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Accelerating First-Order Algorithms for High-Dimensional Minimax Optimization

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Abstract: This study introduces two first-order algorithms for high-dimensional minimax optimization: Accelerated Momentum Descent Ascent (AMDA) and Accelerated Variance-Reduced Gradient Descent Ascent (AVRGDA). These methods aim to address common challenges in nonconvex optimization, such as slow convergence and computational complexity. AMDA leverages momentum-driven techniques to smooth the optimization path, reducing oscillations and improving convergence speed, particularly in nonconvex-strongly-concave problems. AVRGDA incorporates adaptive learning rates that dynamically adjust according to gradient norms, enhancing the efficiency of variance reduction and handling complex optimization tasks in high-dimensional spaces. Through experiments in adversarial training and large-scale logistic regression, these methods demonstrate superior performance in terms of training time, robustness, and computational cost compared to traditional first-order methods. Theoretical analysis shows that AMDA and AVRGDA achieve convergence rates of $O(\epsilon^{-3})$ and $O(\epsilon^{-2.5})$ respectively in high-dimensional, nonconvex minimax problems, confirming their efficiency and robustness in practical applications.

Keywords: First-Order Methods; High-Dimensional Optimization; Minimax Optimization

1. Introduction

Minimax optimization is essential in various fields, such as adversarial machine learning, robust optimization, and economic modeling, where balancing competing objectives is critical. In high-dimensional settings, the complexity of these problems increases due to the intertwined nature of minimization and maximization, leading to challenges in achieving efficient convergence. Traditional first-order methods, while scalable, often struggle in nonconvex scenarios, where saddle-point instability and slow convergence become significant issues. To address these challenges, this paper introduces enhanced momentum-based and variance-reduction techniques. These approaches improve convergence rates, stabilize the optimization process, and offer more effective handling of high-dimensional, nonconvex minimax problems, providing robust solutions in scenarios where existing methods underperform.

2. Related Work

Recent developments in minimax optimization have led to the exploration of various first-order methods aimed at improving efficiency in high-dimensional and nonconvex settings. Chris Junchi Li (2024) made significant contributions by proposing fully first-order methods tailored for bilevel and minimax problems, establishing a critical foundation for further advancements in accelerated techniques^[1]. His work demonstrated the potential of first-order methods to overcome the inherent complexity of bilevel structures while maintaining computational feasibility. Huang et al. (2020) introduced an innovative combination of zeroth-order and first-order momentum methods, providing a novel approach to tackle both mini and minimax optimization problems^[2]. Their findings illustrated that momentum-based techniques could significantly enhance convergence rates, even in nonconvex environments where gradient-based methods typically struggle.

Building upon these foundations, Muehlebach and Jordan (2023) advanced first-order algorithms by integrating nonlinear constraints, which are often encountered in high-dimensional minimax settings^[3]. This work emphasized the importance of handling complex, constraint-driven optimization tasks that appear in real-world applications. Zhou et al. (2020) and Alacaoglu et al. (2024) extended this research further by focusing on worst-case convergence rates and improving the adaptability of first-order methods in nonconvex and co-hypomonotonic problems, respectively^[4,5]. Their contributions underscored the necessity of designing algorithms that not only perform efficiently under typical conditions but also maintain robustness in adverse or highly complex scenarios.

In summary, the field has seen notable progress in both theoretical and practical aspects, with researchers increasingly targeting the challenges posed by high-dimensional, nonconvex minimax optimization. However, the ongoing need for faster, more scalable, and more sta-

ble methods has prompted further exploration into accelerated first-order techniques, which this paper aims to address.

3. Proposed Methods

This paper introduces two innovative first-order methods designed to improve the efficiency and stability of high-dimensional minimax optimization: Accelerated Momentum Descent Ascent (AMDA) and Accelerated Variance-Reduced Gradient Descent Ascent (AVRGDA). Both methods are grounded in existing momentum-based and variance-reduction frameworks but incorporate significant advancements to address the computational and convergence challenges that arise in nonconvex, high-dimensional settings. These methods aim to not only accelerate convergence but also ensure stability during the optimization process, which is critical for the minimax problems often encountered in adversarial learning and robust optimization.

3.1 Accelerated Momentum Descent Ascent (AMDA)

AMDA is specifically designed to smooth the optimization trajectory and mitigate oscillations, which are frequently observed in high-dimensional minimax problems due to the interaction between the descent and ascent steps. By leveraging advanced momentum techniques, AMDA reduces the fluctuation commonly seen in gradient-based methods. This approach builds on the work of Huang et al. and extends it by incorporating mechanisms that improve performance in nonconvex-strongly-concave settings. AMDA dynamically adjusts the momentum term to better handle the curvature of the optimization landscape, ensuring more efficient navigation through saddle points and reducing the impact of adversarial saddle behaviors. The method's scalability allows it to efficiently manage the complexity of high-dimensional environments, offering enhanced convergence stability and efficiency compared to traditional first-order methods.

3.2 Accelerated Variance-Reduced Gradient Descent Ascent (AVRGDA)

AVRGDA is an advanced method that enhances traditional variance-reduction techniques by introducing adaptive learning rates, which adjust dynamically according to the gradient norms. This adaptive mechanism ensures that the learning rates are optimally scaled based on the local geometry of the optimization landscape, allowing for more efficient convergence in high-dimensional and nonconvex settings. Unlike conventional variance-reduction methods that often suffer from diminishing returns in high dimensions due to the increased computational complexity, AVRGDA mitigates these issues by reducing variance without sacrificing gradient accuracy.

The key innovation in AVRGDA lies in its ability to effectively balance the trade-off between exploration and exploitation in the optimization process. By dynamically adjusting learning rates, the method can accelerate convergence during stable phases while maintaining robustness in regions with high curvature or adversarial saddle points. This adaptability is crucial in minimax optimization, where the interaction between descent and ascent steps can introduce oscillations and slow convergence. Through this targeted variance reduction, AVRGDA not only accelerates the overall optimization process but also ensures that the algorithm remains computationally feasible in high-dimensional spaces, offering significant improvements over traditional first-order methods.

4. Convergence Analysis

The convergence analysis of the proposed AMDA and AVRGDA methods is based on advanced techniques from stochastic approximation and smoothness assumptions applied to nonconvex-strongly-concave minimax optimization problems. For AMDA, we rigorously demonstrate that the algorithm achieves a convergence rate of $O(\epsilon^{-3})$, where ϵ represents the desired level of accuracy. This result is particularly significant for high-dimensional problems, as AMDA effectively reduces oscillations and stabilizes the optimization process, leading to faster convergence towards saddle points.

For AVRGDA, under mild conditions, we establish a convergence rate of $O(\epsilon^{-2.5})$ under mild conditions. This improvement over standard variance-reduction methods is due to the adaptive learning rate mechanism that dynamically adjusts to the gradient's local norm, ensuring efficient navigation through regions of high curvature. The convergence analysis also takes into account the variance-reduction properties, which minimize the stochastic noise inherent in gradient evaluations. These results confirm the robustness and computational efficiency of both methods in high-dimensional, nonconvex minimax problems, making them well-suited for real-world applications such as adversarial

machine learning and robust optimization.

5. Experiments

To evaluate the effectiveness of the proposed AMDA and AVRGD methods, we performed a series of comprehensive experiments across various high-dimensional minimax optimization tasks. These include adversarial training in deep neural networks and large-scale logistic regression models, both of which represent challenging real-world scenarios where convergence speed and optimization accuracy are critical.

For adversarial training, we applied our methods to a convolutional neural network (CNN) tasked with defending against adversarial attacks. The results demonstrate that both AMDA and AVRGD significantly reduced training time while achieving better robustness compared to baseline first-order methods. Specifically, our methods exhibited superior convergence behavior, reducing oscillations typically seen in gradient descent and improving model performance under adversarial conditions.

In the large-scale logistic regression experiments, we focused on datasets with millions of features to test the scalability and efficiency of our algorithms. Both AMDA and AVRGD outperformed traditional variance-reduction techniques, achieving faster convergence with a noticeable reduction in computational cost. These methods were particularly effective in high-dimensional spaces, where traditional approaches often experience slowdowns due to the increasing complexity of the optimization landscape.

Quantitative metrics such as convergence time, accuracy, and robustness were used to assess the performance, and our methods consistently achieved better outcomes across all benchmarks. These experimental results validate the theoretical convergence rates and demonstrate the practical applicability of AMDA and AVRGD in real-world high-dimensional minimax optimization problems.

6. Conclusion

This paper advances the field of high-dimensional minimax optimization by introducing two novel first-order methods, AMDA and AVRGD, designed to address the inherent challenges of nonconvex optimization problems. Through rigorous convergence analysis and comprehensive experiments, we demonstrate the efficacy of these methods in improving both convergence rates and stability across diverse optimization tasks. The momentum-driven and variance-reduction techniques provide scalable and robust solutions, making these methods highly applicable in real-world settings such as adversarial machine learning and large-scale optimization problems. These contributions deepen the theoretical framework of minimax optimization while offering practical tools that outperform existing first-order approaches.

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Current situation and optimization path of occupational injury protection for new types of workers - based on PMC index model

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Abstract: With the development and growth of the sharing economy, various new forms of employment emerge at the historic moment, and the social security rights and interests of flexible employees in new forms of employment are significantly less than those of traditional practitioners, and the problems in occupational injury protection are especially prominent, which is in urgent need of the state to issue policies to improve. Since 2019, the central and local governments have successively carried out pilot work on occupational injury protection for workers with new employment forms. Based on the PMC policy evaluation index model, this study conducted a systematic quantitative evaluation and analysis of the occupational injury protection policies of the new types of flexible employment in several pilot provinces and cities, quantitatively evaluated the scientific integrity of each dimension of the current policies, and put forward targeted optimization countermeasures for the occupational injury protection policies of the new types of flexible employment. Effectively safeguard the occupational injury protection rights and interests of new types of flexible employment.

Keywords: New Employment Form; Policy Evaluation; Occupational Injury; Social Security

1. the current predicament of occupational injury protection for workers in new forms of business

1.1 The identification of labor relations is difficult and controversial. At present, it is difficult to identify the labor relations of new employment forms and disputes are often involved, mainly because there is no formal labor contract signed between platform enterprises and employees. In addition, according to the current laws and regulations, platform enterprises and new forms of employment do not meet the standards of labor relations identification, but more in line with the mode of service cooperation agreements between self-employed workers and platform enterprises. This ambiguity of labor relations will lead to many problems, such as platform enterprises do not have to assume the duties of employers, such as providing social insurance to employees, providing a safe and healthy working environment and paying legal wages, and employees can not get the same welfare protection as permanent employees.

1.2 The working environment of employees in new employment forms is high intensity and high risk. There are still a variety of unstable and unsafe factors in the working environment of new employment forms, including high-load work pressure, long-term work intensity, lack of safety and other factors. These unfavorable conditions may lead to occupational fatigue, accidental injury and other problems of the new employment form, so that they face a significant increase in occupational injury risk.

1.3 The existing occupational injury protection measures cannot achieve full coverage. Although various platform enterprises provide different types of commercial insurance for their new employment forms, the insurance still cannot provide strong and perfect protection for this group. Compared with industrial injury insurance, commercial accident insurance provides a narrow scope of protection, low protection standards, relatively high premium cost, numerous exclusions, and only one-time compensation, lack of long-term protection and dynamic adjustment ability.

2. the current policy analysis and evaluation results -- based on the PMC model

2.1 Collection and text mining of policy texts

In the process of collection, the research adheres to the strict screening principle. Firstly, the repeated policy texts are excluded to ensure the uniqueness of each document. Second, it focuses on policies directly related to occupational injury protection for flexible employees

under the “new employment pattern”, excluding non-policy documents such as leadership instructions, meeting minutes, announcements, and so on, in order to focus on core issues. Finally, through careful comparison and evaluation, 35 most representative policy documents are selected from the mass of texts to build an effective database for this study. Then the policy text is transcribed, and the powerful function of ROSTCM 6.0 software is used to analyze the word frequency of the text. Finally, 60 high-frequency keywords are sorted out and analyzed as an important basis for constructing the policy evaluation index system and evaluation criteria.

2.2 Variable classification and parameter identification

Based on the OmniaMobilis hypothesis as the guiding ideology, this paper takes the occupational injury protection policy of flexible employees in new forms of employment as the research object, and on the basis of the policy evaluation study by Ruiz Estrada, the setting of variable parameters by Zhang Yongan and Zhao Jianguo et al., combined with the content of policy text mining and the characteristics of flexible employees in new forms of employment. Nine first-level variables are adjusted and established, which are: policy nature (X1); Policy timeliness (X2); Policy level (X3); Policy content (X4); Policy evaluation (X5); Policy object (X6); Policy instruments (X7); Guarantee mode (X8); Policy effectiveness (X9).

2.3 Policy quantitative evaluation results

In this paper, five policy texts with comprehensive coverage, strong representation and clear implementation policies are selected from the text database to reflect the current development of occupational injury protection policies for flexible practitioners of new formats in China. The quantitative evaluation results of the policies show:

2.3.1 The score of the five policies in terms of policy nature is 0.6, and the nature of the five policies is “guidance”, “suggestion” and “pilot”, rather than “supervision” and “regulation”, which means that the design and implementation of the above policies are not directly related to the supervision, management and formulation of relevant standards for the protection of occupational injury of flexible employees in the new business. In addition, although the policy text has put forward a number of policies on occupational injury insurance and rights protection of new flexible employment personnel, most of these policies are not mandatory, which limits the actual implementation effect of the policy.

2.3.2 The five policies have excellent performance in terms of policy content. Each policy contains the protection object, protection type, protection level, rate standard, payment subject, treatment level, etc., and the content is detailed and specific. In particular, the occupational injury insurance for new types of flexible employment has made comprehensive and detailed regulations. However, at the same time, some policies do not cover issues related to occupational injury dispute resolution. In addition, none of the policies address occupational injury prevention, the lack of which increases the risk of workplace injury for flexible workers

2.3.3 All the five policies scored poorly in terms of policy effectiveness, only 0.33 points. In terms of the evaluation dimension of policy effectiveness, the five policies scored generally low, only 0.33 points, which reflects a key problem: significant inadequacy of policy documents in terms of legal effectiveness, administrative execution and industry standardization.

2.3.4 The five policies have different scores in terms of policy objects. In terms of evaluating policy objects, the scores of 5 policies show some differences, but the common point is that they all cover the participation of industrial injury insurance institutions and human resources and social security departments. However, a prominent problem is that the role and function of trade unions are not fully taken into account in these five policies.

3. Optimization path of occupational injury protection policy for new types of workers

3.1 Elevate the excellent pilot experience to the legislative level. In view of the problem of different pilot results in different places, the problem reveals that there is no unified solution to the factors such as the setting standard of insurance amount, insurance access conditions, and guarantee payment. In this regard, the system rules of occupational injury protection should be improved, and the pilot experience that can be implemented nationwide should be determined through legislation. Combined with local practices that are conducive to ensuring the occupational safety of practitioners in new forms of business, the pilot effect of the system is better played, and the specific aspects are de-

tailed from the protection subject, payment base, payment rate, etc.

3.2 Coordinate management to build a sound occupational injury protection system. First of all, the concept of flexibility, adaptability and diversity should be established, including the involvement of the government, platform enterprises and insurance companies, to establish a security structure combining occupational injury insurance and commercial insurance, and to build an ecological and platform security mechanism. Secondly, commercial insurance is adopted as a way to supplement protection. Third, for platform enterprises, platform enterprises should fulfill the corresponding management and training of new business workers. For the trade union, it is necessary to urge the government departments to improve the internal communication and dialogue mechanism, set up a dispute mediation organization, and resolve the contradiction in the bud. Finally, from the perspective of individual workers, the management mode of division of labor and cooperation between social security departments and insurance companies can not only meet the needs of new business practitioners for basic injury protection, but also meet the higher level of occupational injury protection needs of new business enterprises.

3.3 Strengthen occupational injury prevention and rehabilitation

First of all, it is necessary to strengthen the attention of occupational injury prevention and rehabilitation, and realize its importance. The current policy focuses too much on occupational injury compensation and neglects the importance of prevention and rehabilitation. Second, we should try to establish a sound legal system. According to the research results and requirements of the International Labor Office on occupational injuries, the prevention of industrial accidents is the primary task of industrial injury insurance. Finally, it is necessary to implement the people-oriented scientific development concept and actively carry out the pilot work of industrial injury rehabilitation.

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Intelligent Application of Big Data in Rail Transit

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Abstract: With the rapid development of technology, especially the widespread application of big data, cloud computing, and the Internet of Things, the rail transit industry is undergoing unprecedented transformation. It is gradually shifting from a traditional management model heavily reliant on manual operations towards a direction of intelligence and automation. This article delves into the intelligent operation system of rail transit from two aspects: train operation situation and passenger flow, analysing its significant role in enhancing operational efficiency, optimizing resource allocation, and improving service quality.

Keywords: Big Data; Rail Transit; Intelligent Operation

1. Intelligent Train Operation

Train operation control system

Modern rail transit systems universally adopt advanced Automatic Train Control (ATC) systems, comprising three subsystems: Automatic Train Protection (ATP), Automatic Train Operation (ATO), and Automatic Train Supervision (ATS). These systems include digital sensors, wireless communication networks, and other technological means to collect key parameters such as train position, speed, traction force, and braking force in real-time, ensuring safe and efficient train operation.^[1]

Automatic Train Protection (ATP)

ATP is the foundation of the ATC system. Both ATO and ATS rely on the work of the ATP subsystem. The Automatic Train Protection (ATP) system, also known as the Train Overspeed Protection System, automatically brakes the train when it exceeds the specified speed. When the onboard equipment receives ground speed limit information, it compares the processed information with the actual speed. If the actual speed exceeds the speed limit, the braking system will control the train braking system to brake.

ATP automatically detects the actual running position of the train, automatically determines the maximum safe running speed of the train, continuously and uninterruptedly implements speed supervision, realizes overspeed protection, and automatically monitors the running interval of the train to ensure the realization of the specified running interval.

Automatic Train Operation (ATO)

Automatic Train Operation (ATO) is a complete closed-loop automatic control system. On the one hand, the train detects its actual running speed, and on the other hand, it continuously obtains the maximum allowable speed provided by the ground. After computation by a computer and based on other factors related to driving, such as locomotive traction characteristics, section gradients, curves, etc., the optimal driving speed is obtained, and the train is controlled to accelerate, decelerate, or even brake.

In the ATO system, the driver plays a supervisory role, so it is required that the channels for obtaining the maximum allowable speed and the locomotive computer for solving the optimal speed have higher reliability and practicability.

Automatic Train Supervision (ATS)

Automatic Train Supervision (ATS) is a complete train command system that organizes and controls train operations through computers. ATS transmits on-site train operation information to the train operation command center in a timely manner. After synthesizing the train operation information, the center issues train operation instructions to the site in a timely and accurate manner to ensure accuracy, speed, safety, and reliability.^[2]

In the field of rail transit, the intelligent management of train operations is becoming crucial for enhancing operational efficiency and safety. The application of key technologies such as digital sensors, wireless communication networks, and algorithm optimization has played an important role in the intelligent operation of rail transit. By applying these key technologies, the rail transit system has undergone a trans-

formation from manual operation to automatic control, significantly boosting operational efficiency. The departure and arrival times of trains are now more precisely controlled, leading to a notable improvement in passengers' travel experience. Furthermore, intelligent monitoring and prediction mechanisms have effectively reduced accident risks, safeguarding the lives and property of passengers.

Dynamic Scheduling Optimization

Real-time data analysis serves as the corn of the intelligent operations system, providing precise data support for the rail transit network through high-speed processing of massive amounts of real-time passenger flow data and train status information. This data encompasses critical parameters such as the precise location, speed, traction, and braking force of trains, as well as valuable insights into passenger travel habits and station passenger flow distributions, offering operators a multi-faceted decision-making foundation.

The intelligent operations system dynamically adjusts train diagrams based on real-time passenger flow data, train status, and route conditions, achieving refined scheduling of train operations. Algorithm optimization ensures that during peak hours, trains are dispatched more frequently to meet heavy passenger demand. Conversely, during off-peak periods, the frequency is reduced to conserve energy and reduce costs. During peak hours, the system effectively alleviates passenger congestion by increasing service frequencies and optimizing headways, guaranteeing a smooth travel experience for commuters. Furthermore, it ensures that trains operate along optimal routes and at the most reasonable speeds, significantly enhancing operational efficiency.

The intelligent operations system also plays an important role in emergency response such as equipment failures or weather changes. The intelligent system can swiftly activate pre-defined emergency response processes, adjusting train schedules to minimize the impact on operations and safeguard passenger safety and comfort.

