Exploration of Issues in Carbon Accounting Services of Accounting Firms under the "Dual Carbon" Targets

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Abstract: *Under the background of the "dual carbon" targets, accounting firms, as professional service institutions, play an increasingly important role in the field of carbon accounting services. This paper deeply explores the issues in carbon accounting services of accounting firms under the "dual carbon" targets by studying the profound impact of the "dual carbon" targets on the accounting field, the importance of accounting firms expanding their carbon accounting services, and proposes corresponding solutions.*

Keywords: *Dual carbon targets; accounting firms; carbon accounting services; issue exploration*

Introduction

In the face of global climate change, China has proposed the "dual carbon" targets, aiming to peak carbon emissions by 2030 and achieve carbon neutrality by 2060. These dual carbon targets—achieving peak carbon emissions and carbon neutrality—represent a landmark strategic action for China and the world in addressing climate change. The introduction of the dual carbon targets has had a profound impact on the accounting industry. As professional service institutions, accounting firms play an important role in the realization of these targets through their carbon accounting services. These services not only provide support for enterprises to achieve the dual carbon targets but also offer a basis for governments when formulating related policies. This paper aims to analyze the opportunities and challenges for accounting firms in the field of carbon accounting services, including the policy environment, technological advancements, talent demand, and risk response strategies, and provide strategic suggestions for optimizing and developing carbon accounting services within accounting firms.

1. Literature Review

1.1 Theoretical Foundations and Development of Carbon Accounting

At the 1992 United Nations Climate Conference, the "United Nations Framework Convention on Climate Change" was established, and in 1997, carbon emissions trading was formed by recognizing carbon emissions rights as a commodity. The concept of carbon accounting emerged based on the carbon emissions trading system. Carbon accounting generally refers to a new accounting science that confirms, measures, reports, and assesses the fulfillment of low-carbon responsibilities, energy conservation, emission reduction, and natural resource utilization by enterprises, based on energy-environmental laws and regulations, using monetary, physical units, or descriptive forms. It discloses the efficiency of corporate natural capital and social benefits. The theoretical foundations of carbon accounting primarily include sustainable development theory, environmental economics theory, and social responsibility theory. Sustainable development emphasizes the coordinated progress of the economy, society, and environment. Carbon accounting encourages enterprises to take positive actions in carbon emissions to align with this concept[1].

1.2 Evolution of Accounting Firm Service Businesses

With economic development and changes in market demand, the services provided by accounting

firms have continuously evolved. These services have gradually expanded from traditional financial auditing and tax planning to management consulting, internal control auditing, and other areas. Since 1993, carbon accounting has undergone multiple attempts and adjustments, reflecting the complex interaction between accounting standards and carbon market practices. Although IFRIC 3 initially provided guidance, it was withdrawn due to controversy. Subsequent joint research by the IASB and FASB did not achieve breakthroughs, but laid the foundation for future standard-setting. Practices in the European Union and Australia show that the development of carbon markets has introduced new requirements for accounting treatment. Today, under the dual carbon targets, new carbon accounting services, such as carbon management accounting, carbon financial accounting, carbon information disclosure, and reporting, have emerged. These services assist enterprises in achieving low-carbon transformation, adapting to sustainable development requirements, and providing more comprehensive and diversified professional services. As a result, accounting firms are playing an increasingly important role in economic and social development, continuously enhancing their competitiveness and value.

2. Analysis of the Demand and Supply of Carbon Accounting Services

2.1 Demand for Carbon Accounting Services

With the increasingly severe issue of global climate change, as well as the establishment of carbon emission regulations and market mechanisms by governments, the demand for carbon accounting services has significantly increased in recent years. Especially in China, with the introduction of the "dual carbon" targets—namely, the strategic goals of carbon peaking and carbon neutrality—enterprises and organizations are facing increasingly strict carbon emission constraints and market pressures, which have directly driven the demand for carbon accounting services. Enterprises and organizations urgently require carbon accounting services in the face of policy regulations, market pressures, internal management needs, and technological advancements. These demands have driven the development of the carbon accounting services market and require service providers to offer more specialized and technical solutions. With the implementation of China's "dual carbon" targets, the demand for carbon accounting services is expected to continue to grow[2].

