, and rural connectivity programs. However, this growth is accompanied by intense competition from both domestic manufacturers and imported products. The influx of lower-priced imported goods reduces the market share of local producers and challenges their sustainability.

Therefore, although LCR policies support domestic industry participation, their effectiveness is constrained by structural limitations within the industrial ecosystem. These findings highlight the importance of strengthening upstream industries, improving regulatory systems, and enhancing competitiveness to ensure sustainable LCR implementation.

### **Recommendations**

This study provides several strategic recommendations for PT ZTT Indonesia to improve compliance with Local Content Requirement policies and strengthen its industrial competitiveness. The company must begin by preparing a comprehensive LCR calculation aligned with the latest regulatory framework under Ministry of Industry Regulation No. 35 of 2025. This preparation is essential, particularly in anticipation of the scheduled recertification process. In addition, PT ZTT Indonesia should develop strategic partnerships with local suppliers to maintain price competitiveness between domestic and imported raw materials. Ensuring that suppliers possess LCR certification is also a key requirement under the updated regulations. The company must actively communicate and socialize these requirements to its suppliers. Through this approach, PT ZTT Indonesia can strengthen its compliance readiness while supporting the development of domestic supply chains.

To further enhance raw material management, PT ZTT Indonesia should implement rigorous supplier evaluation and verification processes. This includes verifying legal compliance, ISO certifications, and overall supplier capability. The company should also conduct onsite audits and direct visits to supplier facilities through its Quality Control and R&D departments. These activities serve as mechanisms for providing technical guidance, training, and quality improvement support. In addition, increasing the Company Benefit Weight is recommended to optimize LCR scores through factors such as labor absorption, investment, and ESG practices. The company should also anticipate global supply chain risks by increasing inventory levels and implementing bulk purchasing strategies. Long-term forecasting and stronger supplier collaboration are necessary to ensure supply continuity. Continuous communication and periodic evaluations will allow the company to adapt its strategies effectively.

From a regulatory perspective, PT ZTT Indonesia must improve its ability to manage import compliance and optimize cost efficiency. This includes accurately evaluating customs values and ensuring proper classification of goods under HS codes. The company should also actively monitor Free Trade Agreement developments to take advantage of tariff reductions through certificates of origin. In terms of production and technology, improving efficiency remains a priority through better material utilization, machinery upgrades, and workforce development. The company should also utilize data on quality issues as a basis for supplier development and process improvement. Regular product benchmarking against competitors and affiliated companies is necessary to maintain competitiveness. In addition, investment in research and development is encouraged to enhance innovation and increase LCR value. Environmental management practices must also be strengthened to ensure compliance with sustainability standards.

In the distribution and logistics dimension, PT ZTT Indonesia is advised to strengthen its after-sales capabilities to improve customer satisfaction. An effective after-sales team can address field issues and support product development based on customer feedback. This approach contributes to improving product competitiveness and maintaining long-term customer relationships. Furthermore, logistics strategies must ensure timely delivery and efficient coordination with customers. The company should also improve planning to reduce uncertainties in distribution processes. These efforts are essential to maintain service reliability in a competitive market. Strengthening logistics performance will also support overall operational efficiency. Consequently, distribution improvements play a key role in sustaining market competitiveness.

In responding to business competition, PT ZTT Indonesia must focus on maintaining product quality and cost competitiveness. The company should develop raw materials through both local and international suppliers to ensure quality consistency and price efficiency. Exploring alternative sourcing from countries with lower tariffs is also recommended. If local suppliers are unable to meet capacity and quality requirements, the company may consider investing in domestic raw material production facilities. Such investments can ensure long-term supply stability and reduce dependency on imports. The company should also continuously monitor global telecommunications industry trends. This ensures that its products remain relevant and aligned with market needs. Through these strategies, PT ZTT Indonesia can strengthen its position in an increasingly competitive industry.

In addition to company-level strategies, this study also highlights important policy recommendations for the government. Strengthening the upstream industry is essential to reduce dependency on imported raw materials. The government should encourage investment through fiscal incentives such as tax holidays, tax allowances, and research and development support. Developing a clear roadmap for import substitution is also necessary to guide long-term

industrial development. Collaboration between domestic industries and global firms should be promoted to facilitate technology transfer. Furthermore, the establishment of research centers involving industry, academia, and government institutions can support innovation. These measures aim to build a more resilient and competitive industrial ecosystem. As a result, government support plays a crucial role in enhancing LCR effectiveness.

Regulatory reform and market protection are also critical components of policy recommendations. The government needs to harmonize derivative regulations to ensure comprehensive coverage of all cable products. Simplification of import licensing through integrated digital systems can reduce administrative delays. Tariff structures for strategic raw materials should be evaluated to ensure cost competitiveness. The LCR certification process must also be streamlined to avoid delays in project participation. In addition, customs processes should be improved through better inter-agency coordination. Strengthening supervision of unfair trade practices and ensuring compliance in SOE procurement are equally important. Overall, these policy improvements are necessary to create a more supportive environment for domestic industries and sustainable LCR implementation.

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# STRATEGIES FOR IMPLEMENTING LOCAL CONTENT REGULATIONS IN FIBER OPTIC CABLE MANUFACTURE: A CASE STUDY OF PT ZTT INDONESIA

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