LOCAL UPGRADING IN THE GLOBAL TIRE VALUE CHAIN: A THAI PRODUCER BEYOND OLIGOPOLY

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1. INTRODUCTION AND RESEARCH OBJECTIVES

The global automotive industry is currently undergoing a major structural transformation, driven by vehicle electrification, digitalisation, environmental regulation, and intensifying sustainability demands. A substantial body of research has examined how these changes are restructuring powertrain and battery supply chains, yet the reconfiguration of component industries that remain indispensable regardless of propulsion technology has attracted far less systematic attention. The automotive tire industry is a prime example of such a component sector. Tires are a safety-critical component whose demand is tied to vehicle operation itself rather than to any specific drivetrain architecture: they are equally essential for internal combustion engine vehicles and for electric vehicles. At the same time, the advance of electrification and environmental policy is likely to alter what constitutes an "optimal" tire in terms of rolling resistance, durability, noise, and materials. For these reasons, the tire industry provides a particularly meaningful and timely field in which to investigate the broader implications of the ongoing transformation of the automotive sector.

Historically, the global tire industry has been characterised by a pronounced oligopolistic structure, dominated by a very small number of vertically integrated multinationals headquartered primarily in advanced economies. The home countries of these firms have likewise occupied leading positions in international tire trade statistics, reflecting both the strength of their global brands and the comparative advantages stemming from highly developed industrial ecosystems. This oligopolistic configuration has appeared deeply entrenched, sustained by high barriers to entry rooted in materials science, precision manufacturing, and stringent safety certification requirements.

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Recent trade data, however, suggest that this configuration is undergoing significant change. New export hubs have emerged across the Global South and Eastern Europe, gradually eroding the lead long enjoyed by the traditional tire-producing nations. The central interpretive question raised by this structural shift is whether the rise of these new exporters primarily reflects the international horizontal expansion strategies of incumbent global manufacturers—relocating or establishing production facilities to optimise costs and serve regional markets—or whether locally owned firms have themselves built the technological capabilities and market access needed to become independent global exporters. These two explanations carry sharply different implications both for theories of GVC governance and for policies aimed at fostering industrial development in emerging economies.

This study is designed to distinguish between these explanations and to clarify the developmental trajectory of local firms in a safety-critical component industry. It pursues three interrelated research objectives:

RO1. To document and analyse the macro-level restructuring of the global tire GVC over 2012–2023, using trade statistics to map shifts in the competitive positions of countries across both passenger car and commercial vehicle tire segments.

RO2. To examine, through firm-level fieldwork, whether and how a representative Thai local tire manufacturer has achieved technological upgrading, export orientation, and market repositioning within the global tire GVC, thereby contributing to the multi-polarisation of an industry historically dominated by a handful of global majors.

RO3. To assess the broader theoretical and policy implications of the findings for debates on GVC upgrading, industrial development in the Global South, and the resilience of component industries under conditions of electrification, sustainability pressures, and geopolitical supply chain disruption.

2. LITERATURE REVIEW

2.1 Global Value Chain Theory and Industrial Upgrading

The concept of the global value chain has become a central organising framework for analysing how production, trade, and value creation are distributed across countries and firms in the contemporary world economy. Gereffi et al. (2005) established the foundational typology

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of GVC governance, distinguishing among market, modular, relational, captive, and hierarchical governance forms on the basis of transaction complexity, codifiability, and supplier competence. Their framework directed attention toward the question of how lead firms exercise power over upstream suppliers and downstream distributors, and under what conditions firms in developing countries can move up the value chain. Humphrey and Schmitz (2002) further specified the concept of upgrading, identifying four trajectories—process upgrading, product upgrading, functional upgrading, and inter-sectoral upgrading—that describe the pathways by which firms in developing countries can enhance the value they create and capture within a GVC. These foundational contributions set the terms for subsequent empirical research on GVC participation and upgrading in the Global South.

A critical strand of this literature focuses on the conditions under which local firms in developing countries can upgrade beyond the role of low-cost subcontractors. Schmitz (2004) argued that participation in buyer-driven GVCs often enables rapid process and product upgrading but simultaneously constrains functional upgrading by limiting the scope of activities that local firms are permitted to perform. Conversely, Giuliani et al. (2005) demonstrated in their comparative study of Latin American clusters that the degree to which local firms can upgrade depends on both the structure of external linkages and the strength of internal cluster dynamics, including local knowledge spillovers and collaborative learning. More recently, Kaplinsky and Morris (2016) drew attention to the increasing difficulty of upgrading in GVCs characterised by "adverse incorporation," in which the terms of participation systematically disadvantage developing-country suppliers even as they gain access to global markets.

Despite its theoretical richness, much of the GVC upgrading literature has focused on labour-intensive industries such as apparel, footwear, and electronics, where barriers to entry are relatively low and the technology requirements are more easily met by local firms. The applicability of these frameworks to capital-intensive, safety-critical component industries—where product standards, materials science, and precision manufacturing impose substantially higher entry barriers—has received less systematic attention, and this study addresses that gap directly.

2.2 The Automotive Component Industry and the Role of Local Firms

The automotive industry has been a major focus of GVC research, owing to its complex modular architecture, high degree of international vertical integration, and the central role of first-tier global suppliers in organising production networks (Sturgeon et al., 2008).

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Research on automotive components in developing countries has largely concentrated on the conditions under which local suppliers can enter and advance within supplier hierarchies dominated by global Tier 1 and Tier 2 firms. Chantasasawat and Kohpaiboon (2020) examined the determinants of Thailand's road vehicle exports and found that both government industrial policy and the presence of established multinational OEM customers played critical roles in sustaining Thailand's export competitiveness, which has underpinned Thailand's emergence as the "Detroit of the East" in the ASEAN region.

The question of whether the rise of Global South countries in automotive component trade primarily reflects multinational production relocation or genuine local firm development has been explored in the context of Eastern Europe and Mexico, but remains underexamined for ASEAN. Pavlínek (2018) showed that in Central and Eastern European automotive industries, the improvement in trade statistics often concealed deep foreign ownership of production and limited value capture by domestic firms, a phenomenon he termed "dependent development." Whether a comparable dynamic characterises ASEAN's tire export surge or whether, as in some East Asian cases, local firms have succeeded in building independent technological capabilities, is precisely the empirical question this study is designed to answer.

2.3 The Global Tire Industry: Structure, Oligopoly, and Emerging Competitors

The global tire industry exhibits structural characteristics that set it apart from most other automotive component industries. First, it is characterised by exceptionally high brand recognition and consumer safety sensitivity, which sustain premium pricing for established global brands and create formidable reputational barriers to entry for new competitors. Second, tire production involves sophisticated polymer chemistry, precision mould engineering, and complex curing processes, each of which represents a domain of proprietary knowledge that incumbent multinationals have developed over decades. Timmer et al. (2014), drawing on World Input-Output Database (WIOD) data, demonstrated that value-added in rubber and tire manufacturing has been increasingly concentrated in a small number of advanced-economy firms, consistent with the oligopolistic structure observed in trade statistics.