2. Intelligent Management of Passenger Flow

Passenger flow forecast and analyse

The key to passenger flow forecasting lies in utilizing diversified data resources.^[3] Using big data prediction to optimize scheduling decisions mainly involves adjusting train schedules and improving headways. Based on predicted passenger flow data, train schedule adjustment strategies can be employed to increase or decrease the number of trains during specific time periods, particularly during peak hours and holidays, in order to accommodate changes in passenger flow, alleviate congestion, and shorten waiting times. The optimization of headways relies on real-time passenger flow information to adjust the running time between trains, thereby meeting passenger demand while enhancing vehicle utilization. Predictive maintenance based on big data enables rail transit operators to plan the maintenance of vehicles and facilities in advance, reducing unexpected disruptions caused by failures and ensuring smooth operation. Implementing these strategies necessitates efficient data analysis capabilities and an agile scheduling system to promptly respond to and process vast amounts of real-time data.^[4]

Passenger Information Service

The intelligent operation system provides passengers with information services such as real-time train arrival information, carriage congestion levels, and transfer suggestions through various channels like electronic display screens, mobile apps, and social media. This information helps passengers plan their travel routes reasonably, reduce waiting time, and enhance their travel experience. At the same time, the system can continuously optimize service content and improve service quality based on passenger feedback and behaviours.

Real-time Train Arrival Information

The passenger information service system can display real-time train arrival times, departure intervals, and other critical information, helping passengers plan their travel time reasonably and reduce waiting anxiety. Through electronic display screens, mobile apps, and other terminals, passengers can access this information anytime, anywhere, thereby improving travel efficiency.

Carriage Congestion Indication

Utilizing cameras installed in carriages and image processing technology, the system can monitor the congestion level of carriages in real-time and display this information to passengers through information distribution terminals. This feature helps passengers in making more informed decisions when selecting carriages, avoiding entering overly crowded ones, and enhancing the comfort of their ride.

Transfer Suggestions and Navigation

For passengers requiring transfers, the system can provide optimal transfer suggestions based on real-time passenger flow data and train operation status. Additionally, by integrating rail transit route maps and in-station navigation functions, the system offers detailed transfer routes and walking navigation to ensure passengers arrive at their destinations smoothly.

Passenger Feedback and Complaint Handling

The passenger information service system typically includes a passenger feedback and complaint handling module. Passengers can submit feedback or complaint information to the system through mobile apps, social media, and other channels. The system automatically records and forwards these to relevant departments for processing. This feature not only helps improve service quality but also enhances passenger engagement and satisfaction.

Weather Warnings and Special Event Notifications

The system is also capable of connecting to external data sources such as weather forecasts and special event notifications, promptly disseminating relevant information to passengers. For instance, during extreme weather or emergency situations, the system can issue early warning messages and countermeasures through various channels including announcements, electronic display screens, and mobile apps, ensuring the safety of passengers' travel.

Passenger Flow Safety Monitoring

In the rail transit system, the application of big data technology provides robust support for passenger flow safety monitoring. By collecting and analysing massive historical passenger flow data, combined with intelligent technologies such as real-time video surveillance and face recognition, the system can accurately predict and monitor passenger flow dynamics. When detecting excessively high pedestrian density in a specific area, the system can automatically trigger an early warning mechanism, promptly pushing warning information to management personnel and passengers, effectively preventing safety incidents such as overcrowding and stampedes. Furthermore, big data analysis can help operators in identifying potential safety hazards, including malicious and abnormal behaviours, providing strong support for safety management efforts. Through the in-depth application of big data technology, the efficiency and accuracy of rail transit passenger flow safety monitoring have been significantly improved, offering robust safeguards for passengers' travel safety.

3. Conclusion

Comprehensive upgrades and optimizations to the rail transit system have been achieved through intelligent management of both train operations and passenger flow. This system not only enhances operational efficiency and service quality but also promotes efficient resource allocation, energy conservation, and emission reduction. In the future, with continuous advancements in technology and the expansion of application scenarios, intelligent rail transit operations will showcase even broader development prospects and limitless possibilities.

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Research and Analysis of Informational Texts within the Framework of Communicative Translation Theory -- A case study of 2022 Yan'an City Government Work Report

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Abstract: The “2022 Yan'an Government Work Report” issued by Yan'an City serves as a crucial source of information for both domestic and international audiences aiming to gain insight into the specific circumstances of the city. This paper adopts a communicative translation theory approach to analyze the translation strategies employed in the 2022 Government Work Report.

Keywords: 2022 Yan'an City Government Work Report; Informative Text; Translation Strategy

In April 2022, the mayor of Yan'an City presented the 2022 Government Work Report on behalf of the city, which encompasses a retrospective review of the past five years' work, outlines the overarching objectives for the next five years, and elaborates on the key initiatives for the current year. The English translation of the government work report holds significant relevance to both China's international image and the cultural representation of Yan'an City. As such, the translation of distinctive Chinese elements within the report necessitates thorough consideration and analysis. This paper will analyze the translation methods employed in the 2022 Yan'an Government Work Report as the chosen corpus, aiming to facilitate cultural communication for Yan'an City.

1. The characteristics of informational text

According to Peter Newmark, a renowned English translator and translation theorist, there are three types of texts to be translated: informational, expressive, and evocative. Newmark emphasized that a particular text type may simultaneously embody three linguistic functions, but it can be said that one function predominates. Therefore, different translation strategies and methods should be employed based on the specific text type. Informational text, an essential category in Newmark's text typology, is focused on the communication of factual information. With the increasing frequency of international communication and the expansion of communication domains, the demand for the translation of informational texts is also on the rise. Informational texts are primarily intended to convey information devoid of personal emotion. For this reason, when translating informational texts, the main objective is to elucidate concepts from the perspective of the target language reader, in a manner familiar to the reader. The Government Work Report is an informational text, thus the translation of such texts should be based on communicative translation.

2. Brief introduction of communicative translation theory

Communicative translation means to ensure that the effect obtained by the target language readers is as close as possible to that obtained by the source language readers, and that the impact of the target language on the target language readers is as close as possible to that of the original text on the source language readers (Newmark, 1981). Its focus is on the target language reader or audience. Therefore, when processing the original text, the purpose is to convey the language information, rather than simply copying a series of language units. Its concern was how to preserve the functionality of the original text so that it would be relevant to new readers. Communicative translation pays less attention to the form of the source language and more attention to the communicative function of the language, but it requires the translation to be smooth, reliable and fully convey the information of the source language.

Drawing from the theory of communicative translation, the author utilizes the official text of the 2022 Yan'an City Government Work Report as the corpus, analyzing the translation techniques employed within the report's informative sections alongside previously acquired translation skills. The study underscores the crucial role of accurately conveying information about China's national conditions, introducing the current development status of Yan'an City, and outlining its future development plans.

3. Translation principles of informational texts

3.1 Fidelity

One of the characteristics of informational text is to disseminate some information externally, necessitating that translations adhere as closely as possible to the original text's essential meaning. In the process of translation, it is important to avoid over-interpreting the author's underlying intentions, focusing instead on conveying the explicit meaning presented by the text.

3.2 Accuracy

The linguistic function of an informative text is to convey facts and content, and translation work must be based on fidelity to the original text to ensure the accuracy of translation. Throughout the translation process, if any content might be deemed inappropriate or offensive, adjustments should be made to ensure that translations are contextually appropriate and culturally sensitive.

3.3 Rigor

In the process of translating informational texts, it is imperative to uphold a rigorous professional attitude. Most of the informative texts are political texts, scientific and technological texts or economic and trade texts of the type of government work reports. These texts sometimes require the translation of a large amount of data and professional terms. Therefore, it is necessary to maintain a rigorous attitude in translation.

4. Translation skills of informational texts

4.1 Words with Chinese characteristics

The words with Chinese characteristics are a unique linguistic phenomenon in the Chinese language and culture, and often have distinct characteristics of The Times. It includes concepts, politics, terms, phrases, and vocabulary specific to Chinese national culture.

4.1.1 Literal Translation

Example 1:

Original text: 脱贫工程

Target text: Poverty alleviation project

Example 2:

Original text: 高质量发展

Target text: High-quality development

Example 3:

Original text: 共同富裕

Target text: Common prosperity

Example 4:

Original text: “两学一做”学习教育

Target text: “Two Studies and One Action” Education Campaign

The three terms mentioned above are all standalone vocabulary. Corresponding explanations for each can be found in English. This translation approach makes the text concise and easily comprehensible, allowing readers to grasp the meanings at a glance. This method not only preserves the original style but also helps the target language readers understand the national context of our country, while reflecting the simplicity and accuracy of the translation.

4.1.2 Interpretative translation

Sometimes, certain words may be straightforward and easy to understand in Chinese, but a direct translation into English might leave readers perplexed. In this case, the method of literal translation and interpretive translation can be adopted. This can not only preserve the

original form of the words, but also make the reader understand the connotation clearly.

Example 5:

Original Text: 反对“四风”

Target Text: Eliminating the Four Malfeasances refer to favoring form over substance, atism, hedonism, and extravagance.

The problem of “four winds” is a problem to be solved under China’s national conditions, making it a term with Chinese characteristics. When translating, we should provide an explanation of what exactly these four issues refer to. Only in this way can readers of the translated text fully comprehend the deeper meaning of the entire phrase.

4.2 Sentence-level translation skills

4.2.1 Literal translation

Example 6:

Original Text: 这五年，我们千方百计补短板、强基础、促融合，城乡面貌焕然一新。

Target Text: Over the past five years, we have made everything possible to shore up the shortcomings, strengthen the foundation, and promote integration, thus taking on a new look in urban and rural areas.

In the above example, the phrases “shore up the shortcomings”, “strengthening the foundation” and “promoting integration” are simple and easy to understand, and will not cause ambiguity. Moreover, the structure of the whole sentence is simple, and it does not need to adjust the structure of the sentence to make the sentence smooth, so the translation technique of literal translation is directly adopted, so that the information in the original text can be completely transmitted to the target reader, and the principle of fidelity is complied with.

4.2.2 Reorganization

Example 7:

Original Text: 干部作风明显改善，服务效能持续提升。

Target Text: The standards of officials has been markedly improved, and the efficiency of their services has continued to rise.

In Chinese narratives, the subject is often in the first person, which leads to a tendency to use the passive voice in English translations to emphasize objective facts. In Example 8, the significant improvements in the work style of officials and the continuous enhancement of service efficiency are all attributed to the government’s proactive regulation and guidance. Therefore, in the English translation, the subject is used to highlight the objective facts, making the sentence more in line with the reading habits of the target audience.

4.2.3 Additional translation

Example 8:

Original Text: 稳妥化解政府隐性债务，严厉打击非法金融活动，守住了不发生系统性金融风险的底线。

Target Text: The Yan’an municipal government has steadily resolved hidden government debts, cracked down on illegal financial activities, and held the bottom line of no systemic financial risks.

This sentence is no problem according to the Chinese custom, because the default main language is the government department. However, there is a lack of subjects in English. Therefore, during the translation process, it is essential to explicitly include the subject “Yan’an municipal government” to enhance the clarity of the sentence. If the subject remains ambiguous, it is necessary to add it through an additive translation approach.

5. Conclusion

Guided by Newmark’s theory of communicative translation, we should adhere to the three core principles of fidelity, accuracy, and rigor when translating informative texts, while also keeping the target audience in mind. With China’s increasing internationalization, the English translation of political texts has become particularly significant. To help the international community better understand Yan’an and the realities of China, the translation of government work reports must be accurate and rigorous, showcasing the city’s positive image and reflecting the country’s and city’s strengths to the world through translation.

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Corpus-Based Approaches to World Englishes: Applications and Challenges

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Abstract: This paper investigates the use of corpora in studying World Englishes (WEs), focusing on their role in analysing language variation, morpho-syntactic patterns, and sociolinguistic changes. It also addresses key challenges, such as the lack of representativeness, limited spoken data, and difficulties in managing Creole and standard English varieties. The study highlights the need for more comprehensive corpora to better understand the complexities of WEs.

Keywords: World Englishes; Corpora; Language Variation; Creole; Standard English

1. Introduction

Corpora are essential tools for examining the linguistic diversity in WEs. This essay explores how corpora help analyse different aspects of WEs, such as grammatical and sociolinguistic variation, as well as changes over time. Despite their benefits, current corpora face limitations in scope, particularly in spoken data and representation of Creole-English dynamics. This paper emphasises the importance of enhancing corpora to improve the study of WEs.

2. Discussion

Corpora are valuable tools for studying English varieties worldwide. The International Corpus of English (ICE) was specifically developed to provide comprehensive spoken and written language samples from various countries and regions. Following ICE, the Global Web-Based English (GloWbE) corpus was created, collecting most of its texts from the internet. These corpora provide rich, diverse datasets for analysing the usage and evolution of English in various global contexts, offering crucial insights into WEs.

2.1 Corpora in studying World Englishes

Corpora are essential for studying WEs by testing models of language variation and change. Through examining different varieties of English, researchers can refine existing theories. For example, corpora have been used to test Schneider's Dynamic Model and the hypothesis that new English varieties may develop regional standards. Corpora can also assess linguistic epicentres. Heller, Bernaisch, and Gries (2017) analysed English genitive alternation across six ICE sub-corpora to evaluate Indian and Singapore English as potential epicentres in Asia. This analysis, supported by extensive data, shows how corpora can effectively describe and model linguistic variation, providing statistical evidence for epicentre status.

Corpora enable researchers to examine morpho-syntactic variations in English usage across countries. By analysing linguistic features in diverse texts, researchers can identify patterns and differences in vocabulary and grammar, including specific lexical and syntactic features of different English varieties. Biermeier (2014) compared compounding and suffixation across twelve sub-corpora of the ICE, focusing on distinctions between native and non-native English varieties in Asia and Africa. ICE's diverse range of samples allows researchers to compare linguistic features across countries. This study employed ICE data to explore and compare the frequency and creativity of Word-formation strategies. By analysing the lexical richness present in various texts, researchers can characterise regional or national-specific morphological features.

Moreover, parsed corpora are highly valuable for studying syntactic variation, as shown by Collins (2008) in his analysis of the progressive aspect across nine ICE corpora. With grammatical structures and word classes already annotated, scholars can perform faster data analysis without needing manual annotation. The study revealed regional differences in progressive usage, with Australian and New Zealand English being the most innovative. Additionally, it compared the frequency of progressive forms in speech and writing, highlighting stylistic

variations between these contexts. This shows how corpora can uncover linguistic pattern differences across various forms of language.

Corpora facilitate the analysis of sociolinguistic and pragmatic variation in WEs. By examining social variables and pragmatic features, researchers can investigate language function and meaning in discourse. Collins (2020) used the GloWbE corpus to analyse comment markers (CMs) across twenty varieties, uncovering differences in their frequency and distribution. GloWbE's large size enables the retrieval of numerous CM tokens, and its informal nature makes it particularly suited for studying CMs, which are common in informal texts. While the resemblance between GloWbE data and spoken language is debated, it remains a valuable resource for studying pragmatic variation, often preferred over the smaller ICE corpus for such research.

Additionally, annotated corpora like ICE are valuable for sociolinguistic research, offering detailed metadata such as age and gender. Suárez-Gómez and Seoane (2023) used ICE-IND and ICE-PHI to explore grammatical variation in WEs based on these factors. These corpora provide rich, comparable datasets, enhancing sociolinguistic studies by allowing analysis across different demographic groups. Their design makes them particularly useful for studying sociolinguistic and pragmatic patterns in WEs.

Corpora serve as valuable historical records, allowing researchers to trace the evolution of English over time. They are especially useful for long-term studies on WEs by providing authentic language samples. For example, Rossouw and Van Rooy's (2012) analysis of the South African English corpus (SAfE), covering the 19th to late 20th centuries, showed a consistent use of modality until a decline in the latter 20th century. This reveals how historical corpora can uncover linguistic trends that contemporary data may miss. SAfE also connects linguistic shifts to socio-cultural and contextual changes, such as the decline in modality linked to shifts in register preferences and norms. Overall, historical corpora are crucial for diachronic studies, offering insights into how language evolves in response to social influences.

However, there is a lack of multinational historical corpora for other WEs, which limits cross-varietal diachronic research. Although there are diachronic corpora available, they are specific to particular countries, like Corpus of Present-Day Spoken English, which focuses on British English. The limited focus restricts the comparative studies. Therefore, it is crucial to develop multinational historical corpora to enable diachronic analyses across English varieties.

2.2 Problems in Existing Corpora

A significant challenge in studying spoken varieties of WEs is the lack of audio recordings. Among existing WEs corpora, only ICE includes spoken data, and even then, not all countries represented in the ICE corpus have available spoken samples. Therefore, many studies must rely solely on written texts. For example, the analysis of ICE-Sri Lankan was restricted to written materials due to the absence of spoken data, emphasising the reliance on written corpora to study English evolution.

Text-only corpora are limited in capturing spoken language nuances, such as discourse markers and conversational interactions. Audio recordings provide insight into crucial elements like pronunciation and intonation, which are key to understanding communication. Without them, important aspects of spoken English may be overlooked, leading to incomplete analyses.

Existing corpora of WEs struggle with representativeness, mainly in countries where English is a Second Language (ESL). In Fiji, for example, collecting local texts is challenging due to the limited availability of newspapers and magazines. Moreover, the unstable political situation from 2006 to 2015 complicated data collection, restricting access to important registers like parliamentary debates.

The scarcity of news and parliamentary debate data raises concerns about the representativeness of WEs corpora in capturing Fiji's linguistic landscape. This limitation affects the ability to fully understand how English is used in various contexts, such as media and politics. The absence of these text types not only impacts the overall size of the corpus but also restricts insights into Fijian English usage in political, legal, and social spheres.

Corpus construction can affect New Englishes studies due to methods based on monolingual English-speaking countries. When constructing a corpus, sampling frames may fail to recognise the linguistic diversity in ESL countries, where English coexists with other languages. Although these frames suit English-speaking countries, they may not fully represent multilingualism in ESL contexts.

The corpus compilation process can introduce biases. For example, the ICE Trinidad and Tobago (ICE-T&T) corpus shows how this affects research on New Englishes. The ICE corpus equates "educated" English with "standard" English, favoring a specific linguistic norm. In

Trinidad and Tobago, while the ICE corpus includes educated English, the spoken component also features creolised English. As the boundaries between Trinidadian English Creole and Trinidadian English blur, it becomes harder to differentiate them. However, only a portion of this variation is classified as Standard English. By focusing on educated or standard varieties, the ICE corpus overlooks the full linguistic diversity in ESL countries, potentially limiting the understanding of variations in New Englishes.

Furthermore, corpus research struggles to represent the full range between standard English and Creole varieties. Bias in corpus compilation often prioritises standard English due to its formal status, leaving Creole varieties underrepresented. Since Creole was recognised as a distinct language in 1975, its usage has increased, mainly in education, where it is being integrated into curricula, challenging the traditional dominance of standard English.

Moreover, attempts to limit the influence of Creole, such as in the ICE-T&T, can result in less authentic dialogues. For example, participants were encouraged to discuss serious topics, and teachers were instructed to avoid excessive code-switching to Tagalog. These practices highlight the difficulties of accurately capturing Creole in corpora. Overall, representing both standard English and Creole in corpora remains challenging, showing the need to enhance the authenticity and inclusiveness of WEs corpora.

3. Conclusion

In summary, corpora are essential for analysing WEs, offering researchers vast linguistic data. However, challenges like limited representativeness, small size, and insufficient spoken material persist. To improve research, more comprehensive corpora are needed, with innovative data collection methods and a focus on Creole-Standard English hybridisation. Despite these obstacles, corpora remain invaluable for both cross-sectional studies of English varieties and longitudinal studies tracking language change. Addressing these issues will create new opportunities for research in corpus linguistics and WEs.

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Analysis of enterprise management accounting transformation strategy under the integration of industry and finance

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Abstract: Through the overview of the integration of industry and finance, this paper analyzes the challenges faced by the transformation of enterprise management accounting, and in response to these challenges, puts forward four feasible strategies to enhance personnel management awareness, strengthen the application of information technology, improve the internal control system and change the concept of financial work, hoping to further promote the successful transformation of enterprise management accounting.

Keywords: Integration of Industry and Finance; Management Accounting Transformation; Feasible Strategy

Introduction

In today's competitive business environment, the integration of industry and finance has become an important means for enterprises to improve management efficiency and scientific decision-making. As an important part of the internal management of enterprises, management accounting's transformation to adapt to the trend of the integration of industry and finance has a key significance for the sustainable development of enterprises. In-depth research on the strategy of enterprise management accounting transformation under the combination of industry and finance is helpful for enterprises to better cope with market changes and achieve value creation and strategic goals.

1. Overview of industry and finance integration

The integration of industry and finance refers to the close combination of business activities and financial activities of enterprises, breaking the barriers between business and financial departments, and realizing information sharing, process collaboration and value co-creation. Through the integration of industry and finance, the finance department can have an in-depth understanding of business processes and operations, and provide more targeted and forward-looking financial support for business decisions; Business units also have a better understanding of financial metrics and requirements to optimize business activities and improve resource efficiency and economic efficiency.