2.2 Supply of Carbon Accounting Services

The carbon accounting services provided by accounting firms typically include the quantification, monitoring, reporting, and verification of greenhouse gas emissions. These services help enterprises comply with relevant environmental regulations while also supporting internal environmental management and communication with external stakeholders. The service content may also include carbon footprint analysis, the formulation of carbon neutrality strategies, and participation in the carbon trading market. Although the market is gradually maturing, it still faces many challenges. Addressing these issues requires not only the joint efforts of the industry but also the support and cooperation of governments, research institutions, and educational sectors.

3. Impact of Dual Carbon Targets on the Accounting Industry

3.1 Impact of Dual Carbon Targets on Corporate Accounting

Strengthened carbon emission accounting and reporting: The introduction of the dual carbon targets has prompted corporate accounting to expand from traditional financial reporting to environmental information reporting. Enterprises need to not only focus on financial status and business results but also accurately measure, record, and report carbon emissions. This requires upgrading corporate accounting systems to support the collection, analysis, and disclosure of carbon emission data, ensuring the accuracy and compliance of the information[3].

Carbon asset and liability management: With the establishment of the carbon emissions trading market, carbon emission rights have become assets or liabilities for enterprises. Corporate accounting needs to handle economic activities such as the purchase, holding, and trading of carbon emission rights, incorporating them into the balance sheet, while calculating the fair value changes of carbon emission rights and including them in the profit and loss of the period.

3.2 Accounting Standards and Carbon Accounting Information Disclosure

Adjustment of standards to meet dual carbon targets: Accounting standards need to be adjusted to regulate the accounting treatment of carbon emissions and carbon asset management. The standards should clearly define the recognition, measurement, subsequent measurement, and disclosure criteria for carbon assets to ensure the comparability and consistency of the information.

Information disclosure requirements: Enterprises need to regularly disclose their carbon emissions, carbon asset management status, emission reduction measures, and their effectiveness in accordance with regulatory requirements. This disclosure includes not only direct and indirect greenhouse gas emissions but also the status of carbon emission rights holdings and transactions, as well as the impact of carbon emissions on financial status and business results (Research on the Carbon Accounting Information Disclosure of Listed Companies in China).

3.3 Impact of Carbon Emissions Trading on Accounting Treatment

Increased complexity of accounting treatment: The introduction of carbon emissions trading brings new accounting requirements. For example, when an enterprise purchases carbon emission rights, it must recognize them as assets. When selling or using them, it must reduce the assets accordingly and recognize revenue or costs. In addition, the impact of market value fluctuations of carbon emission rights on financial statements must be considered[4].

Risk and uncertainty management: The volatility of the carbon emissions market brings risks to enterprises, including price fluctuation risks and transaction default risks. Accounting systems must be able to identify and measure these risks to ensure the authenticity and fair reflection of accounting information.

4. Current Status of Carbon Accounting Services in Accounting Firms

4.1 Content of Carbon Accounting Services Provided by Accounting Firms

Under the dual carbon targets, the business scope of accounting firms has evolved to include carbon accounting services. For example, carbon management accounting has two main aspects: First, it involves managing a company's carbon assets, achieving carbon trading compliance at the lowest cost through asset replacement, investment, and other means. Second, it includes incorporating the cost of carbon dioxide emissions into the operating costs of the enterprise, accurately recording and analyzing relevant business activity information to provide effective financial data for investment decisions.

Enterprises disclose carbon trading information to stakeholders, including shareholders, tax authorities, consumers, regulatory bodies, and potential investors, through financial statements. To enhance both horizontal and vertical comparability of financial reports, it is necessary to establish unified standards for recording carbon trading. Carbon information disclosure and reporting: On one hand, carbon information disclosure helps enterprises assess their operational status, aiding investors in identifying risks and making sound investment decisions; on the other hand, it supports regulatory bodies in effectively overseeing enterprises and assists companies in formulating optimal strategies. Many countries have established regulations regarding carbon information disclosure, among other requirements.

4.2 Capability of Accounting Firms in Providing Carbon Accounting Services

The "Big Four" accounting firms—Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY), and Klynveld Peat Marwick Goerdeler (KPMG)—as well as domestic firms like Lixin, have rapidly developed strong carbon accounting service capabilities, whereas smaller local accounting firms have lagged behind in their development and capabilities.

EY and Deloitte, as internationally renowned accounting firms, have strong capabilities in carbon accounting and sustainability services. EY has implemented carbon reduction measures in its own operations and offers several distinctive solutions, including green infrastructure, renewable energy, green supply chains, and green finance. Deloitte emphasizes its ability to assist enterprises in collecting and calculating ESG-related data, preparing ESG reports, and building digital management platforms. PwC and KPMG have also demonstrated their professional expertise in ESG and carbon accounting

services. PwC notes that, with the establishment of global sustainability disclosure baseline standards, companies will shift from passively responding to ESG issues to taking proactive actions. KPMG highlights institutional investors' focus on ESG and the resilience and growth potential of companies in their low-carbon transformation[5].