Trade data compiled from UN Comtrade for the period 2012 to 2023 confirm that the home countries of the largest global tire manufacturers—Japan (Bridgestone, Sumitomo/Dunlop, Yokohama, Toyo), France (Michelin), the United States (Goodyear), and Germany (Continental)—dominated global tire exports in 2012, together accounting for a disproportionate share of world trade value. The European Tire and Rubber Manufacturers' Association(ETRMA 2016) documented how this oligopolistic structure was reinforced by EU

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regulatory requirements for tire labelling and rolling resistance standards, which effectively raise the performance bar for all market entrants. KPMG (2019) similarly identified regulatory compliance, sustainability standards, and product certification as key structural features of the global tire market that tend to favour established players with deep R&D resources and extensive testing infrastructure.

Yet the same trade data reveal that this oligopolistic geography began to shift meaningfully over the following decade, as Thailand, Vietnam, Türkiye, and several Eastern European countries substantially improved their positions in global tire export rankings (Baba, 2024). The author's prior work presented at the Gerpisa 32nd International Colloquium in Brussels documented these structural shifts at the macro level for both passenger car and commercial vehicle tire segments and introduced a four-stage model of national competitive development—undeveloped, balanced, global supply hub, and global sourcing—to describe the developmental trajectories observed across approximately 150 countries. The present study builds directly on this foundation by adding firm-level evidence to the macro analysis.

2.4 Technology Acquisition and Market Segmentation Strategies of Local Tire Firms

A small but growing body of literature has examined how firms in developing countries have accessed the technology and market knowledge required to enter capital-intensive manufacturing industries. Hobday (1995) documented the sequential learning process through which East Asian electronics firms moved from original equipment manufacturing (OEM) to original design manufacturing (ODM) and eventually to original brand manufacturing (OBM), arguing that sustained engagement in OEM relationships provides crucial technological learning opportunities while also constraining strategic autonomy. A parallel logic applies to tire manufacturing: OEM supply relationships with established vehicle manufacturers impose exacting quality and certification requirements that, when met, serve as credible quality signals that local firms can leverage in aftermarket sales and in building export reputations.

The role of equipment sourcing in technology acquisition has also been highlighted in the literature on latecomer industrialisation. Amsden (2001) emphasised the centrality of "the rise of the rest" on the basis of borrowed technology, arguing that developing-country firms have successfully industrialised not through innovation in the Schumpeterian sense but through the disciplined mastery and incremental improvement of imported production technologies. In the tire industry, the gradual commoditisation of production equipment—including the entry of Chinese and German equipment suppliers offering radial tire machinery

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at lower price points than was historically available—has reduced one dimension of the capital barrier that previously protected incumbent manufacturers. This dynamic is directly relevant to understanding the upgrading trajectory of Thai local tire firms, which have drawn on both Japanese technical partnerships and more recently Chinese and German equipment to move from bias to radial tire production.

Market segmentation strategy represents a further dimension of competitive positioning that the literature on emerging-market firms has increasingly emphasised. Luo and Tung (2007) argued that emerging-market multinationals frequently pursue "springboard" internationalisation strategies, using overseas market entry to access resources, capabilities, and reputations that feed back into domestic competitive position. For smaller local firms that lack the resources for full-scale internationalisation, a parallel logic applies to niche segmentation: by targeting the global automotive aftermarket rather than competing directly with top-tier OEM suppliers, local firms can build international sales volume, accumulate export experience, and generate revenues that fund further capability development, while avoiding direct confrontation with global majors on their strongest competitive terrain.

3. METHODOLOGY

This study adopts a mixed-methods research design that combines macro-level quantitative trade data analysis with micro-level qualitative firm fieldwork. The two components are sequentially integrated: the trade analysis establishes the structural context within which Thailand's tire industry has evolved, while the firm-level case study examines the mechanisms through which at least one local producer has navigated and contributed to that structural change. This design enables the study to move between the aggregate patterns visible in national trade statistics and the firm-level strategies and capabilities that underlie them.

3.1 Trade Data Analysis

The quantitative component draws on the UN Comtrade database, which provides bilateral merchandise trade statistics reported by national customs authorities and harmonised according to the Harmonised System (HS) commodity classification. Two product categories are analysed: new pneumatic passenger car tires (HS 4011.10) and new pneumatic bus and truck tires (HS 4011.20). These categories correspond directly to the two principal segments of the global automotive tire market and allow for a differentiated analysis of competitive dynamics across segments that differ in their technological requirements, price points, and

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customer bases.

The analysis covers the period 2012 to 2023, a span that captures both a stable baseline year prior to the most significant structural shifts and the most recent year for which sufficiently complete multi-country data were available at the time of writing. For each year and each product category, export values, import values, and global market shares are computed for all countries with non-zero reported trade, yielding a dataset covering approximately 150 to 171 participating countries depending on the year and segment.

A central analytical indicator used throughout the study is the Global Competitiveness Index (GCI), defined as:

$$GCI = (exports - imports) / (exports + imports)$$

This index takes values between −1 and +1, where −1 represents a country that imports exclusively (complete import dependence), 0 represents a perfectly balanced trade position, and +1 represents a country that exports exclusively (complete export orientation). The GCI allows countries to be classified into three competitive types—"export-type" (GCI consistently positive and high), "balanced" (GCI near zero), and "import-type" (GCI consistently negative)—and to track transitions between these types over time.

As shown in the conceptual framework (Fig. 1), this typology forms the empirical basis for the four-stage developmental model applied in the analysis: Stage I (undeveloped, no significant trade participation); Stage II, which is defined by a GCI ranging between −0.1 and +0.1 to reflect balanced, modest trade activity; Stage III, a global supply hub characterized by a GCI between +0.1 and +1.0 due to a strong export orientation; and Stage IV, a global sourcing phase defined by a GCI between −1.0 and −0.1, representing high imports that reflect domestic market maturity, comparative advantage realignment, and a transition away from being a significant tire-producing country.

Changes in country rankings, market share trajectories, and GCI transitions are used to characterise the restructuring of the global tire GVC over the study period, with particular attention to Thailand's movement across both tire segments and to the rise of other Global South and Eastern European producers.

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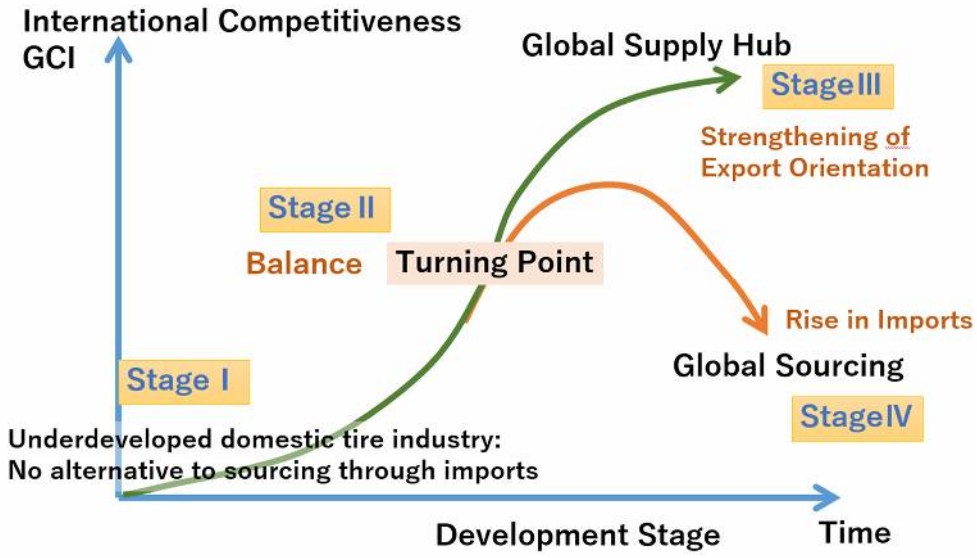
Figure 1. Conceptual Framework of the Four-Stage Developmental Model



Source: The author

3.2 Firm-Level Field Survey

The qualitative component consists of a field survey conducted at Otani Co., Ltd., a Thai locally owned tire manufacturer, in February 2026. The fieldwork comprised a factory visit and semi-structured interviews with senior management, conducted at the company's production facility in Thailand. Semi-structured interviewing was chosen as the primary data collection method because it allows systematic coverage of a predetermined set of thematic areas while preserving the flexibility to explore unexpected issues as they emerge in the course of the conversation. The interview protocol was organised around the following thematic domains: company history and founding circumstances; technology acquisition and upgrading trajectory; current production capacity, product range, and quality-control practices; domestic market positioning and competitive dynamics; export orientation, destination markets, and customer relationships; and the firm's assessment of future challenges and strategic priorities.