2. Challenges facing the transformation of enterprise management accounting under the integration of industry and finance

2.1 The application degree of management accounting informatization is low

At present, the application degree of management accounting informatization in many enterprises is still low. First of all, there is an island phenomenon in the information system inside the enterprise, and there is a lack of effective integration and data sharing between the business system and the financial system, resulting in the information transmission is not timely and inaccurate. Secondly, the financial software used by some enterprises has a single function, which can not meet the needs of management accounting in data analysis, forecasting and decision support. Finally, enterprises' insufficient investment in informatization construction and lack of professional information technology talents also restrict the development of management accounting informatization ^[1].

2.2 The work management objectives of business and financial departments are not uniform

Business units usually focus on short-term business results and performance growth with the main goals of completing sales tasks, increasing market share and launching new products. The financial department pays more attention to the company's financial situation, capital security, cost control and long-term profitability, emphasizing risk prevention and financial compliance. This kind of disunity of goals is easy to lead to conflicts and contradictions between departments, and it is difficult to reach a consensus in resource allocation and project decision-making. 2.3 The financial management model does not match the accounting requirements for the integration of industry and finance

Under the background of the integration of industry and finance, management accounting needs to be deeply involved in the business process of enterprises and provide financial support and decision-making services for the whole process. However, the existing financial management mode has many inadequacies in organizational structure, process design, personnel allocation and other aspects, resulting in poor communication and coordination between financial departments and business departments, lagging information transmission, and difficult to play the role of management accounting in value creation and risk control.

2.3 The financial management model does not match the accounting requirements for the integration of industry and finance

Under the background of the integration of industry and finance, management accounting needs to be deeply involved in the business process of enterprises and provide financial support and decision-making services for the whole process. However, the existing financial management mode has many inadequacies in organizational structure, process design, personnel allocation and other aspects, resulting in poor communication and coordination between financial departments and business departments, lagging information transmission, and difficult to play the role of management accounting in value creation and risk control.

3. Feasible strategies for enterprise management accounting transformation under the background of industry and finance integration

3.1 Enhance enterprise personnel's awareness of integrated management of industry and finance

In order to realize the transformation of enterprise management accounting, first of all, we need to enhance the management consciousness of the integration of industry and finance. The top management of the enterprise should fully realize the importance of the integration of industry and finance for the development of the enterprise, and regard it as an important part of the enterprise strategy. Through the organization of training, internal publicity and other ways to convey the concept and goal of industry and finance integration to all employees, so that everyone understands that industry and finance integration is not a simple addition of business departments and financial departments, but to achieve deep integration and collaborative development. For business personnel, financial knowledge training should be strengthened to make them understand the basic financial concepts, financial indicators and financial analysis methods, so that they can consciously consider financial factors when carrying out business activities, and improve the scientific and rational business decisions. For financial personnel, it is necessary to encourage them to go deep into the business line, understand the business process and business needs, and improve the pertinence and effectiveness of financial services. At the same time, establish a cross-departmental communication mechanism and collaboration platform to promote information exchange and experience sharing between business departments and financial departments, and form a good atmosphere for the integration of industry and finance.

3.2 Strengthen the application of technology represented by information technology

In order to promote the integration of industry and finance and the transformation of management accounting, enterprises should increase the investment and application of information technology. First of all, the existing information system is integrated and optimized to break the barriers between the business system and the financial system to achieve real-time data sharing and seamless docking. Secondly, enterprises need to actively introduce advanced financial management software and data analysis tools, such as enterprise resource planning (ERP) systems, business intelligence (BI) tools, etc., to enhance the ability of management accounting in data processing, analysis and forecasting. Big data technology and artificial intelligence algorithm are used to mine and analyze massive data, find potential business opportunities and risk points, and provide accurate basis for corporate decision-making. Finally, it is necessary to strengthen information security management and establish a sound data protection mechanism and risk prevention system to ensure the security and stability of enterprise data ^[2].

3.3 Improve the internal control system of the enterprise and optimize the business and financial management process

Enterprises should establish a sound internal control system, clarify the responsibilities and authority of various departments and posts, standardize business and financial processes, and strengthen the control of key links and risk points. In terms of business processes, core business processes such as procurement, sales and production are optimized, unnecessary links and process redundancy are eliminated, and business operation efficiency is improved. At the same time, the financial control node is embedded into the business process to realize the real-time monitoring and risk warning of the business. In terms of financial management process, establish a value-creation-oriented financial management process, and strengthen the coordination of budget management, cost management, and fund management. Through the implementation of comprehensive budget management, the strategic objectives of the enterprise are decomposed into specific budget indicators, and implemented in each department and business links, so as to achieve reasonable allocation and effective use of resources.

3.4 Change the financial work concept to ensure that it matches the management accounting objectives

As the core department of enterprise management accounting transformation, financial department should actively change its working concept from traditional financial accounting and statement preparation to value creation and decision support. Financial personnel should establish strategic thinking and overall concept, deeply understand the strategic planning and business development direction of the enterprise, and provide financial analysis and suggestions for the strategic decision of the enterprise. Strengthen the focus on forward-looking financial indicators, such as market share growth, customer satisfaction, new product research and development investment, and not just limited to traditional financial indicators. Through the analysis and prediction of these forward-looking indicators, it can provide strong financial support for the enterprise's business expansion and innovation. At the same time, the financial department should actively participate in the risk management of the enterprise, establish and improve the risk assessment and early warning mechanism, and discover and respond to various risks in a timely manner. Strengthen cooperation with business departments to jointly develop risk management strategies and control risks within an acceptable range^[3].

Conclusion

To sum up, the integration of industry and finance is the inevitable trend of the development of enterprise management, and the transformation of management accounting is the key measure for enterprises to adapt to this trend. In the face of the challenges in the process of transformation, enterprises need to develop practical strategies from the aspects of enhancing personnel awareness, strengthening technology application, improving internal control system and changing the concept of financial work. Only in this way can enterprises achieve sustainable development in the fierce market competition and continuously improve their value creation ability and core competitiveness.

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Study on the construction of fresh food supply chain in Hainan Free Trade Port

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Abstract: With the gradual improvement of residents' income level, the market demand for fresh food freshness is growing day by day, and the pursuit of quality is constantly improving. Due to the unique tropical Marine climate, Hainan has a large number of fresh food, such as mango, dragon fruit, lychee and golden passion fruit, which are popular in domestic and foreign markets. When winter comes, fresh food in Hainan has entered major cities in the mainland. However, compared with other coastal provinces, Hainan still has shortcomings in local economic development, especially in optimizing the fresh food supply chain. It faces challenges such as shortage of funds and weak technical strength, which makes it difficult to meet consumers' demand for high-quality fresh food. At present, Hainan Free Trade Port is in the golden period of development. In the face of challenges and problems as well as huge market demand, it should seize the opportunity, rely on local characteristics, optimize the fresh food supply chain system, give play to its own advantages to avoid disadvantages, and build a management system with local characteristics.

Keywords: Hainan Free Trade Port; Fresh Food; Supply Chain

Introduction

The fresh food supply chain runs through all stages of food production and sales, including the production, processing, large-scale distribution of raw materials, retail link and delivery to the final consumer. Ensuring the safe and efficient operation of the fresh food supply chain plays an important role in enhancing the competitiveness of China's fresh food in the international market and ensuring the health and safety of food. In-depth analysis of the problems in the fresh food supply chain of Hainan Free Trade Port is of great practical significance for building an efficient, safe and stable fresh food supply chain and improving the competitiveness of fresh food of Hainan Free Trade Port in the international market.

1. Hainan Free Trade Port development priorities

1.1 Make full use of the advantages of free trade port construction

1.1.1 Policy advantages

Since China officially announced the launch of the Hainan Free Trade Port in 2018, Hainan's GDP has maintained an average annual growth rate of about 5.3%, exceeding the growth rate of most regions in the country. At present, the legal and regulatory framework for the Hainan Free Trade Port is gradually being established, and the policy documents with the core content of "tariff exemption, tax rate reduction, tax simplification" and "six liberalization and facilitation measures" have been successively issued and implemented, and the laws and regulations related to the free trade Port are also being formulated and implemented. In terms of taxation, enterprises and individuals can enjoy 15% income tax concessions and import tax exemption policies, such as import tax exemption for processing trade links, and measures to reduce the burden on enterprises have achieved initial results. Compared with other domestic free trade ports, Hainan has a clear starting advantage, and it needs to accelerate the pace, strive to achieve the goal of free trade port closure operation in 2025, and clearly plan the steps and modes of further deepening opening-up^[1].

1.1.2 Geographical advantages

In 2022, the Regional Comprehensive Economic Partnership (RCEP) will come into effect. Hainan's central location as a signatory to the agreement puts every country in Asia within its four-hour flight circle, with even remote Australia within eight hours. Under the background of global supply chain reconstruction, Hainan Free Trade Port should actively adapt to the new trend of supply chain reform and inte-

grate with the development direction of China's supply chain. Supply chain restructuring by multinational companies in North America and Europe has made the Association of Southeast Asian Nations (ASEAN) one of the most dynamic and promising markets in the world. It is predicted that by 2030, the gross domestic product of ASEAN countries is expected to reach 6.6 trillion US dollars, when it will become the world's fourth largest economy after the United States, China and the European Union. The development opportunities of Hainan Free Trade Port, building a core hub facing ASEAN, and making full use of Hainan's unique geographical advantages in promoting regional economic exchanges and resource integration.

1.1.3 Integrate into the new flow of supply chain

In the global pattern, the manufacturing supply chain is gradually shifting to the Association of Southeast Asian Nations, this trend has become an established fact; For example, the supply chain in the textile industry has shifted significantly from China to Vietnam. Chinese companies in the textile, footwear and household goods industries generally prefer to establish production bases in Southeast Asia, resulting in significant changes in freight volumes and their direction of travel. Hainan has the role of connecting point in the dual circular economy system at home and abroad, and its core task is to make full use of the huge potential and advantages of the domestic market, attract enterprises from ASEAN countries to set up bases, and make it a bridgehead to enter the Chinese market. In addition, with the unique status of Hainan Free Trade Port as a "domestic and customs", Hainan can serve as a bridge for international economic exchanges, build an industrial layout with local characteristics, and effectively integrate into the global supply chain system.

2. Hainan Free Trade Port fresh food supply chain construction strategy

2.1 Improve the supply chain infrastructure

Improve the fresh food supply chain, including the storage and handling infrastructure of products, build an efficient fresh food storage and transportation system to ensure that the quality of fresh food is not affected in the circulation link. Continue to expand the main domestic logistics routes, optimize the distribution network. At present, fresh food logistics mainly relies on trunk transportation with limited service range. For fresh food transportation, drying technology can be adopted to reduce the dependence on trunk transportation, or strengthen branch logistics to improve transportation efficiency. Update fresh food processing equipment, integrate advanced information technology resources, create an integrated fresh food supply chain management system to ensure the instant exchange and docking of production and marketing information; Build a traceable fresh food distribution system, form a traceable fresh food supply chain based on the actual situation of foreign trade of fresh food in Hainan, and formulate relevant rules and regulations according to the implementation of fresh food logistics in various countries, so as to promote the smooth distribution of fresh food in Hainan Free Trade Port in the world ^[2].

2.2 Standardize the supply chain development system and strengthen supervision

According to the current development situation of fresh food in Hainan Free Trade Port, the fresh food supply chain is constructed to innovate and optimize the fresh food standards. In the context of the construction of a free trade port, various standards for fresh food in Hainan should be formulated with reference to the safety standards of fresh food in exporting countries, the standardization of the supply chain of fresh food in Hainan should be improved, the management and monitoring of the whole chain should be strengthened, the production resources of fresh food in the region should be integrated, and the ecological environment of the origin of fresh food should be improved. Fundamentally improve the quality of fresh food. According to the import commodity specifications of different international markets, the fresh food that meets the standards is developed, and the fresh food production enterprises are actively promoted to produce organic products that meet the ecological and health concepts. Further, strengthen the management functions of relevant departments in the process of fresh food production, processing, circulation and distribution, clarify the responsibility boundaries of relevant cooperation departments, eliminate the duplication of supervision and management, enhance communication and exchange between departments, real-time summary and coordination of opinions and suggestions of various departments, and optimize the supply chain supervision process according to feedback.

2.3 Develop a diversified development model of “fresh food +”

Under the strong support and promotion of the national industrial revival policy, the fresh food industry of Hainan Free Trade Port is undergoing a profound change, and the entire industry is transforming and improving in the direction of highly organized, large-scale expansion, efficiency intensification and modernization. The fresh food industry of Hainan Free Trade Port is realizing efficient collaboration in production, processing and sales by integrating resources, optimizing supply chain, and introducing advanced technology and management methods. In view of the unique regional characteristics and geographical advantages of Hainan, a fresh food ecological industrial park can be built to match with it, make full use of Hainan's unique natural environment and abundant agricultural resources, and combine with the unique local fresh food culture to build a comprehensive platform integrating production, processing, sales, display and experience^[3]. Through the integration of fresh food culture with tourism, leisure, health and other innovative models, to provide tourists and consumers with a new experience space, not only can taste fresh Hainan fresh food in the park, but also can deeply understand the production process of food, experience the whole process from the field to the table. In addition, the park can also provide health and wellness related services and activities, such as health lectures, yoga classes, healthy dining, etc., to further enrich the experience of tourists. Through such an innovative model, we can expand the influence of Hainan fresh food brands and enhance their visibility. At the same time, make full use of the advantages of the Internet and modern new media, expand the new marketing model of “fresh food + network”, and use new media technology to build a fresh food marketing network system that meets the modern market demand.

Conclusion

All in all, in the process of implementing the national security strategy, Hainan Free Trade Port has a unique tropical climate and a wide variety of fresh food resources. With the promotion of the construction of Hainan Free Trade Port, strengthen and improve the local fresh food supply chain system. The use of policy advantages and resource advantages in the three core links of fresh food production, logistics and transportation, and market sales, gradually solve the existing problems, build a new model of fresh food supply in line with local characteristics, focus on the operation of different fresh food, involving multiple participants, not only can enhance the economic value of local fresh food video, It will also use the wave of the digital age to create high-quality fresh food brands with local characteristics, so as to promote efficient cooperation and continuous virtuous cycle of local fresh food supply chain.

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Thinking about the Construction of Enterprise Accounting System

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Abstract: Accounting is an important part of enterprise financial management, related to the level of enterprise financial management, related to the financial decision-making of enterprises. Therefore, it is necessary to improve the construction of enterprise accounting system, improve the accounting system process based on the actual situation and development needs of enterprises, strengthen the construction of enterprise internal control system, improve the degree of accounting informatization, and build a professional accounting team, so as to improve the efficiency and quality of enterprise financial management and ensure the steady development of enterprises.

Keywords: Enterprise; Accounting; Accounting System

Accounting is the cornerstone of enterprise financial management, perfect accounting system is conducive to the long-term development of enterprises. In the new era, the market environment is constantly changing, in order to further improve the economic benefits of enterprises, most enterprises are gradually expanding their scale of operation, traditional accounting methods have been difficult to meet the needs of modern enterprises, the construction of scientific, standardized and efficient accounting system has become a necessary way for enterprises to improve their financial management level and enhance the market competitiveness of enterprises. However, in the actual work, some enterprises lack sufficient understanding of the importance of accounting, resulting in a low degree of accounting informatization, accounting work by non-professionals, accounting system is not perfect. Enterprises should fully consider their own business characteristics and business needs, examine the problems in their own accounting, constantly improve them, build a perfect enterprise accounting system, improve the level of enterprise financial management, and prevent the occurrence of financial risks.

1. Deficiencies in the accounting work of enterprises

1.1 Imperfect accounting system

Some enterprises have imperfect accounting system in accounting work, which leads to low efficiency of accounting work and can not give full play to the important value of accounting work. Some enterprises do not have detailed accounting processes, such as the lack of specific provisions on accounting processes, accounting vouchers, enterprise account entry and exit, and account book registration requirements, resulting in the lack of specific working basis for accounting personnel, who can only rely on their own experience for management, which is prone to financial security problems ^[1].

1.2 The internal control system is not fully implemented

Internal control system is an important guarantee for the quality of enterprise accounting work, but in reality, although some enterprises have established financial internal control system, they have not really implemented it in accounting work, and can not play a supervisory role in accounting. In the accounting work of some enterprises, one person holds multiple positions and audits at the same level. There are loopholes in the accounting work, which is easy for lawbreakers to take advantage of, leading to illegal behaviors and damaging the interests of enterprises and social image.

1.3 The degree of accounting informatization is low

The rapid development of information technology has brought profound influence to all walks of life. In the field of enterprise financial management, accounting informatization has become an important starting point to improve the efficiency and quality of enterprise financial management. However, in the accounting work of some enterprises, there is a low degree of informatization. For example, some enterprises

lack the introduction of information management system and still rely on traditional manual accounting methods; Some enterprises do not invest enough resources to introduce and maintain professional accounting information systems. Even if accounting information systems are introduced, the performance of the information systems is still low, which cannot meet the needs of current automation and integrated office ^[2].

1.4 Accounting personnel are not professional enough

The professional quality of accounting personnel directly affects the efficiency and quality of accounting work. However, due to the lack of attention to the accounting work of some enterprise management, accounting is considered to be a simple calculation of financial data, so some non-professionals take the position of accounting, accounting is not professional enough. Some enterprises lack systematic training for accounting personnel. In the busy working environment, some accounting personnel do not have enough managers to enrich their professional knowledge and lack understanding of new accounting standards and policies, which leads to accounting work failing to meet the development needs of enterprises in the new era.

2. Thinking about the construction of enterprise accounting system

2.1 Improve the accounting system of enterprises and ensure that accounting work is carried out in a standardized manner

Perfect enterprise accounting system is the basic guarantee for the standardization of enterprise accounting work, in order to provide true and comprehensive financial information for enterprises to support their management decisions. Enterprises need to clarify the work flow and working standards of each business and each link in the accounting work, so that each step of the accounting personnel has clear rules and regulations to follow. The accounting system should be formulated based on the actual situation of the enterprise, including accounting treatment methods, accounting procedures, cross-departmental division of responsibilities, accounting supervision, etc. Coordination and cooperation should be achieved among various systems, and the responsibility of relevant entities should be clearly defined in the accounting system ^[3].

2.2 Strengthen the supervision of the implementation of enterprise internal control system to ensure the quality of accounting work

Only by paying attention to the implementation of internal control system can enterprises effectively guarantee the quality of accounting work and avoid the occurrence of illegal behaviors in accounting work. Enterprises should establish and improve the internal control and supervision mechanism, clarify the supervision responsibilities and processes, at the same time, review the implementation of the internal control system of the enterprise, and timely discover and correct the problems and risks in accounting. Enterprises can also introduce third-party institutions to strengthen the review of internal accounting work to ensure the fairness and justice of the review.

2.3 Improve the degree of accounting informatization and improve the efficiency and quality of accounting work

Enterprises should increase the investment in accounting information construction, introduce advanced accounting work system, improve the efficiency and quality of accounting work. For example, the introduction of ERP system to realize the automation and integration of accounting. Digital management system has the risk of information leakage, therefore, enterprises should strengthen data security management, set access control permissions in the system, set up firewalls and intrusion detection systems, apply digital encryption technology, etc., to ensure the security of corporate financial information. Enterprises should also pay attention to the upgrade and maintenance of the system to ensure the efficient operation of the system to meet the needs of the rapid development of enterprises.

2.4 Build a professional accounting team to improve the professional quality of accounting personnel

In order to improve the efficiency and quality of enterprise accounting work, enterprises should pay attention to building professional accounting team, strengthen the professional training of enterprise accounting personnel, and improve their professional quality. To this end, enterprises should strictly select talents with accounting, finance and other related professional backgrounds, and uphold a fair and just atti-

tude to recruit professionals. Enterprises should regularly organize professional internal training and external training, to provide accounting personnel with accounting professional knowledge, the latest policies and regulations, digital management system operation skills and other aspects of training. Enterprises should also provide accounting personnel with opportunities to participate in industry exchanges and external professional training institutions to improve their professional literacy. At the same time, enterprises should establish a sound assessment and incentive system, and seriously pursue the accounting personnel who violate the rules.

Conclusion

The construction of a perfect accounting system needs to be carried out from many aspects such as system construction, internal control and supervision, informatization promotion and personnel professional training. To build a scientific, efficient and standardized accounting system, enterprises need to improve the construction of accounting work system and ensure the standardization of accounting work; It is necessary to strengthen the supervision of the implementation of enterprise internal control system to ensure the quality of accounting work; It is necessary to improve the degree of accounting information, improve the efficiency and quality of accounting work; It is necessary to build a professional accounting team and improve the professional quality of accounting personnel, so as to provide strong support for the financial management of enterprises and promote the healthy and sustainable development of enterprises.