Domestic firms such as Lixin, Tianjian, and Dahua are also actively expanding their sustainability businesses and have ventured into consulting services. These firms provide professional services to help listed companies prepare sustainability reports and offer guidance on carbon emission management and emission reduction strategies.

5. Opportunities and Challenges of Carbon Accounting Services in Accounting Firms

5.1 Opportunities Brought by the Policy Environment to Carbon Accounting Services

The policy environment presents several opportunities for carbon accounting services, including the following four aspects: expanded market demand, promotion of standardization, talent cultivation, and support for industry development.

5.1.1 Expanded Market Demand

The government's firm commitment to achieving carbon peak and carbon neutrality has become a powerful driving force for enterprises to accelerate their low-carbon transformation. In this context, enterprises face unprecedented pressure and responsibility, not only to fully understand their carbon footprint but also to accurately calculate carbon emissions and identify carbon assets and liabilities. Carbon accounting has moved beyond being merely a theoretical concept and has quickly transformed into practical action, becoming an indispensable part of enterprises' efforts to maintain their competitive edge.

5.1.2 Promotion of Standardization

The relevant authorities' formulation and implementation of carbon information disclosure and carbon financial accounting standards have undoubtedly set a unified benchmark for carbon accounting services, significantly enhancing the accuracy of data and the comparability between industries. Standardized processes and transparent regulation not only strengthen the public's trust in carbon accounting information but also reduce communication costs between enterprises, making carbon accounting services more efficient and orderly.

5.1.3 Talent Cultivation

Guided by policies, the education sector has actively responded to the call of the times, with universities and professional training institutions increasingly offering courses on carbon accounting and related disciplines. This has led to the cultivation of a large number of professionals equipped with knowledge and practical skills in carbon accounting, carbon auditing, and carbon trading. The emergence of such talent has injected fresh blood into the carbon accounting services industry, ensuring high service quality and innovation capability[6].

5.1.4 Support for Industry Development

Several support policies have been introduced to reduce the burden on carbon accounting service agencies, encouraging their active participation in the construction and development of carbon markets. For instance, tax incentives have reduced the operational costs of service firms, while subsidies have further stimulated technological innovation and service optimization, creating a virtuous cycle that drives the maturation of the entire carbon accounting services industry.

5.2 Risks and Response Strategies for Carbon Accounting Services

Carbon accounting services carry certain risks, as relevant policies are continuously adjusted and refined with the progress of the dual carbon targets.

5.2.1 Risks of Carbon Accounting Services

In terms of policy, changes in policies could affect the standards, requirements, and market demand for carbon accounting services. For example, adjustments in carbon quota allocation policies may alter the demand for carbon accounting services; the introduction of carbon tax policies may influence enterprises' carbon cost calculations, thereby affecting the content and methods of carbon accounting

services.

In terms of technology, carbon accounting services involve complex carbon emission calculation, monitoring, and reporting technologies. With the rise of the digital economy, the demands for the security and accuracy of carbon accounting information have increased, leading to higher processing requirements for carbon data. Technological uncertainty and limitations could result in inaccurate, incomplete, or unreliable carbon data. For instance, errors in carbon emission monitoring technology may affect the results of carbon calculations, and inadequately functional carbon accounting software may impact the quality of carbon reports. This highlights the inevitable trend for carbon accounting to develop in a direction of intelligence, efficiency, and precision. The carbon accounting service market is still in its early stages, with unstable market demand and fierce competition[7].

5.2.2 Response Strategies for Risks in Carbon Accounting Services

In terms of policy, closely monitor policy changes. Carbon accounting service firms should establish policy research teams to track changes in domestic and international carbon reduction policies, analyze the impact of these policies on carbon accounting services, and provide the basis for adjusting service content and methods. Strengthen communication with policy-making departments, actively participate in consultation and discussions during the policy-making process, reflect industry needs and practical situations, offer professional suggestions for policy formulation, and strive to create a favorable policy environment for business development. Increase the flexibility and adaptability of services, adjusting service content and methods promptly in response to policy changes to ensure that carbon accounting services can meet the needs of enterprises in different policy environments.