Interview data were supplemented by direct observation of production processes during the factory visit, and by secondary sources including company websites, industry reports, and prior published research on Thai local tire manufacturers such as Deestone, Vee Rubber, Thai Tire Rubber, and Siam Truck Radial, which are used to situate the Otani case within the broader population of Thai local producers.

The study acknowledges the limitations inherent in a single-firm case study design. The Otani case cannot be treated as statistically representative of Thai local tire manufacturers

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as a class, and caution is warranted in generalising from its specific developmental trajectory to other firms or other industries. The case is offered instead as an analytically strategic instance—a firm that has demonstrably achieved export-oriented upgrading in a capital-intensive, safety-critical industry—that allows the study to examine the mechanisms and conditions of such upgrading in depth, and thereby to generate theoretically informed propositions that can be tested in future comparative research.

4. RESULTS AND FINDINGS

4.1 GVC Restructuring: From Oligopoly to Multipolarisation

4.1.1 The Passenger Car Tire Segment (HS 4011.10)

In 2012, the global passenger car tire GVC comprised 171 participating countries, with total export value reaching approximately 44.5 billion USD. The geography of exports in the baseline year reflected the industry's historical oligopolistic structure with remarkable clarity. The top ten exporting countries in 2012 were, in descending order of export value: China, Germany, Japan, the Republic of Korea, the USA, France, Thailand, the Netherlands, Czechia, and Indonesia, collectively accounting for approximately 62 percent of world export value.

In 2023, the global passenger car tire GVC comprised 164 participating countries, with total export value reaching approximately 50.2 billion USD. As shown in Table 1, the top ten exporting countries in 2023 were, in descending order of export value: China, Germany, Thailand, the Republic of Korea, Japan, Romania, Poland, Mexico, Hungary, and the Netherlands, collectively accounting for approximately 59 percent of world export value.

Table 1. Top 10 countries in Passenger car

	2023	2012
China	1	1
Germany	2	2
Thailand	3	7
Rep. of Korea	4	4
Japan	5	3
Romania	6	16
Poland	7	11
Mexico	8	19
Hungary	9	12
Netherlands	10	8

Source: Calculated and compiled by the author based on UN Comtrade data

Over the study period, however, the composition and relative positions within this ranking shifted in ways that signal a meaningful departure from the traditional oligopolistic geography. The most striking movement was Thailand's advance from seventh place in 2012 to third place by 2023, representing a substantial gain in global market share within a single decade. Romania similarly advanced from sixteenth place in 2012 to sixth by 2023, and Mexico

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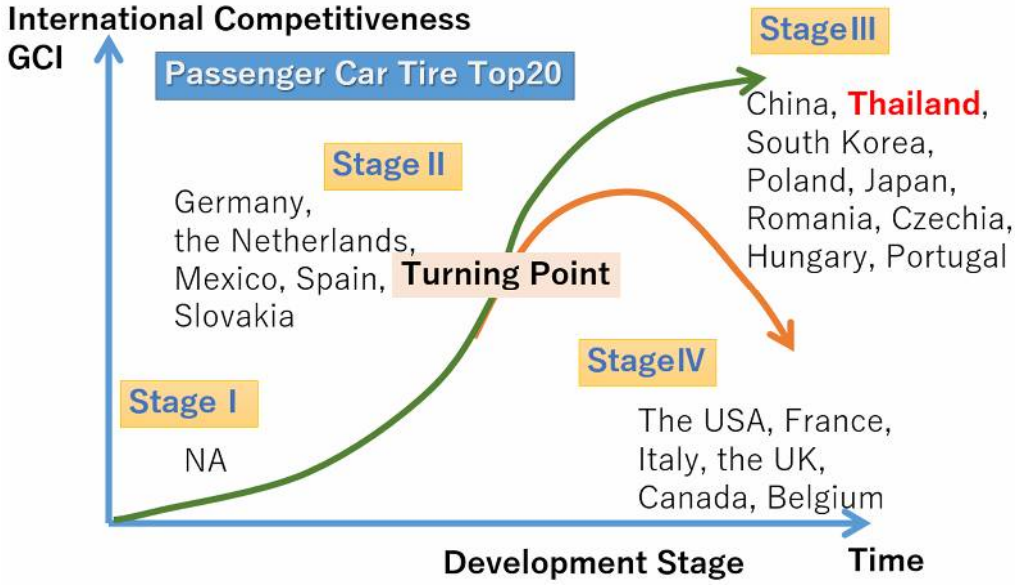
from nineteenth place in 2012 to eighth by 2023. Meanwhile several Eastern European countries—Poland and Hungary—recorded significant upward movements in global rankings, reflecting the continued development of Central and Eastern Europe as a major production zone for tire exports targeting the EU market.

In terms of the GCI-based competitive typology, the passenger car tire segment by 2023 exhibited the following national profiles as shown in Fig. 2. Export-type countries (Stage III: global supply hubs with a consistently positive and high GCI) included China, Thailand, the Republic of Korea, Poland, Japan, Romania, Czechia, Hungary, and Portugal. Balanced countries (Stage II: balanced trade positions with a GCI near zero) included Germany, the Netherlands, Mexico, Spain, and Slovakia. Import-type countries (Stage IV: global sourcing hubs with a negative GCI) included the United States, France, Italy, the United Kingdom, Canada, and Belgium. This distribution is theoretically significant: major traditional consumer markets—most notably the United States, France, Italy, and Belgium—have transitioned toward Stage IV import dependence, while production has increasingly concentrated in export-oriented Stage III hubs in Asia and Eastern Europe. The traditional home countries of major multinationals are therefore no longer synonymous with the principal export hubs of the industry.

Figure 2. Application of the four-stage developmental model to major countries (2023, Passenger Cars)



Source: The author

In summary, this analysis highlights three critical shifts in the global passenger car

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tire industry:

1. In 2012, traditional tire-manufacturing powerhouses still maintained a strong export presence, reflecting the industry's historical oligopolistic geography.
2. By 2023, however, major home countries of global tire multinationals—such as the United States, France, and Italy—demonstrated a clear transition toward import dependence (Stage IV).
3. Concurrently, countries in the Global South and Central and Eastern Europe have dramatically strengthened their export competitiveness, cementing their roles as the industry's new global supply hubs (Stage III).