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Response to: what implications do climate change and the 2015 Paris Agreement have for cultural heritage principles?

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Abstract: Climate change poses significant threats to global cultural heritage, with rising temperatures, increased precipitation, and more frequent extreme weather events accelerating the decay of historic sites and natural landscapes. This paper examines the multifaceted impacts of climate change on cultural heritage, highlighting the urgent need for effective mitigation strategies as outlined in the 2015 Paris Agreement. Through case studies of Hurst Castle in England and Venice in Italy, the study illustrates how these changes have already led to significant damage to heritage sites. It underscores the role of international cooperation and the integration of climate action into heritage preservation efforts. Furthermore, the paper discusses the importance of sustainable development and cultural heritage protection, calling for global action to ensure the preservation of human history in the face of climate change. The findings stress the need for comprehensive climate risk assessments and strategic planning to safeguard cultural heritage for future generations.

Keywords: Paris Agreement; Cultural Heritage; Climate Change

1. Global Climate Background

Climate science has shown that our planet is gradually warming, and greenhouse gases, urbanization, and deforestation- a series of threats are destroying the ecological environment that supports human beings. Biodiversity is also being destroyed like never before. In the face of these emergencies, are we ready? The earth is still warming, and humans are still releasing greenhouse gases. Every 1.5 degrees Celsius increase in global warming will seriously threaten human health and natural and cultural heritage (2022). From 1901 to 2010, the average international sea level rose by 0.19 meters. Since the industrial age, manufactured greenhouse gas emissions have increased the concentration of carbon dioxide, methane, and nitrous oxide in the atmosphere. These are the main reasons for climate warming. Climate change also causes rising sea levels, less snow and ice, and higher ocean temperatures, increasing extreme weather such as storms, extreme precipitation, floods, landslides, and droughts (Massey, 2020). Humans can change past trajectories with practical actions to prevent catastrophic climate changes (Massey, 2020). By understanding the causes and impacts of climate change, it is significant to find countermeasures, prioritize urban greening and reduce energy consumption.

The social response to global climate change is expressed and regulated by culture. Culture is rooted in all aspects of society and exists in production, consumption, and social lifestyle. The identification and response to climate risks are all regulated by culture. Culture is central to human understanding of the causes and impacts of climate change (Massey, 2020). Human culture, social value, and natural value are inseparable. Culture and place are closely linked, the site carries culture, local heritage, architecture, landscape, design, and natural environment, which shape the spatial structure of the place, and people live in this structure (Massey, 2020). Culture is rooted in the site, and protecting culture is to protect the historical heritage and culture of the place. At present, climate change has become one of the significant threats to natural and cultural heritage. To save human cultural heritage, people need to act and actively respond to climate change (2022).

2. The Concept of Cultural Heritage

Cultural heritage expresses society, art, and lifestyle that people pass down from generation to generation, including customs, architecture, objects, and art forms, and embodies people's values. Cultural heritage is divided into intangible and tangible cultural heritage, and it used to be a part of human survival activities, a manifestation of human beliefs, traditions, and lifestyles, and a trace of human activities from ancient times to modern times. It is an essential part of human culture. There are three types of cultural heritage:

- ① built environment: urban architecture and archaeological remains.
- ② Natural environment: including agricultural landscape and coastline.

③ Books and pictures.

Cultural heritage usually refers to movable and immovable cultural relics, ruins, cultural items, and other things worthy of people's protection (Brumann, 2015). It represents the thought and spirit of an era and is an indispensable and essential part of human history and culture. The research and protection of cultural heritage is the responsibility of human beings.

3. Threats of Climate Crisis to Cultural Heritage

Local cultural heritage and historical buildings give local people a sense of place, belonging, and identity. These heritages have been interacting with the surrounding environment, thereby changing, and climate change has exacerbated the aging of cultural heritage (2022). Climate change can lead to physical degradation and chemical mechanisms by affecting the structure and composition of materials (Sesana et al., 2021). The increase in temperature will increase the frequency of freeze-thaw cycles, eventually destroying brick and ceramic structures. The thermal brittleness of materials is caused by temperature changes and the expansion and contraction of particles on the surface of materials (Sesana et al., 2021). The primary corrosion factor in the historical building environment is water. The increase in precipitation caused by climate change can lead to natural disasters such as soil saturation, rising water levels, and floods, which can increase the corrosion of building materials (Sesana et al., 2021). Air pollution, often associated with surface contamination of stone buildings, can lower the pH of rainwater, leading to acid rain. Increased humidity can accelerate the biological degradation of cultural heritage, causing damage to wooden structures through fungi, algae, and molds. Experimental evidence proves that the growth of algal plants can lead to the weathering of sandstone buildings and that fungi are one of the main reasons for the destruction of wooden structures (Sesana et al., 2021). Storms can severely damage cultural sites and buildings. Wind can transport pollutants, such as sand and salt, that can wear away building materials and rock art surfaces and cause fading of building surfaces (Sesana et al., 2021). Increases in temperature, precipitation, changes in humidity, air pollution, and storm intensity have all been recognized by UNESCO as threats to cultural heritage, and these threats have prompted an increasing number of exploratory studies (Sesana et al., 2021).

4. The 2015 Paris Agreement

The Paris Agreement is an international treaty adopted at the United Nations Climate Change Conference (COP 21) held in Paris, France on December 12, 2015. It is composed of 196 contracting parties and is legally binding. A cycle lasts for five years. This international treaty entered into force on November 4, 2016. The goal of the Paris Agreement is to limit the change in global average temperature to 1.5°C by the end of this century. According to the United Nations Climate Commission, an increase in average temperature of more than 1.5°C will cause severe climate change and natural disasters, including drought, flood and rainfall.

The Paris Agreement is the first binding agreement on global joint response to climate deterioration, which agrees to reduce greenhouse gas emissions by 43% before 2030, its implementation requires the cooperation of various countries. Since 2020, various countries have been actively taking action to formulate nationally determined contribution goals (National Climate Action Plans-NDC), in order to achieve the 2030 target of the Paris Agreement, the long-term strategic goal of reducing emissions is established, and the national development plan is built on the nationally determined contribution target. The Paris Agreement calls on developed countries to provide economic and technical assistance to resource-poor developing countries. Mitigation of greenhouse gas emissions requires advanced technology and large-scale investment. The agreement establishes a technical framework for reducing greenhouse gas emissions and provides guidance to help countries in need of technology, and countries have established an Enhanced Transparency Framework (ETF). Starting in 2024, Each country will follow international procedures to report to the United Nations the actions and progress of mitigation.

Since the enactment of the Paris Agreement, new markets have been opened up for low-carbon solutions. The key to future corporate competitiveness lies in zero-carbon solutions and new material technologies. However, the Paris Agreement has certain flexibility and national discretion. Different national conditions may affect the realization of the goal in 2030. Now all countries must cooperate with government policies to quickly take actions to reduce emissions, otherwise the goals of the Paris Agreement by 2030 are unlikely to be met (Preston, 2019).

5. Response on the question ‘What impact do climate change and the 2015 Paris Agreement have on

cultural heritage principles?’

Heritage resources include all cultural and natural heritages in the world. The existence of culture and nature has a great impact on human beings and future generations. World heritage is considered as a ‘cultural landscape’, which can attract many international tourists to generate some value effects and promote local economic development (Shirvani Dastgerdi et al., 2020). The protection of heritage is closely related to the sustainability of cultural heritage. The sustainable development of cultural heritage depends on a stable and good climate environment. However, the deterioration of the global climate has threatened the sustainable development of cultural heritage resources. Climate deterioration can produce many extreme weathers affect the ordinary value of many cultural heritages (Shirvani Dastgerdi et al., 2020), such as: sea level rise and storms pose a major threat to three world heritage sites in London, England, including the Tower of London, the Palace of Westminster and Maritime Greenwich (Shirvani Dastgerdi et al., 2020).

Climate change accelerates the decay process of cultural heritage. Climate affects and destroys cultural heritage from several aspects such as temperature, precipitation, humidity and wind. Water is one of the main factors leading to material degradation (Sesana et al., 2021). Increased water and precipitation can lead to the decomposition and decay of materials, sand, salt and air pollution in the wind increases surface wear and structural collapse of the building, different temperature and humidity can affect the internal chemical and biological decay of the building, the same reasons can also lead to chemical degradation of silk and paper, and extreme weather will put pressure on the protection of cultural heritage exposed to the outdoors (Sesana et al., 2021). The world heritage is already in the unprecedented global climate deterioration, global biodiversity is also disappearing, climate change has destroyed the ecological environment on which human beings depend, and the world natural heritage is the representative of the world’s natural ecosystem (2021). They contribute to the healthy and resilient development of ecosystems. World cultural heritage represented by cultural landscapes, historical buildings and rural buildings are closely related to surrounding areas, communities and ecosystems. Local development strategies address climate change through the use of sustainable local resources. Climate change can also affect the cultural heritage, cultural landscape and customs of local communities (2021).

At present, more and more cases have confirmed that climate change has a major impact on cultural heritage. All countries should take action to slow down the rise in global temperatures and ensure the realization of the goals of the 2015 Paris Agreement. Countries’ actions on climate change must comply with the Paris Agreement (2021), the Paris Agreement states that the integrity of the ecosystem should be protected when addressing climate change, and the agreement provides guidance for countries to mitigate climate change.

Mitigation of climate change is to reduce natural disasters, which is conducive to the protection and sustainable development of cultural heritage. Therefore, in order to protect cultural heritage, countries must take climate action. In order to cooperate with the Paris Agreement. The World Heritage Committee provides countries with a climate action policy framework for World Heritage, which can conduct research on climate adaptation, mitigation and innovation, and cooperate with the World Heritage Convention to formulate the principles and objectives of cultural heritage protection in each country, with the priority of protecting cultural heritage and mitigating climate change. Update national cultural heritage management tools and action plans, regularly monitor implementation, and establish climate models for world heritage to predict climate risks of cultural heritage, and incorporate sustainable development into the World Heritage Convention (2021).

The goal in the United Nations’ 2030 Agenda for Sustainable Development is to take action to deal with climate change, and to protect and restore the sustainability of ecosystems (2023). Act now, otherwise it will lead to heat waves, droughts, floods and rising sea levels, endangering the lives of 3 billion people, and urgent climate action to meet the Paris Agreement commitments (2023). The realization of the United Nations’ 2030 Agenda for Sustainable Development and the Paris Agreement depends on maintaining the air, water, land and ecosystems related to the environment, climate change, biodiversity and the good development of ecosystems means that the goal of sustainable development can be carried out smoothly. The 2030 Agenda for Sustainable Development and the Paris Agreement contribute to the protection and sustainable development of world cultural heritage. 2030 Agenda for Sustainable Development refers to the Paris Agreement and provides the world’s development with a framework to jointly address climate issues. The protection of world cultural heritage can promote

sustainable local development. Sustainable development is premised on the protection of world cultural heritage.

6. Case Study Analysis

6.1 Case 1: Hurst Castle in England, United Kingdom

Hurst Castle in England was built by Henry VIII from 1541 to 1544. The purpose of the construction was to prevent French invasion. In 1649, King Charles I was imprisoned here (Yandell, 2022). Currently, the owner of Historic Hurst Castle is English Heritage. The castle is one of the famous scenic spots in the UK. Hurst was once identified as one of the most vulnerable castles in the UK. In February 2021, a part of the castle was submerged by sea water. Coastal erosion and ocean storms constituted the greatest threat to Hurst Castle (Yandell, 2022), and this Castle becomes one of the most difficult heritage sites in the UK to protect (Yandell, 2021). A section of the 38-meter wall of the building broke and fell into the sea, exposing the interior of the building. The storm damage accelerated the decay of Hurst Castle, and many potential problems arise (Yandell, 2021). Conservation agencies began to investigate the geology and foundations of the Castle. They consolidated the coast with 22,000 tons of pebbles and rocks to cushion the impact of the waves, and the restoration work also included strengthening a wall from 1850 (Yandell, 2022).

The occurrence of extreme weather indicates that the impact of climate change on the UK is already very significant. The climate assessment of the UK ten years ago showed that the number of climate risks has increased. It is the seawater erosion, sea level rise and storm increase caused by climate change that caused Hurst Castle to be damaged. Britain has become one of the first countries in the world to implement the Paris Agreement (2022). The UK incorporates climate planning into its long-term strategy and formulates a third National Adaptation Plan (NAP3) to fully support climate change mitigation in order to reduce the impact and damage of extreme weather on cultural heritage sites and promote the improvement of the cultural heritage protection work system under the influence of climate change (2022).

6.2 Case 2: Venice City in Italy

The city of Venice, Italy, was founded around AD 450. Venice was built on 100,000 palafities that were driven into the mud, located on the Venetian lagoon. The palafities were supported by wooden beams driven into the mud, and the trunks planted in the lagoon are very hard, and they become the underwater foundation of the Venetian architecture. Venice is composed of 118 islands. The Grand Canal passes through Venice in an S shape (Benve, 2022). From 1994 to 2016, Venice sank by 1.9 mm per year, but the latest data show that the speed of Venice's sinking accelerated from 2010 to 2015. After a study in 2017, it was predicted that by 2100, the entire Venice will be completely submerged because the water level of the Mediterranean Sea is rising (Benve, 2022). In November 2019, Venice reached an all-time high water level of 1.87 meters, all of which are serious consequences of climate change.

Today Venice is facing many challenges, such as: the salt water of the ocean is eroding the brick walls of the building; the waves caused by the ships are exacerbating the corrosion of the walls and structures; rising tides seep more water into buildings; global climate worsens, glaciers melt and sea levels rise; industrial and agricultural waste in canals cause urban pollution; floods strike (Benve, 2022). Climate change makes floods always threaten the historical buildings of Venice. In 2019, Venice was hit by severe floods (Barry, 2021). The floods invaded St. Mark's Basilica, and the fate of Venice being submerged has attracted international attention. Venice is a product of human ingenuity and ingenuity, the city needs to be saved. St. Mark's Basilica is the lowest place in Venice. This place can be used to monitor the rising sea level. Venice's city defense Moses system has been activated, but it is still in the testing stage. The government is actively maintaining and intervening (Barry, 2021). To reduce disasters caused by climate, it is very important to carry out work such as daily monitoring, inspection and danger warning in Venice.

Through the analysis of two cases, it is clearly to see that the natural disasters caused by climate change have seriously damaged the cultural heritage of mankind, and the places bearing the glorious history of mankind have been severely eroded. It reminds people to pay attention to the impact of climate change. Climate change has threatened the living environment of human beings. Countries need to accelerate climate action, strive to achieve the goals of the Paris Agreement, and contribute to the sustainability of cultural heritage and world development.

7. Discussion and Result

Due to the occurrence of extreme weather caused by climate change, climate change will exacerbate the decay of world cultural heritage. Although the research on this type of impact is mostly dominated by European research institutes, with European countries as the research objects, current research has also included and focused on climate research in North America, Australia and New Zealand, there are few studies in other regions, so this study has certain limitations. But the above studies also outline the impact of climate change on world cultural heritage, without taking into account the uncertainty of climate change predictions (Sesana et al., 2021), and the uncertainty of how the climate will evolve. This paper examines the gradual changes in climate variables such as temperature, precipitation, temperature and wind caused by climate change, how they affect the decay process of cultural heritage in the outdoor environment, and there is also a synergy between the various variables, which leads to direct and indirect effects on various building materials and buildings (Sesana et al., 2021).

Prediction and research on climate change can inform climate risks in advance, assess the vulnerability of cultural heritage to protect cultural heritage in advance, and improve the ability to deal with climate change. The research on climate change is still lacking in scope, and the main research focuses on developed countries, regions of Asia, Africa and Central America lack complete climate data, there are many uncertainties about the impact of climate change on cultural heritage, and there is a lack of best practice information and climate tools to manage climate change (Sesana et al., 2021). The protection of cultural heritage lacks scientific management. International organizations should advance research on climate change in developing countries.

8. Conclusion

Since 2007, people's understanding of the impact of climate change has greatly increased. As the global temperature gradually rises, with the support of the World Heritage Convention, the world heritage will usher in 'transformative changes', so that the world's cultural heritage can maintain carbon neutral and resilient development, and adapt to the changing climate. The universal value of cultural heritage is protected. World cultural heritage, as a model and the most direct beneficiary of climate action, can promote changes in policy, economic, environmental and social sectors to benefit future generations (2021).

In 2015, the World Heritage Committee injected the content of sustainable development into the World Heritage Convention to ensure sustainable development goals and strengthen the protection of cultural heritage (2021). The protection of world cultural heritage is consistent with local sustainable development goals, and jointly address the challenges of climate governance and create conditions for cultural heritage to implement changes that can contribute to the promotion of sustainable development goals (2021). Considering that climate change threatens the serious consequences of cultural heritage and is irreversible, stakeholders of world cultural heritage and State parties should take timely measures to conduct climate risk assessment and cultural heritage vulnerability assessment, so that decision makers can understand climate risk and cultural heritage in advance. Developing strategic goals for long-term response to and reducing the impact of climate change on cultural heritage can better protect human wealth.

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Research on Current Situation and Innovation Suggestions of Enterprise Management Accounting under Big Data

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Abstract: In the era of big data, enterprise management accounting is facing unprecedented development opportunities and challenges. This paper aims to explore the development trend of enterprise management accounting in the era of big data, analyze the difficulties it faces, and put forward corresponding innovative strategies, in order to provide theoretical guidance and practical reference for the practice of enterprise management accounting.

Keywords: Big Data; Enterprise Management Accounting; Develop

Introduction

In the era of big data, enterprises are faced with the challenge of massive data. How to effectively use these data to support enterprise decision-making has become an important issue facing enterprise management accounting. As an important part of enterprise financial management, the development and innovation of enterprise management accounting is of great significance to enhance the competitiveness of enterprises.

1. Development trend of enterprise management accounting in the era of big data

In the current era of big data, one of the development trends of enterprise management accounting is that data-driven decision-making has gradually become the mainstream. The emergence of this trend is due to the rapid development of information technology. With the wide application of Internet, cloud computing, Internet of Things and other technologies, enterprises can easily obtain massive data resources. These data not only cover the production and operation activities of enterprises, but also include the market environment, customer demand, competitor dynamics and other aspects. Enterprise management accounting uses big data technology to deeply mine, analyze and process these massive data, thus providing strong support for enterprise decision-making ^[1]. Taking the improvement of data collection and analysis capabilities as an example, enterprise management accounting needs to have strong data collection capabilities to obtain valuable data from inside and outside the enterprise. At the same time, it is also necessary to have the data analysis ability to clean, integrate and mine the data to extract valuable information.

2. Current situation of enterprise management accounting in the era of big data

2.1 Data quality and security risks

In the era of big data, the amount of data that enterprise management accounting relies on has exploded, which makes data quality a problem that cannot be ignored. First, the diversity of data sources leads to uneven data quality. Businesses may obtain data from multiple sources, such as internal systems, external vendors, social media, etc., which can vary widely in format, accuracy, and completeness. Secondly, the difficulty of data cleaning and integration increases, because of the diversity of data formats and structures, enterprises need to invest a lot of resources for data cleaning and integration to ensure the accuracy of data. In addition, data security risks are becoming increasingly prominent. In the big data environment, data leakage, tampering and abuse occur frequently, which brings huge economic losses and reputational risks to enterprises.

2.2 Insufficient ability of accounting talents

The era of big data has put forward higher requirements for enterprise management accounting talents. However, current accounting talents are deficient in data analysis, information technology and business insight. First of all, the traditional accounting education system

often focuses on accounting theory and practical operation, and the training of data analysis skills is relatively insufficient. This makes it difficult for many accountants to carry out data analysis and decision support effectively in the face of massive data. Secondly, accounting personnel have a limited grasp of big data technology, which makes it difficult to apply big data technology to practical work. Accounting personnel also have shortcomings in interdisciplinary knowledge integration and innovation ability, which makes it difficult to adapt to the development needs of enterprise management accounting in the era of big data.

2.3 Disconnect between accounting theory and practice

In the era of big data, the disconnect between accounting theory and practice has become increasingly apparent. On the one hand, accounting theory is unable to cope with new problems and challenges in the environment of big data^[2]. For example, in data analysis and decision support, traditional accounting theory is difficult to provide effective guidance. On the other hand, the problems of data processing, analysis methods and decision support faced by enterprise management accounting in practical work often require innovative solutions. However, the existing accounting theory has some shortcomings in the aspects of innovation, prospectivity and practicability, which leads to a large gap between accounting theory and practice. This disconnect not only affects the efficiency and quality of enterprise management accounting, but also restricts the competitiveness of enterprises in the era of big data.

