Research on Dilemmas and Optimization Paths of Green Accounting Transformation of Manufacturing Enterprises in the Greater Bay Area from the Perspective of Carbon Peaking and Carbon Neutrality Goals

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Abstract: The carbon peaking and carbon neutrality goals have driven comprehensive green and low-carbon transformation across industries. Green accounting serves as a core tool for enterprises to calculate environmental costs, control carbon emissions and achieve sustainable development. As a highland for advanced manufacturing agglomeration in China, the Greater Bay Area (GBA) needs to advance the green accounting transformation of manufacturing enterprises to implement the dual-carbon goals and balance industrial development with ecological protection. At present, the transformation of regional manufacturing enterprises is hindered by a lack of unified institutional standards, non-standard accounting systems, low-quality information disclosure and insufficient regional coordination. Based on the cross-border manufacturing agglomeration characteristics of the GBA, this paper sorts out the current development of green accounting, analyzes practical transformation dilemmas, and proposes optimization paths from institutional construction, accounting optimization, information disclosure and regional coordination. It provides practical references for manufacturing enterprises in the GBA to improve their green accounting systems and offers regional experience for the low-carbon accounting transformation of manufacturing industries nationwide.

Keywords: Carbon Peaking and Carbon Neutrality Goals; Manufacturing Enterprises; Green Accounting; Accounting Transformation

1. Introduction

China put forward the carbon peaking and carbon neutrality development strategy in 2020, shifting industrial development from extensive growth to intensive high-quality green development. Traditional financial accounting only focuses on economic benefits while ignoring resource depletion and carbon emission costs, failing to meet the demands of low-carbon governance. Based on the sustainable development theory, green accounting incorporates carbon assets, carbon liabilities, environmental costs and ecological benefits into the accounting scope, balancing economic, social and ecological benefits. It acts as a vital management tool for enterprises to cut carbon emissions and foster green competitiveness.

The GBA boasts a complete manufacturing system and vigorous economic vitality, gathering a large number of manufacturers engaged in electronics, high-end equipment, light industry and chemical sectors, making it a key region for national manufacturing low-carbon transformation. Guangdong Province and cities within the GBA have successively issued supporting policies on ecological environmental protection and carbon peaking. Together with the expansion of the regional carbon trading market and abundant green financial instruments, a favorable external environment has been created for green accounting transformation. Nevertheless, Hong Kong and Macao adopt International Financial Reporting Standards (IFRS), while mainland enterprises have an underdeveloped foundation in green accounting. Most enterprises still follow traditional accounting models, suffering from ambiguous environmental cost accounting, inadequate carbon emission control and formalized disclosure of green information.

2. Current Development of Green Accounting among Manufacturing Enterprises in the GBA

2.1 Improved Policy System Creates a Mature

External Transformation Environment

Guangdong Province and local governments in the GBA have issued documents including the Ecological Environmental Protection Plan for the Guangdong-Hong Kong-Macao Greater Bay Areaand the Guangdong Carbon Peaking Implementation Plan, clarifying requirements for manufacturers on carbon emission accounting, environmental cost control and green information disclosure. The expanding regional carbon trading market, green credit and carbon quota trading mechanisms compel enterprises to establish green accounting systems to accurately measure carbon-related income and expenditure. Hong Kong and Macao have long adopted mature international green accounting standards, offering valuable references for mainland enterprises, and an initial pattern of coordinated green accounting development across the region has taken shape.

2.2 Polarized Transformation Awareness with Slow Progress among Micro, Small and Medium-Sized Enterprises (MSMEs)

Amid stricter environmental supervision, listed and large-scale manufacturers in the GBA have strong awareness of green development. They carry out basic work such as carbon emission statistics, environmental expense collection and social responsibility report disclosure, and some have set up simple green accounting modules. However, MSMEs constitute the main body of manufacturing in the GBA. They prioritize production over environmental protection and short-term economic gains, ignoring the value of green accounting in risk prevention and green financing, and barely carry out green accounting reform, leading to a stark gap in transformation quality across the industry.

2.3 Narrow Accounting Scope Restricts the Managerial Value of Green Accounting

Green accounting in regional enterprises remains in the initial exploration stage with one-sided accounting coverage. Most enterprises only record explicit expenditures such as pollution discharge fees, environmental fines and pollution treatment equipment purchases, while ignoring implicit long-term elements including carbon emission right assets, low-carbon R&D investment, resource depletion and carbon emission reduction subsidies. As a result, the true green costs and benefits of enterprises cannot be fully reflected. Moreover, green accounting merely stays at the bookkeeping level without linking accounting data to production optimization, cost control and business decision-making, failing to support low-carbon technological upgrading and carbon management and giving full play to its managerial value.

3. Practical Dilemmas in the Green Accounting Transformation of Manufacturing Enterprises

3.1 Lack of Unified Green Accounting Institutional Standards and High Cross-Border Institutional Adaptation Costs

China has no special green accounting standards at present. Existing accounting standards only sporadically regulate conventional environmental expenditures, lacking special accounting rules for carbon assets, carbon liabilities and carbon emission costs, leaving enterprises without unified implementation criteria. The accounting systems of Guangdong, Hong Kong and Macao are separated: mainland China applies Chinese Accounting Standards with loose green accounting requirements, while Hong Kong and Macao adopt IFRS with stricter standards for carbon disclosure and environmental risk control. Cross-border enterprises need to adapt to two sets of accounting systems, pushing up operating costs, causing inconsistent accounting calibers and weakening data comparability across the industry.