4.1.2 The Commercial Vehicle Tire Segment (HS 4011.20)

In 2012, the global commercial vehicle tire GVC comprised 171 participating countries, with total export value reaching approximately 28.4 billion USD. The geography of exports in the baseline year also reflected the industry's historical oligopolistic structure with remarkable clarity. The top ten exporting countries in 2012 were, in descending order of export value: China, the USA, Japan, the Republic of Korea, Germany, Canada, Thailand, Spain, Slovakia, and France, collectively accounting for approximately 72 percent of world export value. This indicates an even higher concentration of export power in the commercial segment compared to the passenger car segment in the baseline year.

In 2023, the global commercial vehicle tire GVC comprised 164 participating countries, with total export value reaching approximately 30.5 billion USD. As shown in Table 2, the top ten exporting countries in 2023 were, in descending order of export value: China, Thailand, the USA, Germany, Vietnam, Slovakia, Japan, Canada, Spain, and Türkiye, collectively accounting for approximately 75 percent of world export value.

Table 2. Top 10 countries in Commercial Vehicle

	2023	2012
China	1	1
Thailand	2	7
USA	3	2
Germany	4	5
Viet Nam	5	25
Slovakia	6	9
Japan	7	3
Canada	8	6
Spain	9	8
Türkiye	10	13

Source: Calculated and compiled by the author based on

Over the study period, however, the composition and relative positions within this ranking shifted in ways that signal a structural reshuffling of the traditional oligopolistic

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geography, rather than its dissolution. The most striking movement was Thailand's advance from seventh place in 2012 to second place by 2023, representing a substantial gain in global market share and establishing itself as the primary export powerhouse next to China. Simultaneously, Vietnam staged an extraordinary ascent, leaping from twenty-fifth place in 2012 into the top five by 2023, while Slovakia climbed from ninth to sixth. Türkiye also entered the top ten by moving from thirteenth to tenth place. In contrast, traditional automotive leaders experienced a relative decline in their standings, with the USA dropping to third place and Japan falling from third to seventh. These shifts reflect the continued development of the Global South and South & Eastern Europe as the industry's dominant production zones for commercial vehicle tire exports, with nations like Türkiy expanding the export footprint of the developing world alongside Thailand and Vietnam.

In terms of the GCI-based competitive typology, the commercial vehicle tire segment by 2023 exhibited the following national profiles as shown in Fig. 3. Export-type countries (Stage III: global supply hubs with a consistently positive and high GCI) included China, Thailand, Spain, Vietnam, Poland, Japan, Slovakia, Türkiye, the Republic of Korea, and Luxembourg. Balanced countries (Stage II: balanced trade positions with a GCI near zero) included Canada. Import-type countries (Stage IV: global sourcing hubs with a negative GCI) included the United States, Germany, Mexico, France, Italy, Belgium, Brazil, the Netherlands, and the United Kingdom. This distribution is theoretically significant: major traditional consumer markets and manufacturing powerhouses—most notably the United States, Germany, France, Italy, and Mexico—have transitioned toward Stage IV import dependence, while production has increasingly concentrated in export-oriented Stage III hubs in Asia, Eastern Europe, and Southern Europe. The traditional home countries of major multinationals are therefore no longer synonymous with the principal export hubs of the industry.

In summary, this analysis highlights three critical shifts in the global commercial vehicle tire industry:

1. In 2012, traditional tire-manufacturing powerhouses maintained an even stronger concentration of export power than in the passenger car segment, strictly reflecting the industry's historical oligopolistic geography.
2. By 2023, however, major home countries of global tire multinationals and traditional manufacturing powerhouses—most notably the United States, Germany, France, Italy, and Mexico—demonstrated a clear transition toward import dependence (Stage IV).
3. Concurrently, countries in the Global South and South & Eastern Europe have

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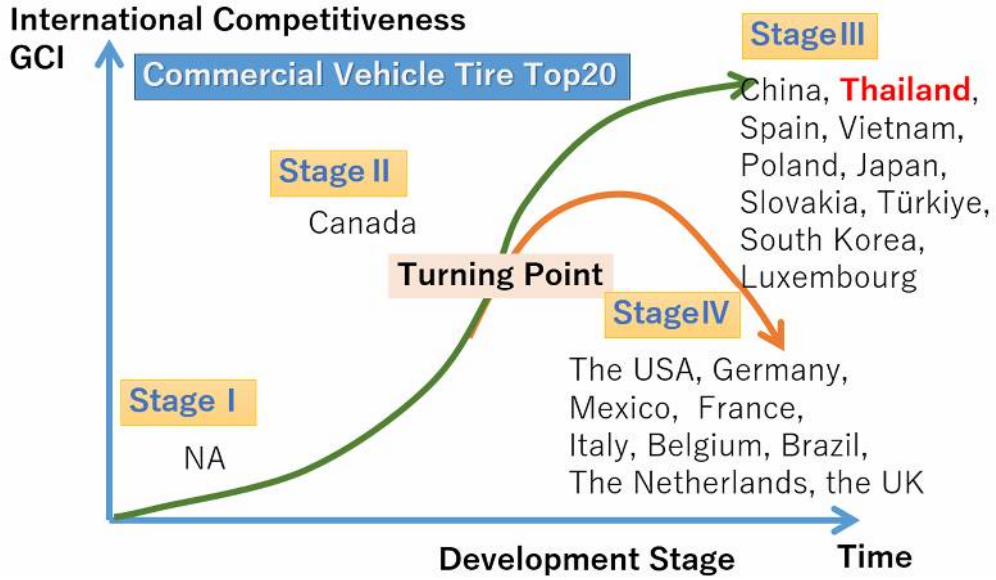
dramatically strengthened their export competitiveness, with Thailand ascending to the world's second-largest exporter and Vietnam staging an extraordinary leap into the top five global supply hubs (Stage III).

Figure 3. Application of the four-stage developmental model to major countries (2023, Commercial Vehicles)



Source: The author

4.1.3 Patterns of Multi-Polarisation and the Four-Stage Developmental Model

Taken together, the evidence from both tire segments points to a consistent pattern of multi-polarisation in the global tire GVC. The countries that dominated export rankings in 2012—those that were, or hosted the principal production facilities of, the largest global tire multinationals—have generally seen their relative positions erode over the study period, while a diverse set of countries in the Global South and South & Eastern Europe have advanced. This shift is not merely a reshuffling of rankings among a fixed set of leading nations: it involves the entry of previously marginal exporters—most strikingly Vietnam—into the upper tier of global suppliers.

This pattern can be usefully described through a four-stage model of national competitive development in the tire GVC. In Stage I, a country has negligible tire manufacturing capacity and is entirely dependent on imports to meet domestic demand; the GCI approximates −1. In Stage II, which is defined by a GCI ranging between −0.1 and +0.1 to reflect balanced, modest trade activity, two distinct structural paths emerge: first, an upward trajectory where domestic production develops to meet local demand alongside initial export

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growth; and second, a downward or flattening trajectory where traditional powerhouses experience a reduction in export dominance due to overseas production relocation, global sourcing strategies, or the reallocation of national resources to other industries with higher comparative advantage. This stage characterises countries like Germany and Canada in specific segments. In Stage III, a global supply hub characterized by a GCI between +0.1 and +1.0 due to a strong export orientation, the country has become a dominant net exporter; this stage characterises the expanding export footprint of the Global South—driven by China, Thailand, Vietnam, and Türkiye—as well as a growing cluster of Eastern and Southern European producers, including Poland, Slovakia, Romania, Hungary, Czechia, and Portugal. In Stage IV, a global sourcing phase defined by a GCI between −1.0 and −0.1, a country transitions toward an import orientation, with rising inflows reflecting the maturity of its domestic market, the comparative advantage realignment of its economy, and a transition away from being a significant tire-producing country; this stage describes major traditional markets and manufacturing powerhouses—most notably the United States, Germany, France, Italy, the United Kingdom, Mexico, and Belgium.