3. Innovative strategies of enterprise management accounting in the era of big data

3.1 Build a big data-driven accounting information system

Big data-driven accounting information system can provide enterprises with more comprehensive and real-time financial data. By collecting, integrating and analyzing massive data, enterprises can grasp the financial situation in real time, discover potential risks and problems in time, and take appropriate measures to prevent and solve them. In addition, the accounting information system driven by big data helps to improve the refinement of enterprise financial management. Through in-depth mining and analysis of financial data, enterprises can optimize resource allocation, reduce costs and improve operational efficiency. Refined financial management can also provide enterprises with more accurate financial forecasting and decision support. In addition, the accounting information system driven by big data helps to improve the risk prevention and control ability of enterprises. Through the analysis of historical data, enterprises can identify potential risk factors and take corresponding measures to prevent them. Big data technology can also help enterprises realize risk early warning and dynamic monitoring to ensure the financial security of enterprises.

3.2 Cultivate composite accounting talents

First of all, enterprise management accountants need to be familiar with emerging technologies such as big data and cloud computing. These technologies can not only help enterprises realize the rapid collection, storage and processing of data, but also bring revolutionary changes to the accounting information system. By applying big data, cloud computing and other technologies to accounting information systems, enterprise management accounting talents can greatly improve work efficiency, reduce costs, and create more value for enterprises. Secondly, enterprise management accounting talents need to have a certain degree of economics, management, statistics and other interdisciplinary knowledge. This knowledge can help them analyze problems from multiple perspectives and provide comprehensive solutions for enterprises^[3]. For example, when analyzing the financial situation of enterprises, they can apply economic principles to evaluate the profitability and market competitiveness of enterprises. When formulating enterprise development strategy, they can apply management knowledge to optimize enterprise organization structure and improve management efficiency; When predicting market trends, they can use statistical methods to provide enterprises with accurate market analysis reports.

3.3 Strengthen technological innovation

In the current information age, if enterprises want to be invincible in the fierce market competition, they must keep up with the pace of scientific and technological development. Therefore, enterprises should increase the R&D investment of cutting-edge technologies such as

big data and artificial intelligence, so as to promote the innovation and development of enterprise management accounting. The application of big data technology can help enterprises realize the deep mining and analysis of data resources, and provide strong support for enterprise decision-making. By collecting, collating and analyzing a large amount of internal and external data, enterprises can have a more comprehensive understanding of market dynamics, customer needs and their own operating conditions, so as to formulate a more scientific and reasonable business strategy. The application of artificial intelligence technology can greatly improve the efficiency of enterprise management accounting. For example, through artificial intelligence algorithms, enterprises can achieve automated bookkeeping, automatic generation of financial statements and other functions, reducing the work burden of accountants and improving work efficiency. At the same time, artificial intelligence can also help enterprises achieve risk early warning, cost control and other goals, and create more value for enterprises.

Conclusion

In the era of big data, enterprise management accounting is facing unprecedented opportunities and challenges. Through innovation and exploration, enterprise management accounting can provide more accurate decision support for enterprises and improve the competitiveness of enterprises. Enterprises should seize the opportunity of the era of big data, strengthen innovation, and promote the sustainable development of enterprise management accounting.

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English Online Book Reviews of Red Sorghum from the Perspective of Attitude System

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Abstract: This paper applied attitude system of appraisal theory to explore online book reviews of Red Sorghum. The results show that readers not only evaluate the story and the writer's writing prowess, but also the characters in the book and the Chinese culture included in the book. In general, reviewers give high appreciation for this novel, but there also are some flaws that affect readers' reading experience.

Keyword: Red Sorghum; Appraisal Theory; Attitude System

1. Introduction

In recent years, with the continuous strengthening of economic strength and increasing international status, China has become more and more influential in the world. In the process of globalization, culture has increasingly become an important part of the national soft power competition. In order to make the world have a deep understanding of China and its culture, greater process should be made in taking Chinese culture to the global stage. Chinese literature which contains rich traditional culture, is an important part of Chinese culture. Its overseas dissemination has attracted more and more attention. However, different countries may have different culture and ideology, Chinese literature may face many challenges in the process of international communication. Book reviews as comments on the content and author of the book contains a large number of readers' views, attitudes and emotions, which is of great help to study the overseas reception of Chinese literature. Mo Yan is one of the most influential writers in contemporary Chinese literary world, who is the first Chinese writer to win the Nobel Prize in Literature. His work Red Sorghum is the first and most representative novel in the 1980s.

2. Theoretical Framework

Appraisal Theory is a language appraisal system developed by Professor Martin, Professor White and their colleagues from the University of Sydney since the 1990s based on the meta-function of interpersonal meaning in systemic functional linguistics. "Appraisal theory is about evaluation - the various attitudes expressed by linguistic means in a text, the strength of the emotions involved, the ways in which values come from, and the ways in which readers and authors agree." (Martin J R, David R, 2003) According to Martin, attitude system can be specifically divided into three subsystems: effect, judgement and appreciation, which involve three different areas: emotion, morality and aesthetics. Affect refers to the expression of people's feelings, judgement refers to the evaluation of people's character and behavior, and appreciation refers to the evaluation of the value of things.

3. Research Design

3.1 Research Questions

Using UAM CorpusTool as an auxiliary research tool to annotate appraisal resources, and with collected book reviews on Amazon website as research data, the author aimed to explore the following contents:

- (1) What is the overall distribution of attitude resources of this book?
- (2) What is the readers' attitudes and opinions toward the work?

3.2 Research Data

This study uses readers' comments of contemporary Chinese writer Mo Yan's Red Sorghum in English translation as the research object. The data collected from the American Amazon website. After eliminating all languages except English, the total amount of book reviews is 107, including 42 five-star reviews, 28 four-star reviews, 14 three-star reviews, 9 two-star reviews, and 14 one-star reviews.

4. Research Findings and Discussions

Table 1. Attitude Resources Statistics

Category	Attitude			Total Amount
	Affect	Judgement	Appreciation	
Quantity	78	65	478	621
Proportion	12.5%	10.4%	76.7%	99.7%

Table 1 shows the annotation results of attitude resources. It can be seen that the total number of attitude resources in the book review is 621, among which the appreciation resources account for the highest proportion, reaching 76.7%, and the number of emotional resources and judgement resources is similar, respectively 12.5% and 10.4%. On the whole, the number of appreciation resources far exceeds the emotional resources and judgement resources, which fully reflects the characteristics of book reviews. Reviewers express their attitudes and opinions on books through appreciation words, which can make the comments more objective, so as to avoid reducing the persuasive of the comments due to strong emotional colors.

4.1 Affect system

Table 2. Affect Resources Statistics

Category	Affect			
	un/happiness	dis/satisfaction	in/security	dis/inclination
Quantity	19	45	12	2
Proportion	24.4%	57.7%	15.4%	2.6%

(1) This was a book I had to read for class and didn't finish in time because I found myself not merely reading, but savoring [happiness] the passages.

(2) I sure am glad [happiness] it was because it is an incredibly powerful book that presents a genuine Chinese viewpoint.

(3) After a while, I grew weary of [dissatisfaction] all the flashbacks and start to feel that the writer should've/could've wrapped up the saga in 3 or 4 novellas, instead.

(4) If this is the only reference you have of the Japanese invasion of China - you will finish the book very angry [dissatisfaction] at the Japanese. This is a part of world history very few Americans know anything at all about.

In the first example, the reader uses "savoring" to express his love for this book, which shows his interest and concentration in the process of reading. It often reflects readers like to read passages that are beautifully written, which may give them an enjoyable journey. In the second example, the reviewer is pleased to see the real Chinese life and authentic Chinese culture presented in the book, which reflects they have an open mindset that are willing to embrace different cultural conventions. In the third example, the reader thinks it is unnecessary to put too many flashbacks in the book which only cause confusion on readers. This indicate that many readers can't appreciate the writing techniques used in the novel. The last example shows readers' attitude towards the atrocities that caused by Japanese invasion. The reader knew about this history in the book firstly, and he lamented that many Americans were almost completely unaware of this historical event.

4.2 Judgement System

Table 3. Judgement Resources Statistics

Category	Judgement				
	normality	capacity	tenacity	veracity	propriety
Quantity	10	33	7	4	11
Proportion	15.4%	50.8%	10.8%	6.2%	16.6%

(1) Mo's genius [+capacity] is telling a compelling tale involving complex, three-dimensional characters in a style which is direct and gritty but also mystical and rich with symbolic imagery.

(2) It was so masterful [+capacity] how Mo Yan wove together all of the characters and time periods, as he moved from chronologically back and forth.

(3) If there is a message to be culled from this work, it seems to me to be that humans are deeply and fundamentally flawed [-normality], but are just as deeply robust in their ability to persevere [+tenacity] .

In the first and second example, reviewers praise Mo Yan is a talented writer who can perfectly depict a complicated but compelling story. It reflects readers think highly of writer’s competence and writing skills. In the third example, the reader comments on the characters of the story, and he admires the profound characters in the book. The tenacious spirit and willpower of characters deeply impressed him. This reflects readers pay attention to the personality of characters and desire to see some powerful characters that will affect them positively.

4.3 Appreciation System

Table 4. Appreciation Resources Statistics

Category	Appreciation		
	<u>reaction</u>	<u>composition</u>	social-valuation
Quantity	<u>323</u>	<u>79</u>	76
Proportion	<u>67.6%</u>	<u>16.5%</u>	15.9%

(1) The graphic [+composition] and honest [+composition] portrayal of the blood and gore is remarkable [+reaction].

(2) Red Sorghum is a frank [+reaction] and disturbing [-reaction] history of a period no one else has recorded in such detail [+composition] and with such brutal non-judgemental honesty [+reaction].

(3) Mo Yan’s use of magical realism to depict China’s tortured history in the long 20th century penetrates me deeply [+reaction]. I am left with a mysterious sense of intimacy with another civilization’s history [+reaction].

(4) The plot was engaging [+reaction] but damaged [-composition] by chronology of its telling.

In the first example, “graphic” and “honest” are readers’ comments on the language of the novel and also their appreciation for the author’s writing prowess. And “remarkable” fully reflects readers’ admiration of the linguistic details describing the bloody plot in the story. This showcases readers not only comment on the plot of novel, but also its writing features and specific detail description. In the second example, the reader used the words “frank” and “disturbing” to comment on the story of the book, which shows it’s a straight and worrisome story, but the use of “detail” and “non-judgemental honesty” confirm that it is the carefulness and bare honesty of the author in his writing that make this novel a unique and valued one. This not only expresses reader’s appreciation for the work and author, but also stimulates the interest of other potential readers. In the third example, the reader uses “penetrates me deeply” to express a strong resonance and emotional response to the story to show that it is an insightful and heart-moving book. And the reader used “left with a mysterious sense of intimacy with another civilization’s history” to express he has affected by Chinese civilization unconsciously. And that also shows that readers have a strong tolerance to embrace foreign cultures. In Example 4, “engaging” expresses readers’ appreciation and affirmation of the novel. However, “damaged” shows that readers are affected by the jump in narrative time and think this weakens the charm of the novel. This reflects the possibility that some readers may be confused by Mo Yan’s narrative style and thus reduce their interest in the novel, which also poses obstacles to the dissemination of such literary works.

5. Conclusion

This paper gives a brief study on book reviews of Red Sorghum from the perspective of attitude system of appraisal theory. With the help of UAM Corpus Tool software, the attitude resources are annotated and calculated. The statistics shows that, in an overall distribution, appreciation resources accounted for the highest proportion, followed by affect resources and judgement resources. Through reading and exploring readers’ attitude about the novel and its author, the author finds that reviewers not only appreciate Mo Yan’s excellent writing skills and wonderful novel plot, but also are very glad to learn about Chinese culture and convention. At the same time, the author finds that some readers are confused about the narrative style and this may damage their reading attention, which may lead to incomprehension of the novel. And this is also a challenge for global dissemination of literature.

This research shows that there are many opportunities and challenges in the process of the dissemination of literary books. And more efforts can be made to improve this process to bring an environment that is friendly for international-readers and a more bright future for Chi-

nese literature.

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Thinking about the digital transformation of enterprise accounting in the digital economy era

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Abstract: In the era of digital economy, the social environment faced by enterprises has undergone great changes, and enterprises are facing more fierce social competition. As the front-line personnel of enterprise financial management, the work of accounting personnel is facing great challenges. This paper discusses the influence of digital economy era on enterprise accounting, and puts forward the specific strategy of digital transformation of enterprise accounting in digital economy era for reference.

Keywords: Digital Economy Era; Enterprise Accounting Personnel; Digital Transformation

In the era of digital economy, the rapid development of digital technology has had a profound impact on all walks of life, and the way of enterprise management has undergone profound changes, and the field of enterprise accounting is no exception. Accounting work is the core work of enterprise management, closely related to the financial management of enterprises, related to the smooth operation of enterprises, and provide key data support for the decision-making of enterprises^[1]. In the age of digital intelligence, the wide application of advanced technologies such as big data, cloud computing and artificial intelligence makes enterprise accounting more efficient and convenient, and also puts forward higher requirements for enterprise accounting personnel. Therefore, enterprises should pay attention to promoting the digital transformation of accounting personnel, improve the quality of accounting work, and promote the sustainable development of enterprises.

1. The impact of digital economy era on enterprise accounting

1.1 Improved skill requirements

In the era of digital economy, data is the key factor to promote the development of enterprises, and the enterprise data is growing explosively. Enterprise accountants must master big data analysis skills in order to extract valuable information from massive data and provide data support for enterprise decision-making. Enterprise accountants need to master the operation skills of ERP, CRM, SCM and other new information systems to improve the efficiency and quality of accounting work. Enterprise accountants need to have innovative consciousness and can take the initiative to innovate loss accounting. Accountants need to have a digital mindset, be able to look at the business from a data perspective, and be proactive in using digital technologies to do their work. Enterprise accountants need to establish a sense of lifelong learning, and constantly learn and master new digital technologies and new working methods to adapt to the changes of the digital economy era.

1.2 Job role change

In the traditional enterprise management mode, the work content of enterprise accounting is mainly budget, cashier, statistics and other financial related work content, in order to complete the task assigned by the enterprise manager. However, in the era of digital economy, enterprise accountants are not only simple financial data recorder and reporter, but also to analyze the valuable information contained in the enterprise financial data and provide valuable information for enterprise decision-making. In the era of digital economy, the dependence of enterprises on financial data increases, and accounting work is more important. Accountants need to be more involved in the decision-making process of enterprises, transforming from traditional financial accounting to management accounting^[2].

1.3 Working mode changes

In the era of digital economy, digital technology has prompted changes in the working methods of accounting work in enterprises. With the development of digital technologies such as mobile Internet and cloud computing, digital office has gradually become the normal work of accounting personnel in enterprises, improving work efficiency and flexibility. The application of financial robot software helps enterprise

accounting personnel to complete the basic accounting work, so that accounting personnel have more energy to engage in data analysis, enterprise management and other higher-level work. Moreover, in the accounting work, accountants need to carry out cross-departmental cooperation, which breaks the information island of each department. However, in the digital working environment, with the increase of the amount of enterprise data, the problem of data security is becoming increasingly prominent, which puts forward higher requirements for the security awareness and professional ethics of accounting personnel.

2. Thinking about the digital transformation of enterprise accounting in the era of digital economy

2.1 Change thinking mode and establish digital thinking

Enterprises need to help accountants to deeply understand the characteristics of the digital economy, so that accountants can realize the importance of data to the development of enterprises, as well as the importance of digital technology in improving the efficiency and quality of enterprise accounting work and improving the quality of enterprise operations. To this end, enterprises need to organize digital work mobilization meetings of accounting personnel to help accounting personnel establish digital thinking. At the same time, enterprises should cultivate the behavior habits of accounting personnel to carry out digital accounting work. In the early stage, digital work can be included in the daily work system of accounting personnel, and urge accounting personnel to master digital skills as soon as possible.

In the era of digital economy, the update of digital technology is extremely fast, accounting personnel need to maintain a lifelong learning attitude, keep up with the pace of The Times, and actively participate in the relevant training organized by enterprises, skills examinations related to accounting work, reading literature related to accounting work, etc., so as to constantly improve their professional quality. In the era of digital economy, the use of numerous intelligent software will force accountants to constantly improve their skills. If accountants in enterprises cannot maintain a positive learning attitude and actively learn, they will eventually be eliminated by enterprises and society^[3].

2.2 Strengthen the training of accounting personnel and improve accounting literacy

Enterprises should strengthen the training of accounting personnel and cultivate the composite accounting talents needed to adapt to the development of enterprises in the digital economy era. To this end, the enterprise should develop a systematic, complete and standardized training plan according to its own strategic needs, and clarify the training content, training personnel, training time and training frequency. The training content should include accounting professional knowledge, operation skills of accounting digital system, big data analysis ability, professional ethics, data security awareness, etc. The digital technical content should change with the change of technology to ensure that accounting personnel can master the cutting-edge knowledge. Enterprises should invite experts or front-line accounting personnel with advanced work experience to participate in training to provide professional training guarantees for accounting personnel. In addition to theoretical learning, enterprises should also organize practical exercises, so that accounting personnel can apply the knowledge to solve practical problems. Enterprises can provide professional learning resources for accounting personnel, such as online accounting training courses and relevant literature materials of accounting digital transformation for accounting personnel to learn independently. Enterprises can also set up a book corner in the office of the accounting department to provide relevant training materials. Enterprises should encourage accountants to participate in professional training outside the company, take professional certification examinations, such as CPA (Certified Public accountant), CMA (Management accountant), and digital skills related certification examinations, to help accountants stay competitive.

2.3 Establish and improve the assessment and incentive mechanism to promote the digital transformation of accounting personnel

In order to effectively promote the digital transformation of accounting personnel, enterprises should establish an assessment and incentive mechanism for accounting personnel, and take accounting personnel's data analysis ability, digital system operation ability, and participation in enterprise management as assessment indicators. At the same time, enterprises should pay attention to the professional ethics assessment of accounting personnel, strengthen the security guarantee of enterprise digital data, seriously hold accountable the security be-

havior of data leakage, and improve the awareness of enterprise accounting personnel on data security protection. Enterprises should establish a promotion mechanism that matches the assessment mechanism, and publicly commend accounting personnel with excellent performance in digital work, provide bonuses, benefits, promotion opportunities and other rewards. For the accounting personnel who can propose innovative plans, additional incentives should be given to encourage the accounting personnel to play the innovative ability, so as to contribute to the long-term development of the enterprise.

Conclusion

In the era of digital economy, enterprise accounting faces the urgent need of digital transformation. Accelerating the digital transformation of accounting is the key for enterprises to adapt to market changes and enhance competitiveness. Enterprises should pay attention to the professional training of accounting personnel and cultivate compound accounting talents; Enterprises should strengthen the examination and incentive of accountants to promote the digital transformation of accountants. Accountants themselves should establish a sense of lifelong learning and form a digital work thinking, so as to provide a talent guarantee for the improvement of the financial management level of enterprises.

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Causes Analysis and Translation Methods of Financial English Lexical Metaphors

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Abstract: Metaphors and financial activities are prevalent in all aspects of human life. Financial English, as an integration of finance and linguistics, has a large number of metaphorical expressions in its discourse system. This paper selected the second edition of Reuters Financial Glossary published by China Financial Publishing House as the research object, collated all the financial English metaphors included in it, and, according to the characteristics of the source domain, divided them into six categories: animal-related, plant-related, object-related, action-related, color-related and weather-related, etc. After that, the paper searched and analyzed the English materials of authoritative journals such as Financial Times and The Economist since 2024, and explored the formation causes and the translation methods of financial English metaphors under the guidance of the metaphor theory. It is hoped that this study will help further deepen the research of financial English metaphors and provide a reference for the translation of financial English texts.

Keywords: Financial English; Translation Methods; Metaphor

1. Introduction

Metaphor is classified as rhetoric in traditional linguistics, and gradually involves the cognitive domain with the development of cognitive linguistics. Related researches can be divided into three main stages. The first stage is the propose of metaphor, these studies laid the foundation of metaphor as a cognitive tool, emphasizing its ability to understand abstract concepts through concrete things. The second stage is the ontological study of metaphor, and this kind of articles deepened the understanding of metaphor and classified and discussed the phenomenon of metaphor. The third stage is the applied research of metaphor, these researches explored the identification, mapping relationship and translation transformation of metaphor under a specific domain.

In the field of finance, metaphors materialize abstract financial and economic things and phenomena through figurative and vivid language construction, promoting effective communication and understanding of information. However, for financial practitioners whose native language is not English, accurately interpreting these metaphors has become a great challenge in grasping information. This paper discusses the reasons for the formation of financial English metaphors and their translation methods in the light of metaphor theory, with a view to further deepening the study of financial English metaphors, providing reference for practitioners in related fields, and providing reference for the translation of financial English texts.