In terms of technology, adopt advanced technologies and continuously introduce and apply state-of-the-art carbon emission calculation, monitoring, and reporting technologies to improve the accuracy and reliability of carbon data. For example, utilize big data, artificial intelligence, and other technologies to enhance the ability to collect and analyze carbon data; use high-precision carbon emission monitoring equipment to improve the accuracy of monitoring data. Establish a technology assessment and verification mechanism to regularly evaluate and verify the technologies used, ensuring their effectiveness and reliability. For instance, calibrate and test carbon emission monitoring equipment; conduct functional testing and verification of carbon accounting software; strengthen technical training and talent development to improve the technical competence and operational capabilities of service personnel, ensuring the correct application and maintenance of technology. For example, organize technical training courses and seminars, inviting experts for guidance and exchanges[8].

6. Development Strategies for Carbon Accounting Services in Accounting Firms

Under the background of the dual carbon targets, accounting firms face significant market opportunities and challenges. To seize these opportunities and address the challenges, accounting firms need to implement strategic innovations in service models, business processes, information technology applications, and partnership building.

In terms of service model innovation, adopt customized service solutions for different industries and enterprises, developing tailored carbon accounting services. For example, providing carbon footprint calculation for the manufacturing industry, and offering carbon emission trading strategies for the energy sector to meet diverse needs. Combine carbon management consulting with auditing services, including carbon emission monitoring, carbon asset management, and green finance consulting, to provide comprehensive carbon management consulting services. At the same time, strengthen carbon emission auditing services to ensure the accuracy and compliance of corporate carbon emission data. Support companies in preparing ESG reports that comply with international standards, particularly the carbon emission sections, to help them meet domestic and international regulatory requirements and enhance their market competitiveness[9].

In terms of optimizing business processes, establish standardized carbon accounting service procedures and use automation tools, such as carbon emission calculation software, to improve service efficiency and accuracy, while reducing human error. Optimize project management by adopting advanced project management methods, such as agile management, to ensure that carbon accounting service projects are completed on time and with high quality, thereby enhancing customer satisfaction. Clearly separate consulting and auditing services to avoid conflicts of interest and maintain the independence and credibility of auditing services.

Actively strengthen cooperation with the carbon trading market and establish carbon trading alliances. Work closely with carbon emission trading markets to provide clients with the latest market trends and trading strategies, enhancing the depth of services. Establish cross-industry alliances with companies in industries such as energy, manufacturing, and consulting, to share resources and expand the service scope. Strengthen international cooperation by collaborating with international accounting firms and environmental organizations, introducing international advanced experiences and standards, and improving international competitiveness.

Conclusion

This paper explores the opportunities and challenges of carbon accounting services in accounting firms under the dual carbon targets, as well as their impact on the accounting industry. The introduction of the dual carbon targets has not only driven the transformation of practices in accounting firms but has also generated market demand for carbon accounting services. It is becoming increasingly important to make carbon accounting services more mature and comprehensive. In terms of policy, this paper argues that the government should accelerate the improvement of carbon accounting standards and gradually establish and refine carbon accounting laws, regulations, and systems that align with the development of the low-carbon economy in China. In terms of the market, efforts should be made to promote the maturity of the carbon trading market, encourage the education and training of professionals in carbon accounting, and provide top talent for the carbon accounting services industry. In the accounting firm industry, we suggest that accounting firms actively utilize advanced technologies, strengthen cooperation with international organizations, enterprises, and research institutions externally, and internally establish and improve risk management systems to ensure the professionalism and compliance of services. This will help provide more efficient services to clients, improving both market and international competitiveness.

Although this paper provides an in-depth analysis of carbon accounting services under the dual carbon targets, there are still limitations, such as the lack of in-depth quantitative data analysis. In the future, we hope that carbon accounting can rely on digital technologies to more efficiently assist enterprises in managing carbon emissions and disclosing carbon information, thereby promoting sustainable social development. At the same time, we hope that, under the trend of internationalization, carbon accounting services can develop in a more standardized and professional manner. Through policy optimization and industry efforts, carbon accounting services in accounting firms will play an increasingly important role in achieving the dual carbon targets, driving the green transformation of enterprises, and helping the country achieve its sustainable development goals.

Fund Projects

The 2024 University-Level Innovation and Entrepreneurship Training Program for College Students, Zhengzhou Shengda University of Economics and Management.

The First Batch of University-Level First-Class Undergraduate Program Construction Project (Project Number: 1513015), Zhengzhou Shengda University of Economics and Management.

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