The movement of countries along this developmental trajectory—and in particular the rapid advancement of Thailand and Vietnam through Stages I and II into Stage III within a single decade—constitutes the macro-level finding that this paper seeks to explain through subsequent firm-level analysis. The critical unresolved question, to which the next two sub-sections turn, is whether this structural shift primarily reflects the production location decisions of incumbent global multinationals or whether it also embodies the independent development of locally owned firms with autonomous export capabilities.

4.2 What Drives Thailand's Ascent? Multinationals vs. Local Firms

Thailand's emergence as the second-largest exporter of commercial vehicle tires and the third-largest exporter of passenger car tires in the world by the early 2020s raises an interpretive question that trade statistics alone cannot resolve. Export ranking improvements at the national level are compatible with at least two fundamentally different firm-level dynamics: the first is the expansion or relocation of production by incumbent global tire multinationals seeking to optimise costs, access natural rubber supplies, and serve rapidly growing ASEAN markets from a well-positioned regional hub; the second is the endogenous development of domestically owned firms that have built independent manufacturing capabilities, established their own export channels, and begun to compete in international markets on the basis of price-quality combinations that they themselves command.

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Distinguishing between these two dynamics is essential for understanding both the nature of Thailand's industrial development and the broader implications of the GVC restructuring documented in Section 4.1.

4.2.1 The Role of Multinational Manufacturers in Thailand's Tire Industry

The dominant position of foreign-owned manufacturers in Thailand's tire industry is well established and cannot be minimised. Thailand has been the beneficiary of sustained foreign direct investment in tire production since the 1980s, driven by the country's status as the world's largest producer of natural rubber, its strategic location within ASEAN's automotive supply network, and the industrial policy environment associated with the "Detroit of the East" cluster strategy. Major global tire manufacturers with significant production operations in Thailand include Bridgestone, Sumitomo Rubber (Dunlop), Michelin, Goodyear, and ZC Rubber (Chinese), among others. Industry sources suggest that foreign-owned or foreign-affiliated manufacturers may account for as much as 90 percent of domestic tire production volume in Thailand, a figure that would imply that the overwhelming majority of Thailand's tire exports originate from the subsidiaries or affiliates of global multinationals rather than from independently owned local firms.

If this figure is accurate, it would support the hypothesis that Thailand's rise in global tire export rankings is primarily a story of multinational production geography rather than local industrial upgrading in the GVC sense. Global tire manufacturers have clear incentives to expand production in Thailand: proximity to natural rubber supply chains reduces raw material costs; established automotive OEM customers such as Toyota, Honda, Isuzu, and Mitsubishi provide a stable domestic demand base; and the country's export infrastructure and trade agreements facilitate distribution across ASEAN and beyond. Under this reading, Thailand functions principally as an optimised node in the global networks of incumbent multinationals, and its improved trade rankings reflect decisions made in Tokyo, Paris, Akron, and Hannover rather than in Bangkok.

4.2.2 Evidence for Local Firm Development

However, the multinational-dominant interpretation, while substantially correct as a description of the industry's ownership structure, does not fully account for the evidence available at the firm level. A survey of the Thai local tire manufacturer landscape reveals a set of domestically owned firms that have developed genuine manufacturing capabilities, established export operations, and achieved market positions that extend well beyond their domestic origins. The principal local manufacturers include Deestone Group (established

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1977), which has developed multi-segment production capabilities spanning passenger car, commercial vehicle, and agricultural tires and has increasingly oriented its production toward export markets in Europe and North America; Vee Rubber (established 1977), which specialises in two-wheel and bicycle tires and has achieved international recognition through OEM supply relationships; Thai Tire Rubber (TTR, established 1982), which focuses on commercial vehicle and agricultural tires with cost-competitive positioning for OEM supply to Asian and African markets; and Siam Truck Radial (established 1994), which specialises in truck and bus tires and exports to Southeast Asian and Middle Eastern markets.

The existence and export activity of these local firms indicates that Thailand's tire industry is not exclusively a multinational enclave. Rather, it exhibits a dual structure in which foreign-owned producers dominate by volume and value while a stratum of locally owned firms has developed sufficient capability to participate in international markets. The critical question is whether this local stratum is growing in absolute and relative terms—that is, whether local firms are genuinely upgrading and expanding their global presence—or whether they remain marginal contributors whose share of the industry is structurally constrained by the competitive advantages of global majors and the increasingly aggressive entry of low-cost Chinese manufacturers into the mid-market segments that local firms have historically occupied.

4.2.3 Competitive Pressure from Chinese Manufacturers

A further complicating factor in Thailand's competitive landscape is the accelerating entry of Chinese tire manufacturers, both as exporters to the Thai market and as investors establishing or expanding production facilities within Thailand. Chinese tire manufacturers—including Zhongce Rubber (ZC Rubber), Linglong Tire, Sailun, Triangle, and Shuangqian—have in recent years not only expanded exports from China but also begun to establish overseas production capacity in Southeast Asia, in part to circumvent anti-dumping measures imposed by the United States and the European Union on Chinese-origin tires. This Chinese investment has contributed to Thailand's export volume but also intensifies competitive pressure on Thai local firms, which find themselves squeezed between the premium positioning of global brands in the upper market segments and the aggressive price competition of Chinese manufacturers in the lower and mid-market segments.

According to the competitive segmentation described by Otani management, the Thai tire market is structured into four tiers: Tier 1 comprising the top global brands (Michelin, Bridgestone); Tier 2 comprising second-tier global and regional brands (Maxxis, Yokohama,

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Dunlop); Tier 3 comprising Thai local manufacturers such as Otani and Deestone; and Tier 4 comprising low-priced Chinese imports. The observation that the price boundary between Tier 1 and Tier 2 has been under downward pressure as Chinese manufacturers improve quality—thereby compressing the mid-market space in which Thai local firms operate—underscores the structural challenge facing local upgraders and contextualises the strategic choices that firms such as Otani have made in response.

The overall picture that emerges from this section is therefore one of a structurally complex industry in which multinational production dominates by volume but local firms have established a meaningful and export-oriented presence. The mechanisms through which at least one such local firm has achieved this position are examined in detail in Section 4.3.

4.3 The Otani Case: Mechanisms of Local Upgrading

Otani Co., Ltd. provides a revealing example of how a locally owned firm in the Global South can upgrade within a capital-intensive, safety-critical component industry. Founded in 1986 as a Thai family-owned enterprise, Otani has grown from a small tractor-tire producer into a diversified manufacturer of truck/bus and passenger car radial tires employing around 2,400 workers, generating annual sales of approximately 8 billion baht, and holding roughly 10 percent of the domestic Thai market, while exporting an estimated 70–80 percent of its output to markets worldwide. Its trajectory illustrates how incremental learning, strategic technology acquisition, and careful market segmentation can enable a local firm to navigate between the premium segments occupied by global brands and the low-price segments contested by Chinese manufacturers.