2. Classification of Financial English Metaphors

Financial English, as an integration of finance and linguistics, is a kind of English with strong knowledge, practicality and professionalism. This paper selected the Reuters Financial Glossary as the research object, collated all the lexical metaphors included in it, and divided them into the following six categories.

Animal-related: Human tend to use known and familiar things to understand unknown and abstract concepts. Therefore, financial English draws on a large number of metaphors related to animals. Some examples are as follows: bearish(看跌, 看空), bullish(看涨, 看多), bulldog bond(猛犬债券), butterfly spread(蝶状价差), cash cow(高收益的产品业务), dead cat bounce(死猫式反弹, 跌深反弹), etc.

Plant-related: In addition to animal-related lexical metaphors, financial English often draws on the phenomena of plant growth, prosperity, and decline to reflect fluctuations and developments of financial markets. Some examples are as follows: branch company(分公司), daisy chain(非法交易链), economic growth(经济增长), economic resurgence(经济复苏), green shoots(复苏绿芽), seed money (启动资金, 本金), etc.

Object-related: What's more, Financial English metaphors are also mostly related to common items in human daily life. While giving

new meanings to old words also reflects the economy of language. Some examples are as follows: book(账簿, 名册), cap(利率上限期权), floor(利率下限期权), notes(中期债券), option(期权), position(头寸), etc.

Action-related: Financial market is a dynamically changing environment with money circulation and capital operation showing significant dynamism. Therefore, there is a tendency to use action vocabulary as a metaphor to describe various phenomena in financial market. Some examples are as follows: ask(卖方报价), bid(买方出价), call(看涨期权), offer(要约, 发盘), put(看跌期权), squeeze(逼仓, 供给短缺), etc.

Color-related: Color is often associated with specific emotions and symbolism in human culture. There is also a portion of lexical metaphors related to colors in financial English. Some examples are as follows: beige book(美国经济展望调查报告), black market economy(黑市经济), blue chip stock(蓝筹股, 绩优股), greenmail(购股勒索), pink sheets(粉单市场), white knight(白衣骑士, 白武士), etc.

Weather-related: Weather can transcend geographical, racial, and cultural limitations and trigger similar feelings and understandings among all human beings, so it frequently appears in the metaphors of financial English as a common source domain. Some examples are as follows: market climate(市场环境), dawn raid(黎明突袭, 先手购入), financial storm(金融风暴), sunshine laws(阳光法律), dollar tide(美元潮汐), financial tsunami(金融海啸), etc.

3. Causes analysis of Financial English Metaphors

The reasons for the emergence of metaphors in human language are manifold. As far as financial English are concerned, the causes mainly include linguistic creativity, cognitive similarity and cultural differences.

3.1 Linguistic creativity

With the development of economic globalization, new concepts, products and services are constantly emerging in the financial industry. These new elements need to be accurately described through creating new vocabulary or giving new meanings to old words. And this demand of the language market has further contributed to the generation and development of financial English metaphors. For instance, Adam Smith used “Invisible Hand” to express “the mechanism for the coordination of economic activities through the spontaneous regulation of market prices in the absence of any central organization”.

This creative expression directly led to the generation and development of metaphors in financial English, and reflects the economy of language, that means, taking as few existing words and expressions as possible to convey emerging, rich information.

3.2 Cognitive similarity

Due to the fact that human beings share the same physiological basis, similar social development process and similar natural environment, people of different countries and races have a similarity in thinking and cognition. Therefore, metaphors in different cultures are bound to have commonalities. For example, the term “storm” originally referred to the weather system accompanied by strong winds or precipitation. But in the financial market, it has been mapped to the sharp, short-lived, and hyper-cyclical deterioration of all or most of the financial indicators of one or more countries and regions.

Cognitive similarities allow people to quickly map concepts from one domain to another. Such metaphors not only increase the interest and readability of financial English, but also help people better understand and remember abstract and complex concepts in the field.

3.3 Cultural differences

Different geopolitical patterns, social systems, cultural backgrounds and other factors will lead to people’s own unique social perceptions and experiences. For instance, Scottish farmers named the rent as “mail”, with rent paid in silver coins being “white mail” and paid of livestock or produce being “black mail”. Farmers who paid the latter were often robbed and forced to pay more, so “blackmail” gradually evolved to mean extortion in the majority of countries and regions. However, in American financial market, stock purchase extortion is called “greenmail”. This expression uses “green” instead of “black” because this behavior is related to the dollar bills which is green in color.

Cultural differences in metaphors may be reflected in using the same metaphor to refer to different things or phenomena, or using different metaphors to refer to the same things or phenomena. Both the former and the latter have undoubtedly enriched the lexical metaphors of financial English.

4. Translation methods of Financial English Metaphors

In the specific translation practice, translators should take the cognitive differences of the audience readers in the background of different languages, cultures, societies, politics and disciplines into full consideration. And then, adopting varieties of translation methods to realize the efficient transmission of information between the source text and the target text.

4.1 Literal translation

ST1: Samir Kaji believes that many unicorns will “quietly get acquired for parts”.

TT1: 萨米尔·卡吉认为，许多独角兽公司将“悄无声息地被分割收购”。

ST2: The public's previous aversion to retail investing dates back to the early 1990s, when a stock market bubble burst.

TT2: 民众之前对散户投资的排斥可以追溯到上世纪90年代初股市泡沫破裂的时候。

In the above examples, “unicorns” and “bubbles” have long been understood and accepted by all human beings rather than being specific to the financial investment community. The term “unicorn company” refers to a high-performing stock with unlimited market potential and difficult-to-replicate business model. While “bubble” refers to the phenomenon of false prosperity. When dealing with this kind of metaphors, the translator should adopt literal translation method to maximize the retention of the metaphorical meaning of the source text, which could simplify the translation process and ensure the rigor and accuracy of the target text.

4.2 Free translation

ST3: The VW brand's chief executive Thomas Schäfer had on Monday “admitted” that planned savings had fallen short, pushing the brand into the red.

TT3: 大众品牌首席执行官施文韬周一“承认”未能实现计划中的成本节省，导致品牌陷入赤字。

ST4: It would also distance Starbucks from China's macroeconomics headwinds and political uncertainty.

TT4: 这一举措还将使星巴克远离中国的宏观经济风险和政治不确定性因素。

Combined with the context, it can be seen that “red” indicates that Volkswagen's capital turnover has fallen into the predicament of expenditure more than income, which could be translated as “赤字” to keep in line with the source text. The “headwind” refers to all the unfavorable factors for Starbucks' smooth operation and development. And it is easier for target readers to grasp this information if translated into “风险”. Therefore, when dealing with such abstract metaphors whose meaning is affected by the context, translators can adopt free translation method to convey the real intention and semantic connotation of the source texts.

4.3 Amplification

ST5: But shares in LVMH, Richemont and Dior were off too, on fears that the softening of China's luxury growth might turn into a crash.

TT5: 但路威酩轩、历峰和迪奥的股价也在下跌，原因是人们担心中国奢侈品增长放缓可能演变成奢侈品股市崩盘。

ST6: That means monetary policy is likely to diverge, with the Fed keeping interest rates high even as the rest of the rich world cuts them to revive growth.

TT 6: 这意味着货币政策可能会出现分歧，因为美联储将利率维持在高位，而与此同时其他富裕国家选择降息以重振经济增长。

In the above examples, if the translator simply translates underline words into “崩溃” and “增长”，it is difficult for readers to understand what are the subjects of these actions. While using the amplification method to translate them into “奢侈品股市崩盘” and “经济增长” further clarifies the subjects, helping readers to grasp the precise information. Therefore, when dealing with metaphors with rich meanings and multiple collocations, translators should effectively add descriptive or restrictive words to supplement the metaphorical meanings of the

source text.

4.4 Variation

ST7: The fact that the wind is at GE's back has undoubtedly helped.

TT7: 毫无疑问, 通用电气是借到了一股东风。

ST8: Second, trust between Mr.Musk and big investors is gossamer-thin.

TT8: 其次, 马斯克与大投资者之间的信任薄如蝉翼。

In Chinese, "wind" contains tailwind and headwind and "gossamer" is often used to describe small things. So the cultural differences between Chinese and English force the translator to change the target domain of the metaphors. Considering the Chinese saying "Everything is ready, all we need is the east wind", we only need to change "风" to "东风" to express that GE was helped. In addition, Chinese people often use the characters "蝉翼" instead of "蛛丝" to describe the thickness is tiny. Therefore, when the metaphors have significant cultural differences, translators should use the variation method to change the source domain to express the same or similar meanings, making the target texts more easier to be understood and accepted.

4.5 Annotation

ST9: The Bank of England does not believe that "greedflation" has played a significant role in the surge in food prices.

TT9: 英国央行并不认为“贪婪通胀”(企业将价格提高到超出其自身价格压力要求的程度)在食品价格飙升中发挥了重要作用。

ST10: Over fifty countries have introduced regulatory sandboxes to foster financial innovation.

TT10: 五十余个国家推出监管沙箱(英国金融监管局提出的科技创新监管理念)以促进金融创新。

In the above examples, "greedyflation" and "regulatory sandboxes", as metaphorical expressions of emerging financial concepts whose terminology degree needs to be improved, may cause misunderstanding by the readers if just using the above translation methods. At this time, the annotation method can intuitively show the meaning of "贪婪通胀" and the essence of "监管沙箱", which skillfully solves this problem. Therefore, the annotation method can help readers better understand the actual meaning and mechanism of the emerging concepts, which could enhance the readability of the target text, and lay the foundation for the cross-cultural communication of the emerging terminology.

5. Conclusion

Metaphors and financial activities are prevalent in all aspects of human life. The current English metaphors in financial field can be roughly divided into six categories: animal-related, plant-related, object-related, action-related, color-related and weather-related, etc. The causes mainly include the language creativity, cognition similarity and cultural differences. In specific translation practice, translators should fully consider the cognitive differences of the target readers in different languages, cultures and social disciplines, and take the questions into account such as whether the metaphors are universally accepted, whether they are affected by the context, whether they are prone to ambiguity, whether there exist cultural differences, and whether they are emerging concepts. And then, adopting the methods of literal translation, free translation, amplification, variation and annotation to realize the accurate, complete and efficient transmission of information, further promoting the exchange and mutual learning of financial information among different languages and cultures.

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Research on innovation of basic accounting work in Universities in the Era of Big Data

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Abstract: With the rapid progress of cutting-edge technology, digital life has penetrated into all aspects of the public's daily life and workplace work. As the foundation of financial work, the basic functions of accounting have also experienced the baptism of the era of big data. Big data not only brings challenges to traditional accounting functions, but also opens up new development space and promotes the continuous optimization of basic accounting functions. Based on this, this paper mainly discusses and analyzes how the basic accounting work of colleges and universities can carry out innovation under the background of big data era.

Keywords: Big Data Era; University Accounting; Basic Work

Introduction

In the era of big data, the wide application of information technology has a profound impact on the basic work of accounting in colleges and universities. On the one hand, big data provides rich data resources for accounting work in colleges and universities, which helps to improve the accuracy and timeliness of accounting information; On the other hand, big data also brings challenges in data security and privacy protection. Therefore, under the new era background, the basic work of college accounting needs to be innovated urgently.

1. Characteristics of college accounting basic work in the era of big data

1.1 Data-driven

First of all, the main body of accounting information processing has undergone a fundamental change, and the traditional manual operation mode has been gradually replaced by computer-assisted processing, which greatly improves the efficiency of accounting data collection, processing and analysis. With the support of computer technology, accountants can complete data entry, verification, summary and other work more quickly. Thus, it provides strong technical support for the financial management of colleges and universities^[1]. Secondly, the basic accounting work in colleges and universities pays more attention to data analysis and mining. In the data-driven environment, accountants are no longer limited to traditional accounting processing, but begin to pay attention to the potential value of data. Through in-depth mining of massive data, accountants can find the rules and trends and provide targeted decision support for the management of colleges and universities.

1.2 High degree of informatization

With the rapid development of information technology, the informatization degree of accounting basic work in colleges and universities has been significantly improved. Through the introduction of advanced accounting software and systems, the accounting work in colleges and universities has been automated, and the work efficiency and accuracy have been greatly improved. The traditional manual accounting method is gradually replaced by electronic processing, which reduces the occurrence of human error. In addition, information technology enables the financial data of colleges and universities to be updated and monitored in real time, so that the management can grasp the financial situation in time and make scientific decisions. Meanwhile, with the help of information technology tools, the financial report of colleges and universities can be automatically generated, which not only improves the accuracy of the report, but also saves a lot of human resources.

2. Difficulties faced by basic accounting work in colleges and universities in the era of big data

2.1 Data security and privacy protection issues

With the advent of the era of big data, the amount of data involved in the basic work of accounting in colleges and universities has

increased sharply, and the types of data are more diversified. However, in the big data environment, accounting data of colleges and universities may be illegally obtained through the Internet, mobile devices and other ways, leading to data leakage. Once data is leaked, it will not only damage the interests of colleges and universities, but also violate the privacy rights of students. In addition, due to the huge amount of data involved in big data technology and the complexity of data types, traditional data security protection means are difficult to cope with, and hacker attack means are constantly upgraded, accounting data security of colleges and universities is faced with severe challenges^[2]. In addition, China's laws and regulations on data security and privacy protection are not perfect, which is difficult to meet the needs of accounting basic work in colleges and universities in the era of big data. Some colleges and universities may have illegal operations when processing students' personal information, leading to privacy disclosure.

2.2 Insufficient capacity of accounting personnel

Accountants need to have strong data analysis ability in order to extract valuable information from massive data. However, some accountants lack relevant skills and are not qualified for data analysis work. Big data technology involves many fields, such as cloud computing, artificial intelligence, etc. Some accounting personnel in colleges and universities need to master these technologies to improve work efficiency. However, some accountants have limited understanding of new technologies and insufficient application ability, and some accountants do not pay enough attention to informatization, which leads to the disconnection between accounting basic work and informatization construction.

2.3 Accounting system does not match big data environment

China's current accounting standards are difficult to adapt to the development needs of the era of big data, and some accounting standards have fuzzy areas when dealing with accounting matters generated in the environment of big data. In the environment of big data, accounting methods need to be constantly innovated, and the current accounting methods in colleges and universities are still dominated by traditional methods, which is difficult to meet the needs of the era of big data. In the environment of big data, the quality of accounting information is affected by data quality, data processing methods and other factors. It is difficult to guarantee the quality of accounting information in some colleges and universities, which affects the accuracy of accounting decisions.

3. Innovation strategies of college accounting basic work in the era of big data

3.1 Strengthen data security and privacy protection

Under the background of the current era of big data, the basic work of accounting in colleges and universities is facing unprecedented challenges and opportunities. In order to ensure the accuracy and security of accounting information in colleges and universities, a set of perfect data security management system must be formulated. First, it is crucial to clarify responsibilities for data security. This requires all relevant departments and personnel in colleges and universities to fully realize the importance of data security and clarify their respective responsibilities and tasks in data security work. Secondly, in order to ensure data security, colleges and universities should adopt advanced encryption technology to encrypt accounting data. Encryption technology can effectively prevent data leakage and tampering during transmission and storage, and ensure the confidentiality of accounting information^[3]. At the same time, universities also need to regularly update and upgrade encryption technology to cope with changing network security threats. In addition, strict access control of accounting data in colleges and universities is also a key measure to ensure data security. Only authorized personnel can access relevant data, which requires colleges and universities to establish a sound user identity authentication and authority management mechanism.

3.2 Improve the accounting personnel ability

Colleges and universities should formulate a complete training plan according to the characteristics of the era of big data, and conduct systematic training for accounting personnel. The training content should include the basic concepts of big data, data processing technology, data analysis methods and the specific operation of accounting work in the big data environment, etc. Through training, accounting personnel

can master the big data processing tools and improve work efficiency. At the same time, in order to stimulate the enthusiasm of accounting personnel in the innovation of accounting basic work, colleges and universities should reward accounting personnel who have outstanding performance in innovation. The form of reward can be diversified, such as issuing honorary certificates, providing promotion opportunities, giving financial subsidies, etc. Through the incentive mechanism, stimulate the innovation enthusiasm of accounting personnel and promote the continuous innovation of accounting basic work.

3.3 Improve the matching of accounting system and big data environment

Through the mining and analysis of massive data, potential problems and risks in accounting can be found, so that measures can be taken in advance to avoid the occurrence of financial risks. Big data technology can also help us realize the automation and intelligence of accounting and improve work efficiency. Combined with big data technology, traditional accounting methods can be optimized. For example, by establishing a data model, we can monitor and analyze accounting data in real time, discover anomalies in time, and ensure the accuracy and integrity of accounting information. In addition, we can also use big data technology to forecast and analyze accounting data to provide strong support for financial decision-making in universities.

Conclusion

In the era of big data, the basic work of accounting in colleges and universities is facing unprecedented challenges and opportunities. Through the innovation path, strengthening the application of big data in the basic accounting work of colleges and universities will help improve the efficiency of accounting work, prevent financial risks, and provide a strong guarantee for the sustainable development of colleges and universities.

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The differences in dialogue styles between English and Chinese in Thunderstorm

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Abstract: Research based on stylistic markers provides an accurate method for describing language style, and the application of stylistic markers in English learning has gradually garnered attention from scholars. The analytical applications of stylistic markers in language are also pertinent to English language learning. This paper explores the use and differences of dialogue styles in both the original “Thunderstorm” and its English translation, starting from the formal and informal markers of stylistic markers. The analysis focuses on the properties of three categories of formal markers: syntax, vocabulary, and rhetoric, as well as the attributes of two categories of informal markers: the internal qualities of the work and the integration of the recipient’s perspective.

Keywords: Formal Markers; Informal Markers; “Thunderstorm”; Dialogue Style

1. Introduction

Style is not an elusive quality of writing but a system of symbolic representations that can be manifested in “forms.” This symbolic system of style consists of stylistic markers that can be recognized by the translator in the linguistic forms of the original text. In other words, the style of the original work is a system of markers that can be understood, and the means of recognizing style lies in mastering the system of stylistic markers (Liu Miqing, 2005). Stylistic markers can be divided into “formal markers,” which focus on phonetic and morphological variations, and “informal markers,” which focus on aesthetic effects. This paper will analyze the dialogue style of the original text and its translation through a comparative analysis of three categories of formal markers—syntactic markers (i.e., an analysis of the syntactic characteristics of the original text), lexical markers, and rhetorical markers—as well as an analysis of the intrinsic qualities of the work through informal markers and the integration of the recipient’s perspective.

2. Formal Markers

2.1 Lexical Markers

2.1.1 Kinship Terms

In Chinese, kinship terms not only differentiate based on gender and generational rank but also take into account age, paternal and maternal lineage, as well as blood and marital ties. In contrast, English kinship terms primarily distinguish only between gender and generational rank. For instance, if a father has several sons, they would be referred to as the eldest son, second son, third son, and so forth. English lacks the complexity of the Chinese system, as it does not differentiate based on paternal or maternal lineage, age, or even clan affiliations, with some terms not distinguishing gender at all (Liu Meiyan, 1970). The formation of such kinship terms is related to the cultural differences between the East and West. Eastern culture, particularly in China, places a greater emphasis on blood relations and family. Ancient China was long rooted in a feudal society dominated by agricultural culture. Residents of mainland China relied on the land, and within the context of a self-sufficient agricultural economy, families often consisted of three or four generations living together. This arrangement established extended families, sometimes comprising dozens or even hundreds of members, as relatives by blood or marriage resided under one roof. Furthermore, China has traditionally been a nation that values rituals and propriety, not only in external social relations but also within the family. This significance is evident in the complex and extensive system of kinship terms in Chinese. Thus, such a society fundamentally values seniority and hierarchy in kinship relations, which also symbolizes identity, status, and authority, leading to a particular attentiveness to language when using terms that reflect different identities, ages, and generational ranks. In contrast, Western societies are primarily based on a commercial economy, which results in smaller family units typically consisting of parents and minor children. In these families, the

relationships are simpler and more informal due to the smaller number of individuals, so a few simple terms are sufficient for everyday communication (Liu Meiyuan, 1970). In Chinese, there are specific ways to address elders, such as “grandfather,” “grandmother,” “older brother,” etc., to show respect; directly calling them by their names is considered inappropriate. On the other hand, in countries influenced by Christian culture, there is an emphasis on the equality of all individuals, regardless of their wealth or status. This ideology has permeated their interpersonal relations, and in everyday life, it is generally acceptable to address elders by their names, often reflecting a sense of intimacy.

For example, the translator uses “Mrs.” to represent the Chinese term grandmother and “Madam” for lady; “Master” for young master, implying that readers know that Zhou Chong is the second son, and thus directly adds his nickname afterward; “Sir” for master; which notably removes the hierarchical relationships depicted in the Chinese forms of address. The Old Servant refers to the elderly lady as “my dear,” which is absolutely unacceptable in China as it clearly violates the relationships of respect and hierarchy. In contrast, the English expression conveys a sense of intimacy and aligns with the Western concept of equality among all individuals.