3.2 Non-Standard Accounting Mechanisms Limit Refined Environmental Cost Control

Most enterprises have not built standardized green accounting systems. First, the accounting scope is narrow, omitting implicit costs such as carbon emissions and ecological restoration and distorting accounting results. Second, the single historical cost measurement method cannot accurately value new green assets including carbon quotas and green patents. Third, there are no dedicated green accounting posts; financial staff handle relevant work part-time without standardized ledgers, resulting in scattered statistics of carbon and environmental data and hindering refined low-carbon management.

3.3 Insufficient Internal Disclosure Incentives and Imperfect Incentive-Restraint Supervision Mechanisms

Although listed companies are mandated to disclose environmental information, they generally avoid unfavorable content and lack quantitative data. MSMEs have little willingness to disclose voluntarily. Green accounting requires high upfront investment, while the economic benefits of emission reduction lag behind. MSMEs lack internal motivation to improve green accounting systems due to short-term cost concerns. In addition, the industry lacks supporting reward and punishment mechanisms, making it difficult to restrict false and perfunctory disclosure and dragging down the overall disclosure quality.

3.4 Absence of Regional Coordination Mechanisms Hinders Integrated Green Accounting Development

There are inherent differences in accounting standards, environmental supervision and carbon market rules among Guangdong, Hong Kong and Macao, with no regular green accounting coordination platform established. Supervision standards and disclosure requirements are not interconnected, making it hard to share advanced experience and imposing high multi-standard adaptation costs on cross-border manufacturers. The integrated advantages of industrial clusters in the GBA cannot be translated into green governance strengths, as green accounting development operates independently in the three regions and slows down overall transformation progress.

4. Optimization Paths for Green Accounting Transformation

4.1 Improve Regional Institutional Norms and Build an Integrated Green Accounting Standard System

Collaborate with government regulators, industry associations and research institutions to formulate regional green accounting implementation rules tailored to local conditions, unifying accounting calibers, measurement methods and disclosure indicators for carbon assets, carbon liabilities and carbon emission costs. Establish a regular communication mechanism for green accounting across the GBA, sort out institutional differences among the three regions and formulate mutually recognizable accounting standards for cross-border enterprises to break institutional barriers. Incorporate enterprises' green accounting implementation and information disclosure into environmental credit evaluation to strengthen institutional supervision.

4.2 Restructure Refined Accounting Systems to Fully Measure Carbon and Environmental Elements

Enterprises shall reconstruct the traditional accounting framework. First, expand the accounting scope by adding special accounts for carbon emission rights, low-carbon R&D, ecological depletion and carbon emission reduction benefits. Second, combine historical cost with fair value measurement based on regional carbon market prices to boost the accuracy of green asset valuation. Third, set up special green accounting ledgers and clarify data submission responsibilities of all departments, embedding green accounting data into the whole process of production, cost control and strategic decision-making to maximize its decision-making value.

4.3 Establish Tiered Disclosure Mechanisms and a Reward-punishment Supervision System

Implement tiered disclosure rules: listed companies and high-energy-consuming large-scale manufacturers shall conduct mandatory comprehensive quantitative disclosure of core indicators including carbon emissions, carbon assets and environmental costs; formulate simplified disclosure standards for MSMEs to guide voluntary disclosure. Industry associations shall unify disclosure templates and statistical calibers to improve data comparability. Match supporting incentive and restraint policies: offer preferential green credit and special subsidies to enterprises with standardized disclosure and outstanding emission reduction effects; impose credit publicity and disciplinary penalties on enterprises with false disclosure to drive quality improvement.

4.4 Build a Regional Collaborative Sharing Platform to Integrate Green Accounting across the GBA

Set up regular cooperation mechanisms among regulatory authorities and industry associations in Guangdong, Hong Kong and Macao to exchange green accounting policies, accounting standards and supervision experience, and optimize regional management systems by drawing on mature international green accounting experience from Hong Kong and Macao. Build a GBA green accounting information sharing platform to interconnect corporate green data and environmental credit evaluations, simplify accounting procedures for cross-border enterprises, cut institutional adaptation costs and promote coordinated green transformation of manufacturing clusters.

5. Conclusion and Prospect

Based on the cross-border manufacturing agglomeration features of the GBA, this paper sorts out the current status of green accounting among regional manufacturers, summarizes six transformation dilemmas covering institutions, accounting, disclosure, talent, regional coordination and digitalization, and constructs targeted optimization paths suited to the GBA. This system can effectively resolve transformation pain points of enterprises, shift corporate accounting logic from single economic benefit measurement to coordinated management of economic and ecological value, and accelerate the low-carbon upgrading of manufacturing industries in the GBA.

With the continuous implementation of dual-carbon policies, deepening integration of the GBA and iterative upgrading of digital technologies, unified regional green accounting standards will be further refined, and cross-regional collaborative governance mechanisms will become more mature. Green accounting will be deeply embedded in the whole industrial chain operation of manufacturing enterprises, serving as a core support for the GBA to implement national dual-carbon strategies and achieve green high-quality development.

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