4.3.1 From Tire Repair to Local Manufacturer

Otani's origins lie in tire repair rather than greenfield manufacturing. The founder, Mr. S. C. Lin, a Thai entrepreneur of Chinese descent, operated a tire repair business before being approached by a Taiwanese acquaintance who proposed establishing a tire factory, promising to provide equipment and technical support. While this promise ultimately proved impossible for the partner to fulfil, the episode catalysed Otani's entry into manufacturing. Learning that a North American-owned tire factory was being closed, the founder used available capital to purchase its surplus production machinery, while recruiting two experienced Taiwanese technicians and an engineer who had left Firestone to provide the necessary production know-how. Tire moulds were initially imported from China. This combination of second-hand equipment acquisition and targeted hiring of skilled engineers

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reflects a classic latecomer strategy of "borrowed technology" adapted to the specific conditions of the tire industry.

The early years were characterised by severe operational difficulties. With limited prior manufacturing experience, the company initially produced low-quality products and operated at a loss. However, the founder's parallel activities in real estate provided financial breathing space, allowing the firm to continue investing intermittently in improved Chinese-made equipment and to pursue quality upgrades rather than exiting the industry. This willingness to endure extended periods of low profitability in pursuit of capability building is a recurrent theme in the development of successful latecomer firms and underscores the importance of patient capital in local upgrading trajectories.

4.3.2 Technological Upgrading: From Bias to Radial Tires

Technologically, Otani's upgrading path has followed a sequence from bias tractor tires to radial truck/bus tires and ultimately to radial passenger car tires. The company initially focused on tractor tires, producing bias-ply products in which carcass cords are arranged at an angle to the tread. Bias tires are structurally simpler and cheaper to manufacture, and their robustness makes them suitable for low-speed and off-road applications, but they perform poorly relative to radial tires in terms of fuel efficiency, handling, and high-speed stability. Otani's move into tractor tires thus represented a feasible entry point given its limited initial capabilities and the more forgiving performance requirements of the agricultural segment.

A key turning point in the firm's development came through its relationship with Siam Tire, a Thai firm associated with the Siam Cement Group. When Siam Tire entered a joint venture with Michelin in 1987 (Michelin Siam Group), it began seeking cost reductions in its tractor tire supply chain and approached Otani as a potential supplier.Despite lacking direct technology transfer from Michelin at this stage, Otani engaged in intense trial-and-error experimentation with compounding and manufacturing processes, eventually producing tractor tires of comparable quality to Siam Tire's existing suppliers. This achievement led to supply contracts with Siam Tire and, subsequently, OEM supply to Kubota, a major Japanese agricultural machinery manufacturer. The OEM relationship with Kubota provided Otani with both a demanding quality benchmark and a powerful reputational signal, accelerating its learning process and enhancing its credibility in both domestic and export markets.

Otani began exploring radial tire technology in the 1990s, recognising that the global market was steadily shifting from bias to radial tires for truck and bus applications. Initial plans

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to introduce radial truck/bus tires were delayed by the high cost of importing equipment from Japan and Europe and by the 1997 Asian financial crisis, which temporarily halted investment.The firm ultimately entered radial production around 2010, after identifying German-licensed radial tire equipment available at more affordable prices from Chinese manufacturers. Otani Radials Ltd. was established as a dedicated entity for radial truck/bus tire production, enabling the firm to accumulate experience with radial technology in a segment where it could leverage its existing commercial relationships.

Building on this foundation, Otani launched radial passenger car tire production in 2017, expanding into a broader range of sizes from 13 to 24 inches and achieving speed ratings up to VR and ZR, thereby covering applications from kei cars and small sedans to SUVs, sports cars, and electric vehicles.The company reports that it can also produce run-flat and studless tires in response to customer demand, although these remain niche products within its portfolio. Current production capacity stands at approximately 2,500 large truck/bus tires per day and 10,000 passenger car tires per day in two shifts. Production lines employ German tread-forming machines with two-cavity moulds, laser-based centring for precise belt placement, and X-ray inspection for internal structural defects, achieving a reported defect rate of around one percent and a takt time of roughly one finished tire every ten seconds. These quality-control practices place Otani well above the lowest-cost producers and demonstrate a substantive degree of process upgrading.

4.3.3 Export Orientation and Market Segmentation

Otani's upgrading trajectory has been closely tied to its export orientation. As of 2026, approximately 70–80 percent of the company's sales volume is exported. Export destinations are diversified: about 30 percent of exports go to the United States, around 10 percent to ASEAN markets (particularly Vietnam and Malaysia), roughly 15 percent to China, and around 20 percent to other regions including Europe, the Middle East, and Latin America. This diversification reflects a deliberate strategy of targeting the global aftermarket rather than relying primarily on OEM contracts. While the firm maintains some OEM supply relationships, management emphasises that OEM business often combines relatively low prices with exceedingly stringent quality assurance and safety requirements, particularly in areas such as double-lane-change stability tests. From Otani's perspective, the OEM channel is important for learning and reputational purposes but less attractive as a core profit centre, leading the company to focus its volume growth on the aftermarket segment where price–quality trade-offs are more favourable.

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Within the Thai domestic market, Otani situates itself in the third of four competitive segments. According to management, Tier 1 consists of top global brands such as Michelin and Bridgestone; Tier 2 includes second-tier global and regional brands such as Maxxis, Yokohama, and Dunlop; Tier 3 includes Thai local manufacturers such as Otani and Deestone; and Tier 4 consists of low-priced Chinese imports. Otani positions itself above Tier 4 in both price and quality while remaining below Tiers 1 and 2 in price, thereby targeting consumers and fleet operators who seek a balance between cost and performance. Initially, the firm aspired to move into the Tier 1–2 space, but the rapid improvement and aggressive pricing of Chinese tires have effectively lowered the price boundaries between tiers, making full convergence with premium global brands increasingly challenging. In response, Otani has adopted a strategy of maintaining current price levels while investing in further quality improvements, aiming to enhance its value-for-money positioning rather than pursuing direct head-to-head competition with either global majors or the lowest-cost Chinese producers.

4.3.4 Strategic Implications of the Otani Case

The Otani case demonstrates that local upgrading in the global tire GVC is possible, but it also underscores the constraints under which such upgrading occurs. On the one hand, the firm's trajectory from tire repair to a diversified radial tire manufacturer with global exports illustrates the effectiveness of incremental learning through OEM relationships, opportunistic acquisition of second-hand and lower-cost licensed equipment, and strategic engagement with both domestic and international markets. On the other hand, Otani's continued positioning in the third competitive tier, the intensifying squeeze between premium global brands and increasingly capable Chinese competitors, and the company's heavy reliance on the aftermarket segment all highlight the structural challenges facing local firms attempting to carve out sustainable niches in a global industry that remains, in many respects, oligopolistic.

Crucially, Otani's experience indicates that Thailand's rise as a major tire exporter cannot be understood solely as the outcome of multinational network optimisation. While foreign-owned producers remain dominant in volume terms, at least some Thai-owned firms have developed substantial manufacturing capabilities and export reach, contributing to the multi-polarisation of the global tire GVC from below. The following section builds on this insight to discuss the theoretical and policy implications of these findings for debates on GVC upgrading, industrial development in the Global South, and the future of safety-critical component industries under electrification and sustainability pressures.