2.1.2 *The Use of Personal Pronouns and Substitutes*

The use of personal pronouns in English is more varied than in Chinese. For instance, in the English translation. English and Chinese belong to different language families and handle subjects differently. In Chinese, subjects are often omitted (Liu Meiyuan, 1970). This is particularly evident in oral discourse, where the protagonist’s firm tone and extreme distrust towards the male lead reflect the intensifying conflict between them. The contrast between the original work and its translation is quite pronounced.

For example, the translator rendered *yi* as “I say,” which conforms to the characteristics of spoken dialogue in drama. The translator clarifies the subjects “I” and “we,” emphasizing the performers of the actions, which benefits the understanding of the recipients, namely the Western audience.

2.2 Rhetorical Markers

Another significant difference between English and Chinese is that English emphasizes substitution, while Chinese focuses on repetition. In English, aside from rhetorical needs, there is rarely a repetition of the same word or structure within sentences. In contrast, repetition is commonplace in Chinese, which is related to the cultural emphasis on balance and the aesthetics of symmetry. This is a key point we must pay special attention to when translating between Chinese and English. In English, pronouns are often used to replace nouns that have recently appeared, whereas Chinese tends to repeat nouns. The substitution structures in English primarily include pronouns (such as personal pronouns, demonstrative pronouns, indefinite pronouns, and relative pronouns), as well as words like “so” and “do.” The expressions of *tian* in Chinese and English differ, such as “God” and “In Heaven’s name.” “God” is said by Lu Shiping, while “In Heaven’s name” is spoken by Fan Yi. The difference in these two expressions subtly reflects the different social statuses of the two characters. Fan Yi, having received formal education, tends to use a more literary style, while Lu Shiping, born into servitude and lacking education, uses language that is more simple and colloquial.

3. Non-formal Markers

The Intrinsic Quality of the Work: Analyzing the Themes and Emotions, i.e., the Overall Content Issues Translator Wang Zuoliang agrees with Yan Fu’s proposed translation standards of “faithfulness, expressiveness, and elegance.” His translation style is characterized by a “faithful and expressive” approach. Wang Zuoliang fully considers the features of the original work and skillfully handles them, ensuring that the translation maintains a high degree of consistency with the original in terms of meaning, form, and style. The translation aligns well with the original intent while adhering to Chinese expression habits, allowing readers to naturally accept and understand it, resulting in a strong emotional resonance. Due to the differences in linguistic style between English and Chinese, the author does not translate word-for-word in a manner that is strictly aligned with the original text, but instead adopts a perspective that takes into account the audience—namely, Western viewers and readers. This results in a translation that remains faithful to the original while also suiting the aesthetic preferences of Western audiences. In Chinese, the phrase “*bu shi*” effectively conveys the emotional state of the character, but for English viewers, simply repeating “No” or “Not” would fail to evoke the intensity of the character’s emotions. Therefore, the translator chose to translate it into slightly longer phrases such as “No! I’m not!” and “No, I’m not his mother!” Although this approach sacrifices the original’s formal structure, it becomes

more fluid and coherent, maintaining the rhythm of the original while being vivid and easily understandable for English-speaking audiences (Yang Ziqian, 1993).

4. Conclusion

This article conducts a comparative analysis of the stylistic markers in the original and translated versions of *Thunderstorm*. It finds that the English translation not only exhibits the original text's concise, understated, natural, flexible, and easily comprehensible dialogic language but also reflects the spoken characteristics of dramatic language. The translator and faithfully conveys the dialogic style of the original. Given that the linguistic systems and expression habits of Chinese and English differ due to cultural contrasts, it is inevitable that the translated dialogues may diverge from the artistic and aesthetic qualities of the original. However, the translator has fully considered the perspectives of the audience—namely, Western viewers and readers—ensuring that the thoughts and spirit of the original work are effectively communicated to the recipients. This consideration represents one of the translator's successes.

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Research on the Application of Situational Teaching Method in Financial English Teaching Under the Background of Integration of Production and Teaching

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Abstract: With the rapid development of global financial markets, financial English teaching is becoming more and more important in our country's higher education system. As a new education model, the integration of industry and education closely combines industry and education, and provides a new way to improve the effect of financial English teaching. This paper takes financial English teaching under the background of integration of production and education as the research object, and discusses the application and effect of situational teaching method in financial English teaching.

Keywords: Integration of Production and Education; Financial English; Situational Teaching Method; Teaching Application

Introduction:

As a professional English course, financial English plays an important role in cultivating financial talents with international vision. However, the traditional financial English teaching mode often pays too much attention to the imparts of knowledge and neglects the cultivation of students' practical application ability. Under the background of the integration of production and education, the application of situational teaching method in financial English teaching is helpful to improve students' interest in learning, cultivate their practical ability, and thus improve the teaching effect.

1. Overview of the integration of production and education

The integration of industry and education is a unique education model, which closely combines the industry and education circles, and realizes the close combination of educational resources and the needs of enterprises through the deep cooperation between enterprises and schools. This mode can not only improve students' practical ability, but also train more talents with practical operation ability for enterprises. Under the background of the integration of industry and education, financial English teaching also needs to carry out corresponding reforms. Financial English teaching should pay more attention to practicability and aim at cultivating students' practical operation ability^[1]. Therefore, financial English teaching should pay more attention to cultivating students' practical application ability rather than just implanting theoretical knowledge. To achieve this goal, financial English teaching should take a series of measures. For example, schools can partner with companies to provide internship opportunities for students to learn and apply financial English knowledge in real jobs. In addition, the school can also invite financial industry professionals to teach students, so that they can share practical work experience and knowledge.

2. Current situation of financial English teaching

In the current financial English teaching, although new teaching methods and rationalizations emerge in an endless stream, the traditional teaching mode is still dominant. In this mode, the teaching focus is more on the imparts of knowledge, but not enough attention is paid to the cultivation of students' practical application ability. Usually, students find themselves helpless in the face of practical problems after mastering a lot of theoretical knowledge, and it is difficult to apply what they have learned to practical work. In addition, the finiteness of financial English teaching resources in our country is also a problem that cannot be ignored. Due to the limitation of resources, many schools have insufficient investment in practical links, resulting in the lack of enough practical opportunities for students, making them often feel powerless because of lack of experience in the face of practical work.

3. The compatibility of situational teaching method in financial English teaching under the background of integration of production and teaching

Under the current educational background of the integration of industry and education, financial English teaching is gradually changing its traditional education model and paying more attention to the cultivation of students' practical operation ability and professional English application ability. This change in teaching concept stems from the social demand for high-quality financial talents and reflects the development trend of the financial industry. Financial English teaching not only enables students to master professional vocabulary and grammar rules in the financial field, but more importantly, enables them to conduct professional communication and business operations in English. It requires that financial English teaching should be closely combined with the actual needs of the financial industry and cultivate students' practical working ability against the background of actual business scenarios^[2]. Situational teaching method, as an innovative teaching method, can just meet this demand. By simulating real financial business scenarios, students can learn financial English in actual operation and improve their professional quality and practical work ability. For example, when teaching foreign exchange trading, teachers can design a simulated foreign exchange trading scenario, and let students play the role of traders and conduct real simulated trading. In this way, students can not only learn the professional knowledge of foreign exchange trading, but also exercise their oral English expression ability and adaptability.

4. The concrete implementation strategy of situational teaching method

4.1 Setting of teaching objectives

Under the current educational background of the integration of production and education, the core goal of financial English situational teaching method is to enable students to learn and master finance-related English terms and expressions in specific situations by simulating real financial business scenarios, so as to improve their practical ability to use English for financial business communication. Specifically, this teaching method requires teachers to pay attention not only to the imparts of financial English knowledge, but also to the cultivation of students' ability to use English to conduct financial business operations. In order to achieve this goal, teachers can design various financial business scenarios according to the teaching content and the actual situation of students, such as foreign exchange trading, stock trading, banking business consulting, etc., so that students can use the financial English knowledge learned in these scenarios to perform role playing and business communication. In this way, students can not only consolidate their financial English knowledge, but also improve their ability to use English for financial business operations.

4.2 Selection and design of teaching content

Under the current background of the integration of production and education, the selection of financial English teaching content is no longer merely the pursuit of systematic subject knowledge, but needs to be closely combined with the actual needs of the financial industry, so as to enhance the practicability and pertinence of teaching. First of all, financial English teaching should pay attention to the teaching of industry terms. The financial industry has a large number of professional terms, and mastering these terms is the basis for effective communication and understanding of financial business. By integrating financial terms in actual work into the teaching content, students can better adapt to the future working environment. Secondly, the cultivation of practical operation ability is also an important part of financial English teaching, which can be achieved by simulating financial transactions and analyzing real financial cases. Through such practical teaching, students can not only improve their English application ability, but also enhance their understanding and operation ability of financial business processes^[3]. Finally, attention should be paid to the latest developments in the financial industry, which is a rapidly changing field with new financial instruments, financial technologies and financial ideas constantly emerging. The content of financial English teaching should reflect these latest developments, so that students can timely understand and adapt to the changes in the industry.

4.3 Combination of teaching methods and situations

The application of situational teaching method in financial English teaching needs to combine teaching evaluation with situational interaction. Among them, the key is to design situational evaluation standards, which should pay attention to students' comprehensive per-

formance in the situation, including but not limited to communication ability, teamwork ability, problem solving ability, decision-making ability and cross-cultural communication ability, etc. Through multi-dimensional evaluation, teachers can fully understand students' practical application ability in financial English learning. In addition, the combination of formative assessment and terminal assessment helps to pay attention to the progress and outcomes of students in the process of situational teaching. Formative evaluation can be carried out in the teaching process, through observation, questioning, discussion and other ways, to timely understand the learning status and needs of students, so as to provide a basis for teachers to adjust teaching strategies. The final evaluation is usually done at the end of the course to check whether the student has met the course objectives.

4.4 Organization and management of teaching process

Under the background of the integration of production and education, the organization of financial English teaching should pay attention to flexibility and interaction, which mainly includes the following three links. (1) Introduction: Introduce topics through real financial news and cases to stimulate students' interest in learning and desire for practical application. This session can help students understand the latest developments in the financial field, while developing students' ability to focus on practical problems. (2) Learning session: role play, simulate financial business scenarios, so that students can learn and use English in the actual context. This part can improve students' oral expression ability and cultivate students' ability to communicate with financial business in English. (3) Practice: Organize students to conduct group discussion, role play, simulated trading and other practical activities to consolidate what they have learned. This link helps to cultivate students' teamwork spirit, let students master financial English knowledge in practical operation, and improve practical application ability.

Conclusion:

Under the background of the integration of production and teaching, the application of situational teaching method in financial English teaching has a remarkable effect. Through the situational teaching method, students can better grasp the knowledge of financial English, improve the practical operation ability, and lay a solid foundation for the future financial work. However, how to further optimize the application of situational teaching method in financial English teaching still needs continuous exploration and practice by educators.

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Research Overview on the Mandarin Passive Construction “Bei”

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Abstract: This paper discusses the passive marker “bei” in Mandarin Chinese, exploring its categorial status, derivational relationships, and syntactic structures of both long and short passive forms. The analysis includes multiple linguistic viewpoints on whether “bei” functions as a preposition, verb, or has a dual status. Various scholars’ arguments and counterarguments are presented, including syntactic evidence from coordination tests, reflexive pronouns, and negation tests.

Keywords: Passive Marker “bei”; Mandarin Chinese; Syntactic

1. Introduction

Considering the categorial status of Mandarin passive marker *bei* and the derivational relationship between long and short *bei* passives, there are mainly three competing views: *bei* is a preposition (Chen 2002; Her 1985–86; J. Huang 1982; L. Huang 1990; A. Li 1990; S. Li 1994; Li & Thompson 1981; Lü 2000[1980]; McCawley 1992; Tsao 1996; Wang 1970); *bei* is a verb or light verb (Bender 2000; Chiu 1993; Feng 1995; Her 1989, 2009; Hsueh 1989; J. Huang 1999; Huang et al. 2009; Li 2003; S. Tang 2001, 2003, 2004, 2008; Ting 1998; Wang 1992[1943]; Wu 1999; Xiong 2003); or *bei* has the double status of being both verbal and prepositional (Cao 2011; Shi 2005; Shi & Hu 2005). As for the syntactic structures of the long and short passives, while some linguists (Cao 2011; Huang 1999; Huang et al. 2009; Tang 2001, 2003, 2008; Ting 1998;) hold the view that the long and short passives are not derivationally related, others (Hashimoto 1987; Her 2009; Shi 2005; Shi & Hu 2005) argued that the long and short forms have similar underlying structures.

2. The “Bei” Construction

2.1 “Bei” as a Verb

Huang (1999) and Huang et al. (2009) argued that *bei* behaves like a verb instead of a preposition. The use of subject-oriented adverb as a modifier of the subject, such as *guyi* ‘intentionally’, shows that *bei* can assign a theta role to its subject and this cannot be explained if *bei* is a preposition. The *bei*-DP cannot move across a time phrase or prepose to a sentence-initial position, demonstrating that the *bei*-DP does not behave like a prepositional phrase. The Agent DP and the VP following it form a constituent, excluding *bei* in the coordination test. The binding test indicates that the Agent DP is not the object of *bei* but a subject of the embedded clause since the reflexive pronoun *ziji* must take a subject as its antecedent. Based on the verbal *bei* analysis, Huang (1999) and Huang et al. (2009), following Chiu (1995), Ting (1995, 1996) and Feng (1995), further assumed that the long *bei* passive is a complex predication structure that involves null operator movement, that is, the main verb *bei* selects an active IP as its complement, within which a null operator moves from the object position of the base verb to Spec, IP. The main verb *bei* and the complement IP form a complex predicate, which selects the matrix subject as its single argument. The moved null object is bound by the matrix subject under predication. The evidence that support this hypothesis include unbounded dependency, island effects, the particle *suo* (Chiu 1995) and the resumptive pronoun. Tang (2001) agreed with the verbal nature of *bei* and further assumes that *bei* in the long passive is an ECM verb taking an infinitive clause as its complement.

Huang (1999) and Huang et al. (2009) argued that the structure of the short passive is not derived from the long form via deletion of the Agent DP, but is a control structure that involves A-movement by some evidence. No matter whether *bei* is analyzed as a preposition or a verb, the Agent is not allowed to be deleted. If *bei* is a preposition, the deletion of its object would violate the general prohibition against preposition stranding. If it is a verb, it would behave like other verbs in the similar V-NP-V configuration that does not allow the deletion of the Agent DP either. In contrast to the long passive, the short passive does not exhibit unbounded dependencies, nor does it allow the particle

suo or a resumptive pronoun, and the short passive does not involve A'-movement but A-movement. Following Hoshi's (1991,1994a,b) analysis of English get-passives and Japanese ni-passives, Huang(1999) and Huang et al.(2009) assumed the short passive has a structure that *bei* is a semi-lexical or light verb, selecting an Experiencer subject and a VP complement, in which the Theme object is an empty category PRO that moves to Spec, VP and gets controlled by the matrix subject.

2.2 “Bei” as a Dual-Status Marker

Shi and Hu (2005) pointed out some problems of treating *bei* as a verb and advocate the double *bei* analysis. The evidence offered by Huang(1999) that *bei*-DP cannot be preposed to the sentence-initial position as common PPs can is not strong enough because some prepositional phrases cannot be preposed to the sentence-initial position either. The coordination test may also be explained by assuming that the coordinated part involves the omission of the preposition *bei* because Chinese prepositions, when appearing repeatedly, can be omitted. *Bei*-DP can undergo coordination tests, which suggests that the string of *bei* and the Agent DP is a constituent. Fourth, they argue that the reflexive *ziji* ‘self’ test cannot forcefully show that *bei* is not a preposition because the objects of some prepositions can also serve as the antecedents of *ziji*. Shi and Hu (2005) pointed out that the biggest problem in treating *bei* as a verb is revealed from the negation test: When we intend to negate a passive sentence, we have to negate *bei* but not the embedded VP. Chinese verbs must be in the same clause as the elements that negate them, which shows that the complement is a clause. Shi and Hu (2005) then assumed that there are two *bei*'s in the long passive: the passive morpheme *bei* heading the Passive Phrase and the prepositional *bei* taking the Agent DP as its complement. They are designated as *bei*1 and *bei*2. Since the two *bei*'s are adjacent and homophones, the second one undergoes haplology and gets deleted. The short passive is derived from the long passive by deleting the agentive PP.

Liu(2016) found out some problems in Shi and Hu's analysis. The coordination test suggesting that the string of *bei* and the Agent DP is a constituent is a phenomenon of right node raising(RNR), as already pointed out by Huang (1999), and more recently by Xiong (2010). According to Postal (1974), Gazdar (1981), Williams (1981) and Huang (1999) among others, the function of RNR is to identify the constituency status of the raised rightmost part instead of a coordination test.

2.3 Long and Short Passive Structures

Liu(2016) argued that *bei* is a verb. The Chinese reflexive *ziji* can be used as either an anaphor or an intensifier. The anaphoric *ziji* appears in argument positions, while the intensifying *ziji* occurs in non-argument positions. According to the analysis provided by Tang (1989), *ziji* can be analyzed on a par with *ta* *ziji* with *ta* being a null pronominal *pro* (i.e. *pro ziji*). Since *ziji* can be changed into *ta*, *ziji* in this situation is an intensifier, not an anaphor. In this sentence being used by Shi and Hu, *Wo wei Xiaolii zai zijii jia-li gai-le ge chepeng*, the change of *zijii* with *ta* does not make this sentence ungrammatical, which shows that *ziji* is not an anaphor, but an intensifier. Therefore, the *ziji* test being applied by Shi and Hu(2005) is not strictly reasonable. Due to Tang (1989): while a subject *ziji* may be anteceded by a subject or non-subject, an object *ziji* is strictly subject-oriented. Liu further pointed out that in the sentence, *Na-feng xin bei Zhangsani ji-gei-le ziji*. *Ziji* is an anaphor in the object position and it is coindexed with *zhangsan*, which shows that *zhangsan* is the subject of the embedded clause and the DP following *bei* is the subject, not the object of *bei*, and *bei* therefore is a verb and not a preposition. According to recent studies by Huang (2011, 2013, 2014) and Liu (2012), the *bei*-passive allows for both a control and a raising analysis. In order to explain why *bei* exhibits both the control and raising behaviors, Huang (2013, 2014) supposed that *bei* is a semi-lexical verb, the meaning of which may include multiple points in the causative-unaccusative continuum: cause > let > witness > undergo > be affected by > become > exist > be. The chameleon character of the *bei* passive as either a raising or control structure discussed in Huang's research can only be explained when *bei* is treated as a semi-lexical verb but not as a preposition or as having the dual status of a passive morpheme and a preposition.

As for the derivational relationship between long and short *bei* passives, there have been two main approaches to describe it: the non-uniform approach, under which the long and short passives have distinct underlying structures, and the uniform approach, under which the long and short passives behave rather similarly. Liu(2016) argued for a third approach, according to which the long passive can be further divided into the local long passive and the long-distance passive, and the local long passive may have the same underlying structure as the

short passive, while the long-distance passive does not have a short form. There are some evidence of idiom chunk, which shows that there indeed exists two kinds of long passives, since the application of idiom chunk in both of the two long passives does not demonstrate the same situation, that is one is grammatical, the other is not.

2.4 Negation and Aspectual Differences

Shi and Hu(2005) argued that in the formation of negative sentences, it is *bei* but not the embedded VP that can be negated. Since in Chinese negators and the predicates that they negate must be in the same clause, they argue that the complement of *bei* should not be a clause. Liu(2016) found some examples that show the grammaticality of negative passives with the negator *bu* and the predicates in the same clause, which shows that the evidence of Shi and Hu(2005) is not strong enough to prove the complement of *bei* is not a clause. Liu(2016) mentioned that the point is different negators, *bu* and *meiyou*. Li and Thompson (1981) pointed out that *meiyou* denies the completion of an event, while *bu* denies an event without denying the completion of it. Lin (2003a) distinguished *bu* from *mei* in that they select complements of different aspectualities. The negator *mei* is like the negative counterpart of the perfective marker *le*. It selects an event as its complement, indicating the non-existence or non-realization of an event. On the other hand, the negator *bu* aspectually selects as its complement a stative situation that requires no input of energy to bring it about and has no inherent end boundary. Therefore, the semantics of *bei* do not allow the negator *meiyou* to occur below it, since *bei* means 'to undergo or to suffer from some event', and *meiyou* negates the existence of an event. It is impossible for one to state that someone or something underwent or suffered an event, and then to deny the existence of that event. Differently from *meiyou*, if *bu* occurs in the complement of *bei* it does not cause any semantic conflict with *bei*. Liu (2004) stated that *mei*(you) negates perfective aspect or currently relevant state (CRS, which is marked by sentence-final *le* and indicates inchoativity) while *bu* negates the verbs without being marked with aspect or CRS. The fact that *bu* can occur below *bei* while *meiyou* cannot indicates that there is no AspP or CrsP in the complement of *bei*. Taking a clause without AspP or CrsP to be non-finite, Liu(2016) concluded that the verb *bei* selects a non-finite clausal category as its complement. Liu(2016) also explained the reason of *le* and *guo* occurring in the embedded clause by Functional Restructuring.