5. DISCUSSION AND CONCLUSION

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5.1 Answering the Research Question

This paper set out to explain Thailand's remarkable ascent in global tire exports and to determine whether this rise primarily reflects the horizontal expansion of incumbent multinationals or whether locally owned firms have themselves upgraded to become significant global exporters. The macro-level evidence presented in Section 4.1 demonstrated a clear shift from an oligopolistic configuration—dominated by the home countries of major tire manufacturers—to a more multipolar structure in which the Global South and South & Eastern Europe, most notably Thailand, have become key export hubs in both passenger car and commercial vehicle segments. At the same time, the four-stage developmental model and the GCI-based typology showed that several traditional core countries have moved toward an import-oriented "global sourcing" position, while Thailand has transitioned rapidly into the "global supply hub" stage.

The structural interpretation of Thailand's export performance cannot, however, be reduced to a simple dichotomy between multinational and local firm dynamics. On the one hand, the dominance of foreign-owned producers in Thailand's tire industry—likely accounting for the majority of domestic production and exports—confirms that multinational production network optimisation has been a central driver of the country's improved trade rankings. Investments by Bridgestone, Sumitomo Rubber, Michelin, Goodyear, and Chinese manufacturers such as ZC Rubber have leveraged Thailand's abundant natural rubber resources, established automotive cluster, and export infrastructure, embedding the country deeply within the global production networks of incumbent tire majors. From this perspective, Thailand's rise is a paradigmatic instance of how GVC reconfiguration reallocates production across space while leaving strategic control in the hands of lead firms headquartered in advanced economies.

On the other hand, the evidence from the Otani case study and the broader landscape of Thai local manufacturers demonstrates that Thailand's ascent in the tire GVC is not solely the outcome of foreign capital and control. Otani's trajectory—from a tire repair business to a diversified producer of radial truck/bus and passenger car tires exporting 70–80 percent of its output to multiple world regions—shows that locally owned firms can develop substantial technological capabilities and export reach even in a safety-critical, capital-intensive industry. The existence of other export-active Thai local manufacturers such as Deestone, Vee Rubber, Thai Tire Rubber, and Siam Truck Radial further indicates that a stratum of indigenous firms has emerged which contributes meaningfully, albeit still modestly in aggregate, to Thailand's

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export performance and to the de-oligopolisation of the global tire GVC.

The research question can therefore be answered in a nuanced way. Thailand's rise as a major tire exporter is primarily underpinned by the international production strategies of incumbent global manufacturers, which continue to dominate the industry in volume, technology, and brand power. At the same time, the country's trajectory also reflects the independent upgrading of locally owned firms that have carved out intermediate market segments through incremental learning from OEM relationships, strategic acquisition of affordable foreign equipment, and export-oriented aftermarket strategies. The interaction between these two dynamics—multinational network optimisation from above and local firm upgrading from below—is what underlies the multi-polarisation of the global tire GVC described in this paper. The following sub-sections elaborate the theoretical and policy implications of this dualistic but mutually reinforcing pattern of development.

5.2 Theoretical Implications for GVC and Upgrading

The findings of this study carry several implications for theories of global value chains and industrial upgrading. First, they qualify the widespread assumption in the GVC literature that the emergence of Global South export hubs in sophisticated manufacturing industries can be explained primarily by the spatial reorganisation of multinational production networks. Much of the existing work on automotive GVCs has emphasised the role of lead firms and first-tier suppliers in orchestrating global production, often treating developing-country locations as sites of cost-driven production relocation with limited indigenous capability building. The Thai tire industry certainly exhibits features of such "dependent development," with foreign-owned manufacturers dominating production and export volumes, yet the Otani case demonstrates that this is not the whole story.

By documenting how a locally owned firm has moved from bias tractor tires to radial truck/bus and passenger car tires, and from a purely domestic base to a diversified global export portfolio, this study shows that upgrading in a safety-critical, capital-intensive component industry can proceed through mechanisms analogous to those observed in more widely studied, less technologically demanding sectors such as apparel and electronics. Otani's trajectory illustrates classic process and product upgrading via incremental learning from OEM relationships, functional upgrading through the development of its own brand and export channels, and inter-segment upgrading from agricultural to passenger car and commercial vehicle markets. This suggests that the conceptual toolkit developed by Humphrey, Schmitz, and others for labour-intensive industries can, with appropriate caution, be extended to

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component industries characterised by higher technological and regulatory barriers, provided that we pay close attention to the specific forms of technology access (e.g., equipment imports, engineering talent recruitment) and quality assurance required in such sectors.

Second, the four-stage national competitive development model applied in this paper contributes to ongoing efforts to integrate macro-level trade patterns with micro-level upgrading trajectories. By linking changes in export rankings and GCIs to distinct stages—undeveloped, balanced, global supply hub, and global sourcing—the model provides a heuristic for understanding how countries move from import dependence to export orientation and, in some cases, back toward import reliance as their economies mature and comparative advantages shift. The rapid transition of Thailand and Vietnam into the "global supply hub" stage in commercial vehicle tires underscores that such movement can occur over relatively short time horizons when global lead firms reorganise their production networks and when local firms are able to leverage these shifts for their own upgrading. At the same time, the persistence of foreign ownership dominance in Thailand cautions against interpreting Stage III as synonymous with autonomous national control over an industry; the stage instead denotes a trade position that may be underpinned by a variety of ownership and governance configurations.

Third, the Thai case refines debates on "adverse incorporation" and "middle positions" in GVCs. Local firms such as Otani occupy an intermediate space between premium global brands and low-cost Chinese competitors, supplying mid-market segments in both domestic and international aftermarket channels. This position offers room for capability building and profit generation but is also structurally precarious, as improvements in Chinese quality and continuing cost competition compress margins from below, while premium brands defend the upper segments through brand power, technological innovation, and regulatory compliance advantages. Theoretically, this suggests that upgrading trajectories that culminate in durable mid-tier positions may be a more realistic outcome for many local firms in safety-critical component industries than full convergence with global leaders. Such mid-tier positions nonetheless matter for GVC structure: by eroding the oligopolistic dominance of a few incumbents and contributing to multi-polarisation, they reshape competitive dynamics even if they do not overturn existing hierarchies.

Finally, the study highlights the importance of viewing GVC upgrading and multi-polarisation as joint outcomes of both top-down and bottom-up processes. Multinational network optimisation "from above" and local firm upgrading "from below" are not mutually

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exclusive explanations but interacting drivers of structural change in the tire GVC. Theoretical frameworks that focus exclusively on either lead-firm strategies or local capabilities risk missing this interaction. A more complete account must incorporate both the strategic calculus of global majors and the agency of local capital in exploiting the windows of opportunity created by shifts in technology, regulation, and market demand.

5.3 Policy Implications for Thailand and the Global South

The Thai case carries several policy implications for governments in the Global South that seek to leverage GVC participation in safety-critical component industries for broader industrial development. For Thailand itself, the findings suggest that the long-standing cluster strategy often described as the "Detroit of the East" has been effective in positioning the country as a global hub for automotive and tire production, but that further policy refinement is needed if local firms are to deepen their upgrading trajectories rather than remain a thin stratum beneath dominant multinationals. The combination of infrastructure investment, export-oriented industrial estates, and investment promotion policies has successfully attracted global tire manufacturers and stimulated export growth, yet the persistence of foreign ownership dominance indicates that localization of technological capabilities and strategic control remains incomplete.

First, industrial policy should explicitly address the interfaces between multinational producers and local firms. The Otani case underscores the importance of OEM relationships as channels for capability building, particularly in meeting stringent safety and quality standards. Policy instruments that encourage global tire manufacturers to source selectively from qualified local suppliers, involve them in joint development projects, or provide structured technical assistance could amplify these learning effects. This might include co-funded supplier development programmes, tax incentives conditional on local sourcing and technology transfer commitments, or public support for collaborative testing and certification facilities that are accessible to both foreign and domestic firms. Strengthening these interfaces would help ensure that Thailand's role as a production base for multinationals translates more directly into the upgrading of indigenous firms.

Second, the findings highlight the need for financial and institutional support tailored to the capital-intensive nature of tire manufacturing. Otani's trajectory shows that upgrading from bias to radial tires and from agricultural to passenger car and commercial vehicle segments required substantial investment in specialised equipment, such as high-precision tread-forming machines, laser-based centring systems, and X-ray inspection facilities. Access

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to patient capital was critical in enabling the firm to endure early losses and pursue long-term capability building. Industrial policy frameworks that provide long-term credit at reasonable rates, facilitate leasing or co-financing of advanced equipment, and support R&D in materials and process innovation can lower the barriers to technological upgrading for local firms. Such measures are particularly important in industries where safety and regulatory compliance make underinvestment in quality-enhancing equipment a high-risk strategy.

Third, the Thai experience suggests that regulatory and sustainability agendas can be harnessed as levers for upgrading rather than treated solely as compliance burdens. EU and domestic regulations on rolling resistance, wet grip, noise, and environmental performance have historically favoured established global brands with strong R&D capabilities. However, if domestic regulators and industry associations design standards and labelling schemes that reward demonstrable improvements in safety and environmental performance, local firms may be incentivised to invest in higher-value products and to differentiate themselves from low-cost competitors. Support for testing facilities, joint research on eco-friendly compounds, and certification schemes that are accessible to mid-sized local firms can help them move upward within increasingly sustainability-conscious global markets.

For other Global South countries, particularly those such as Vietnam and Türkiye that have recently emerged as major tire exporters, the Thai case offers both inspiration and caution. On the positive side, it shows that export-oriented upgrading is possible even in an industry historically dominated by a small number of global majors, provided that policy frameworks foster both multinational investment and local firm development. On the cautionary side, it underlines the structural vulnerability of local firms operating in intermediate market segments, especially in the face of intensifying competition from Chinese manufacturers that combine improving quality with aggressive pricing. Policymakers in these countries must therefore balance the short-run gains from hosting multinational production with longer-term strategies to nurture indigenous firms that can occupy defensible niches in global markets.

Finally, in the broader context of electrification and sustainability, the findings suggest that safety-critical component industries such as tires will continue to play a central role in national industrial strategies even as powertrain technologies evolve.[file:12] Governments seeking to position their economies in the emerging landscape of electric and connected mobility should recognise that upgrading in components like tires, brakes, and steering systems can provide resilient sources of export earnings and technological capability that are less vulnerable to shifts in specific propulsion technologies. Policies that integrate

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component-industry upgrading with national EV and sustainability agendas may therefore yield more robust development paths than strategies focused narrowly on batteries or final vehicle assembly.

5.4 Limitations and Directions for Future Research

Like any case-based study, this research has several limitations that must be acknowledged. First, the firm-level analysis relies primarily on a single case, Otani, as the principal lens through which local upgrading in the Thai tire industry is examined. While Otani is analytically strategic in that it is a clearly export-oriented, technologically upgraded local producer in a safety-critical, capital-intensive industry, it cannot be assumed to be statistically representative of all Thai local tire manufacturers. Other local firms such as Deestone, Vee Rubber, Thai Tire Rubber, and Siam Truck Radial may exhibit different ownership structures, technology acquisition paths, market strategies, and performance outcomes. A fuller understanding of local upgrading in Thailand's tire GVC would require comparative analysis across multiple firms and segments.

Second, the macro-level analysis is based on trade statistics and the GCI, which capture cross-border flows of goods but not the distribution of value added, ownership, or profitability within national industries. UN Comtrade data cannot distinguish between exports produced by foreign-owned subsidiaries and those produced by domestically owned firms, nor can it reveal the internal cost structures, margins, or R&D expenditures of the firms behind the trade flows. As a result, the four-stage developmental model developed in this study must be interpreted as a heuristic for trade-based competitive positioning rather than as a direct measure of underlying economic upgrading or income capture. Integrating input–output data or firm-level financial information would allow future research to refine this model and to better distinguish between export growth that reflects genuine domestic capability building and export growth that primarily reflects foreign-controlled enclave production.

Third, the fieldwork conducted at Otani, while rich in qualitative detail, is temporally and thematically bounded. The factory visits and interviews took place in February 2026 and provide a snapshot of the firm's operations and strategies at that point in time. They do not capture in real time how the firm responds to subsequent shocks, such as further tightening of environmental regulations, new trade remedies targeting tire imports, or abrupt changes in demand associated with economic downturns or technological shifts in mobility. Moreover, the interviews necessarily rely on management accounts of the firm's history and strategy, which may be subject to selective recall or strategic framing. Triangulating these accounts with

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internal documents, worker perspectives, and customer views would strengthen the robustness of the firm-level analysis.

Fourth, the analysis of competitive dynamics vis-à-vis Chinese manufacturers is based largely on secondary reports and qualitative assessments rather than on systematic firm-level or trade-restriction data. While it is clear that Chinese manufacturers have improved quality and expanded both export and overseas production presence, the precise magnitude of their impact on Thai local firms' market shares and margins is not quantified in this study. Future research could remedy this by combining detailed import data disaggregated by origin and brand with price and performance information in key destination markets, thereby providing a more granular picture of how Chinese competition reshapes the strategic space available to local upgraders.

These limitations point directly to several avenues for future research. At the firm level, comparative case studies encompassing multiple Thai local tire manufacturers would allow the identification of common and divergent upgrading paths, as well as the role of ownership, governance, and managerial choices in shaping outcomes. Extending such comparative work to local firms in other emerging export hubs—most notably Vietnam and Türkiye—would make it possible to test whether the mechanisms observed in the Thai case travel across contexts. At the industry level, combining trade statistics with value-added and employment data would help clarify the developmental significance of tire GVC participation for host economies, particularly in terms of wages, skill formation, and spillovers to related industries such as synthetic rubber, machinery, and logistics.

Methodologically, longitudinal research designs that follow specific firms over time through repeat field visits and panel interviews could provide deeper insights into how local firms navigate successive waves of technological and regulatory change. In the context of electrification and sustainability, future studies might also explore how local tire manufacturers engage with emerging technologies such as smart tires with embedded sensors, low-rolling-resistance compounds, and circular-economy strategies including retreading and material recycling. Investigating whether and how local firms participate in these innovation domains would shed light on their prospects for moving beyond mid-tier positions in global markets.

Despite these caveats, the present study makes a substantive contribution by demonstrating that the restructuring of the global tire GVC is driven not only by the spatial optimisation strategies of incumbent multinationals but also by the incremental yet significant

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upgrading of local firms in the Global South. In doing so, it shows that component industries that remain essential under electrification, such as tires, can serve as important arenas for industrial development and for the gradual erosion of entrenched oligopolistic structures. For scholars of GVCs and industrial upgrading, the Thai tire industry thus provides a valuable empirical field in which to observe how top-down network reconfiguration and bottom-up local capability building interact to produce a more multipolar global industrial landscape.

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