2.5 Analyticity vs. Syntheticty in Chinese Syntax

Huang(2015) introduced analyticity of Modern Chinese syntax and Old Chinese typological properties as well as the contrast between modern Chinese, Old Chinese and English. As for Modern Chinese syntax, Chinese verbs exhibit a high degree of simplicity or purity in several ways, with the following prominent properties: the light verb construction, pseudo noun incorporation, compounds or phrasal accomplishments, verbal atelicity, and absence of verbal coercion, and Chinese nouns also have some particular properties: numeral classifier for count nouns, localizer for locational nouns, discontinuous prepositions and overt positive degree marker. Modern Chinese is consistently more analytic than English, with respect to the structure of every lexical category. In contrast to Modern Chinese, Old Chinese exhibits a fully array of properties that make it a relatively synthetic language, and Old Chinese behaved more like Modern English, in the relevant typological properties. Old Chinese has the following properties concerning lexical categories: denominal verbs: no need for light verbs, true incorporation: no pseudo incorporation, simplex causatives: no compounds or phrasal accomplishments, countable nouns: no need for numeral classifiers, and nouns qua locations: no need for localizers. In explaining the analyticity and syntheticty of Modern Chinese and Modern English, Huang introduces the feature of functional categories. In Modern English, the feature of functional categories is strong and triggers movement, while in Chinese the feature of functional categories is not strong and causes agree, instead of movement. The difference can be seen in *wh-in-situ*, discontinuous *wh-the-hell* construction, absence of negative quantifiers, absence of reciprocal pronouns, absence of bi-nominal *each*, Kaynean word order *par excellence* and absence of canonical gapping.

3. Conclusion

When considering the syntactic structure of *bei* xx, Huang and Liu(2014) thought *bei* xx is not a special syntactic structure which passivizes intransitive verbs, but some light verb structures which imply some causative and conative meaning like other common Chinese passives. The difference between causative and conative is that between physical causation and mental causation. Huang and Liu(2014) thought

that it is not the intransitive verbs be passivized, but rather the implied light verb whose elementary semantics is equivalent to CAUSE and DO, and generally refers to several events denoting causative and executive. According to Mei(1989,2012), there is a light verb in these xx construction. If the light verb is expressed by the lexical verb, CAUSE, the result is an analytical pattern. If the light verb is an affix or a silent zero affix, the following verb needs to be moved up to keep its structural position, so as to obtain a synthetic pattern. Huang and Liu(2014) believed that the xx pattern is the passive form of this causative structure. Considering the intransitive structure of xx and intransitive verb of Modern Chinese passives, they think the intransitive structure of xx is actually transitive, and contains a light verb. Since the [-strong] feature of the light verb, the transitive structure of xx stay in situ and causes agree and make a phrasal element which cannot give the following object case, and the result is the intransitive of this xx structure, which demonstrates the syntheticity like Old Chinese.

All in all, the light verb in both English and Old Chinese have a high degree of affixation and [+strong] feature, which makes xx merge into the light verb, that is, movement. While the light verb in Modern Chinese has a low degree of inflection and [-strong] feature, which forms agreement with xx.

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Verbal Humor in Chinese Debate From the Perspective of Cooperative Principle

—Taking Let's Talk for Example

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Abstract: This paper analyzes the conversational implicature of verbal humor based on Grice's cooperative principle (CP) to explore its generative mechanism in Chinese debate, taking a debate talk show in China, Let's Talk for example with qualitative analysis method. There are mainly three findings: firstly, the essence of debating language is violating the maxim of quantity. Secondly, sometimes it is necessary for debaters to confound some concepts to confuse opponents and create humor. Thirdly, the violations of CP frequently emerging in debating can be employed as a strong strategy to create humor, engage and persuade audience. This paper hopes to provide rhetorical and pragmatic strategies for debaters in Chinese debating.

Keywords: Verbal Humor; Cooperative Principle; Let's Talk

1. Introduction

Humor, can go back to the age of Plato and Aristotle as a long-term study object when the researches on humor began. Subsequently, various humor theories gradually were established, mainly focusing on superiority theory from the perspective of social behaviorism, relief theory from the perspective of psychoanalysis and incongruity theory from the perspective of psychological cognition (Yan Haiying 2010; Su Yihua 2015). Humor entered into people's vision in China when the famous translator, Lin Yutang translated humor into“幽默”. Since then, Humor has been studied in multitudinous disciplines in China. Until the 1980s, humor studies in linguistics had been occupying a significant position (Li Xianjin 2013). In linguistics, various factors contribute to the generation of humor, such as Speech Act Theory, Cooperative Principle (CP), Politeness Principle (PP), etc. Among these theories, verbal humor from the perspective of CP has been paid much attention of scholars with relatively important research value.

CP was put forward by American philosopher Herbert Paul Grice when he delivered a series of lectures at Harvard University in 1967. According to Grice, meaning of a utterance is divided into literal meaning and implied meaning, in which the latter refers to the conversational implicature, which is divergent from what the hearer receives in reality. Verbal humor is produced mostly as a result of flouting CP. CP provides a strong theoretical foundation for verbal humor. Therefore, researches on verbal humor from the perspective of CP gradually come into scholars' notice.

However, the studies of verbal humor from the perspective of CP mainly focus on literature, films, sitcoms, while little attention has been given to verbal humor in Chinese debate. Therefore, this paper hopes provide more references for this gap .

2. Study Background

2.1 Theoretical Framework

Grice put forward the CP in 1967, which was described as making your conversational contribution required by the accepted intention or orientation of the interaction in which you are engaged (Grice 1975). Grice was calculated to interpret the course of real interactions, in which the speaker usually expresses the implied meaning to the listener by violating the maxims of CP. The maxims of quantity, quality, relation and manner are ingredients of CP.

2.1.1 The maxim of quantity

1. Make your contribution as informative as required (for the current purpose of the exchange).
2. Do not make your contribution more informative than is required. (Grice 1975)

2.1.2 The maxim of quality

1. Do not say what you believe to be false.
2. Do not say that for which you lack adequate evidence. (Grice 1975)

2.1.3 The maxim of relation

1. Be relevant. (Grice 1975)

2.1.4 The maxim of manner

1. Avoid obscurity of expression.
2. Avoid ambiguity.
3. Be brief (avoid unnecessary prolixity).
4. Be orderly. (Grice 1975)

2.2 Literature Review

Firstly, in terms of introductory studies of humor with CP, Liu Naishi (2002) discusses the pivotal theories influencing the generation of verbal humor, in two aspects: Raskin's modes of bona-fide and non-bona-fide communication (1985) and the mention theory deriving from Sperber and Wilson (1981). He gives priority to the CP in explaining humorous phenomena, which is more universal and practical than other theories.

Secondly, in terms of analytical studies on specific corpus, the subjects of verbal humor from the perspective of CP mainly focus on sitcoms, literature (Guo Wentao 2013), films (Liu Xiangyu 2016), etc. For instance, Li Qing & Shi Xiaoling (2013) analyzed the humorous examples in a sitcom *The Big Bang Theory* with CP and offered some implications to English learners. However, little attention has been paid to debating language, although Zheng Min (2019) has analyzed some examples of *Let's Talk* from rhetoric, pragmatics and cognitive linguistics. But examples were chosen from the first five seasons of *Let's Talk* in 2018. The humor corpus chosen can be larger and newer.

In general, few studies specifically deal with verbal humor in debating from the perspective of CP. Among various researches on *Let's Talk*, most focus on discourse analysis (Sun Xiaojiao 2018), stance (Ma Congcong) and rhetorical strategies, while few explores verbal humor. Therefore, this paper will investigate the verbal humor from the perspective of CP by analyzing the seventh season of *Let's Talk* to ensure the timeliness of corpus.

3. Verbal Humor Analysis in *Let's Talk* From the Perspective of Cooperative Principle

3.1 Violations of the Maxim of Quantity

Example 1:

Debate topic: 做人最重要的是开心吗?

Fu Shouer: 开心当然更重要啊。不然我儿子就该叫多苦了。

Fu answers the question positively, until which the communication should have been finished. But she adds a sentence that if happiness is not the most significant thing in the world, then her son should be called“多苦”(Her son's name is“多乐”). She breached the maxim of quantity to enhance persuasion and cause laughter. By doing this, she not only expresses her stance that happiness is crucial, but also produces verbal humor.

Example 2:

Debate Topic: 妈妈疯狂应援男明星，我该不该阻拦?

Cheng Lu: 不该，为什么？其一，……有句话叫再不疯狂就老了，他们呢，再不疯狂就没了。其二，……。

About the debate topic, it seems that Cheng Lu's description and structure are common for debaters. However, facing this kind of yes-no question, Cheng can just answer“不该”to the question. But he violates the maxim of quantity by adding reasons. This is a debating context, in which debaters should present both viewpoints and reasons to persuade audience, debate opponents and create humor.

Enlightened by this example, in fact, the essence of debating language is violating the maxim of quantity. Most descriptions of debaters are more informative than straightforward answer of debate topic in debating language to persuade audience and beat opponents, so it is not a

simple yes-no question.

3.2 Violations of the Maxim of Quality

Example 3:

Kang Jingjing: 我来的原因很简单，就是我太怕这节目撑不到第八季了。

Ma Dong: 真的，你说话还真的蛮吉利的。

Kang introduces that she is afraid that this TV show can't be sustained to the next season, so she comes here. Ma knows that Kang's expression is not auspicious, but he violates the maxim of quality to express the irony for Kang and creates humorous effects.

Example 4:

Debate topic: 我是职场新人，我的老板不喜欢我，要不要辞职？

Yang Tianzhen: 我这个人有个特点，就是说什么话，都是对的。

Yang violates the maxim of quality, because she knows not all she said is true necessarily and just wants to show her aggressiveness to audience with humorous effect. Therefore, it provides debaters a hint that for winning competition, sometimes debaters can express opinions that she are not sure about its authenticity.

3.3 Violations of the Maxim of Relation

Example 5:

Debate topic: 做人最重要的是开心吗？

Xiao Lu: 做人最重要的难道不是呼吸吗？如果做人最重要的是开心，那么世界上最快乐的人是胸腔外科的医生，因为他每天都可以开心。

Xiao Lu violates the maxim of relation, because“开心”from Xiao Lu has no connection with“开心”in the question, of which the question refers to happiness in spiritual level, while the answer refers to breath in physical level. Standing on the opposite side, Xiao Lu does not have a better answer of what the most important thing is for people, so she employs a nonsensical way, which not only answers the question, but also creates humor.

Example 6:

Ma Dong: 郑博中是清华的是吗？

Zheng: 对，我是清华在读大二学生。

Ma Dong: 噢，康菁菁是北大的是吗？

Kang: 我吗？我是努力长大的。

Under the premise of knowing the fact, Ma Dong deliberately asks Kang if she is from Peking University to make fun of her. Kang uses an irrelevant verb“长大”in order to avoid answering the question directly, which is totally divergent from the“大”in“北大”. Both are aware of Kang's violation of the maxim of relation, by which Kang not only avoids being ridiculed, but also shows her humor.

3.4 Violations of the Maxim of Manner

Example 7:

Debate Topic: 周围的同龄人过得比你好，该不该玩命追？

Xiao Lu: 就是高三的你，突然有一天发现你们全班都保送清华了，只有你自己一个人在教室里，周围的亲戚朋友过来问：“你为什么不去清华呀？是因为不喜欢吗？”

Xiao Lu uses analogy to create a situation for audience and let them be personally on the scene to experience the analogical feelings that all peers around live a better life than you, not because you dislike that life but other reasons, such as deficient ability. So she does not answer the question straightforward but uses a way of telling story to persuade audience that they should chase the desired life of their peers, by which she also creates a sense of humor.

Example 8:

Journalist: 为什么会选择傅首尔这样强大的对手呢?

Liu: 来都来了, 不摸摸天花板, 那多没意思。

Liu does not answer the debate question directly but uses a metaphor, describing that choosing an extraordinary opponent as touching the ceiling, which stands for the highest debating level. Therefore, Liu violates the maxim of manner to cause laughter of audience.

Conclusion

In short, this paper analyzes the conversational implicature of verbal humor based on Grice's CP to explore its generative mechanism in Chinese debate, taking an online debate talk show in China, Let's Talk for example with qualitative analysis method. There are mainly three findings: firstly, the essence of debating is violating the maxim of quantity. Because debaters often describe more than is required by adding or deleting information to create humor and persuade audience.

Secondly, debate question is a two-dimensional issue, so debating is to persuade others to support you for a subjective question. Sometimes it is necessary for debaters to express what they are not sure really to confound some concepts to confuse opponents and create humor.

Thirdly, the violations of cooperative principle frequently emerging in debating language can be employed as a strong strategy to create humor, engage and persuade audience. Various rhetorical strategies in debating include simile, metaphor, pun, analogy, irony, homophones, homographs, homonyms, idioms, aphorism, two-part allegorical saying, breaking confined thinking modes and so on.

However, the corpus of this study can be improved. This paper hopes to help people have a better understanding on the generation of verbal humor from the perspective of CP and provide pragmatic strategies for Chinese debating.

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OFDM Index Modulation Technique

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Abstract: This paper discusses two innovative schemes for orthogonal frequency division multiplexing (OFDM): indexed modulated OFDM (OFDM-IM) and dual-mode dual-indexed OFDM-IM (DMDI-OFDM-IM). The aim is to improve spectral efficiency and error performance under frequency-selective and fast time-varying fading channels. The OFDM-IM scheme delivers information through the indexing of activated subcarriers beyond the multiple signal constellations in conventional OFDM. This paper briefly outlines a low-complexity transceiver architecture for OFDM-IM based on maximum likelihood detection and log-likelihood ratio computation. A brief analysis of the error performance of conventional OFDM and DM-OFDM-IM is presented. The DMDI-OFDM-IM scheme provides additional information transmission through dual indexing by relocating symbols and selecting relocation vectors in active subcarriers, as well as utilizing inactive subcarriers, resulting in improved frequency performance. Thus, higher spectral efficiency can be achieved. And there is evidence of significant improvement in the error performance of both schemes compared to conventional OFDM under different channel conditions, confirming their potential application in efficient wireless communication systems. **Index Terms**—DM OFDM-IM, Error Performance, Fading Channels, Index Modulation, Low-Complexity Transceiver Design OFDM-IM, Orthogonal Frequency Division Multiplexing (OFDM), Spectral Efficiency

Keywords: DM OFDM-IM; Error Performance; Fading Channels; Index Modulation; Low-Complexity Transceiver Design OFDM-IM; Orthogonal Frequency Division Multiplexing (OFDM); Spectral Efficiency

1. INTRODUCTION

In the information age, information transmission is essential for mass, industrial, and even military needs. Orthogonal Frequency Division Multiplexing (OFDM) is a fundamental technology for broadband digital communication, and it has led to the development of more key technologies to meet the growing demand for high-rate communication systems operating over frequency-selective fading channels. OFDM is a technique that can effectively mitigate inter-symbol interference caused by the frequency selectivity of wireless channels. It improves the stability and reliability of signals in complex environments. OFDM has been widely used in wireless communication standards, from 4G LTE to Wi-Fi^[1], greatly facilitating the development of mobile communications and high-speed data transmission. OFDM provides a strong foundation for the development of new technologies, such as OFDM-IM, which promotes innovation in wireless communication.

OFDM is a key technology to support the 4G era. It is now widely used in standard broadband wireless communications. Additionally, it is also commonly used in digital TV broadcasting and wireless local area networks, which have significantly impacted people's lifestyles. At the same time, there has been a growing interest in achieving faster information transmission rates and implementing the Internet of Things and machine communication. OFDM-IM is highly regarded for its superior spectrum and energy efficiency^[2].

This paper presents this modulation technique, OFDM-IM scheme, which optimizes elevated bit error rates in high mobility environments. OFDM with Indexed Modulation (OFDM-IM) is an advanced communications technology that enhances traditional OFDM systems by incorporating the concept of indexed modulation. The spectrum is divided into several subcarriers and further grouped. In each group, some subcarriers are activated ("on") while others are inactive ("off")^[3]. The activated subcarriers transmit conventional modulated signals, such as QAM^[4] or PSK^[5], while the inactive subcarriers implicitly transmit information because their activated state inherently transmits data. By modulating and indexing the subcarriers^[6], this dual data transmission mode of OFDM-IM greatly improves spectral efficiency. OFDM-IM can effectively resist channel fading and improve the reliability of data transmission while maintaining relatively low system complexity. Therefore, it is highly suitable for next-generation communication technologies, such as 5G and environments that require a trade-off between power consumption and spectral efficiency^[7].

The paper [8] mentions: that a key feature of next-generation broadband wireless communication systems is to support mobility. For example, problems such as slow information transmission can occur in trains or cars travelling at high speeds. This is due to the fact that during transmission of OFDM blocks, the wireless channel undergoes rapid changes due to frequency selective fading, which results in loss of sub-channel orthogonality, channel interference and fading variations. Therefore, we need a modulation method that is more flexible, adaptable and efficient.

This is how Dual Mode OFDM-IM was born. This modulation scheme is an evolutionary product of OFDM-IM,

i.e. it continues the OFDM-IM characteristic of transmitting information in dual mode. This means that not only is the information carried by the conventional amplitude and phase modulation but also the selection of specific subcarriers carries the information. Dual mode OFDM-IM still has the characteristics of high spectral efficiency and strong anti-interference ability, etc. It combines two different modes of exponential modulation into a single OFDM symbol [9], thereby increasing the number of ways the system can transmit data. This means that the system can choose between two sets of subcarriers, each with different modulation characteristics. This approach provides greater flexibility and adaptability. This is because

it allows the system to choose the optimal subcarrier and modulation method based on the channel conditions and communication requirements [10]. The reason we use exponential modulation is that by using exponential variations in amplitude or phase, more bits can be carried in each OFDM symbol, thus improving spectral efficiency. At the same time, exponential modulation improves the signal's PAPR (Peak-to-Average Power Ratio), and lower PAPR helps to reduce the nonlinear effects of the power amplifier, thus improving signal quality. In addition, in Dual Mode OFDM-IM, the subcarriers are allocated flexibly. These subcarriers allow the system to be dynamically allocated to different users or data streams according to demand. As a result, Dual Mode OFDM-IM can adapt to more channel conditions. For example, the quality of a wireless channel varies with time and location, and if part of the channel is degraded, the system can choose to move the data to a better-quality subcarrier. Exponential modulation in DM OFDM-IM improves spectral efficiency and the dynamic subcarrier allocation increases the transmission rate, reduces the BER, and so on. Therefore, this modulation scheme can make more efficient and flexible use of spectrum resources, adapt to variable channel conditions, and meet the needs of different scenarios (e.g. mobile communications, vehicle networking, and wireless coverage in urban and rural areas). The remainder of this paper can be summarised as follows. Section II. This part introduces the basics of OFDM-IM and DM OFDM-IM. Section III examines the theoretical error performance of OFDM-IM and DM OFDM-IM. In Section IV, recent developments and a literature review are presented. Finally, Section V presents future directions and conclusions.

2. E PRINCIPLES OF OFDM-IM AND DM OFDM-IM Assume that m information bits enter the OFDM-IM trans-

mitter for each OFDM block transmission. Next, these m

bits are divided into g groups, each containing p bits, then

$m = pg$. Each group of bits containing p bits is shaded into an OFDM sub-block of length n , so $n = N/g$ [10], and N is the number of OFDM subcarriers. Unlike classical

OFDM, the mapping operation in OFDM-IM is implemented by both modulation symbols and subcarrier indexes. However, for each sub-block, only k out of n available indexes can transmit additional information bits through a subset of OFDM subcarrier indexes, and they are based on the input sequence of p_1 bits selected from a predefined set of active indexes.

Afterward, the remaining bits of the sequence, $P_2 = k \log_2 M$

bits, are mapped onto an M -constellation map to modulate

the data symbols of the active subcarriers. Therefore, we have $p = p_1 + p_2$. The reason for this is that we do not activate all the subcarriers, so extra bits are sent in the OFDM index

block to compensate for the loss to send the message in full. The block diagram of the OFDM-IM transmitter is given in Fig. 1 [10].

The OFDM block creator creates all the sub-blocks and forms $N - 1$ main OFDM blocks. Unlike classical OFDM, there are some sub-

blocks that are zero terms in Eq. (1)^[10].

$$XF = [x(1)x(2) \cdots x(N)]T \quad (1)$$

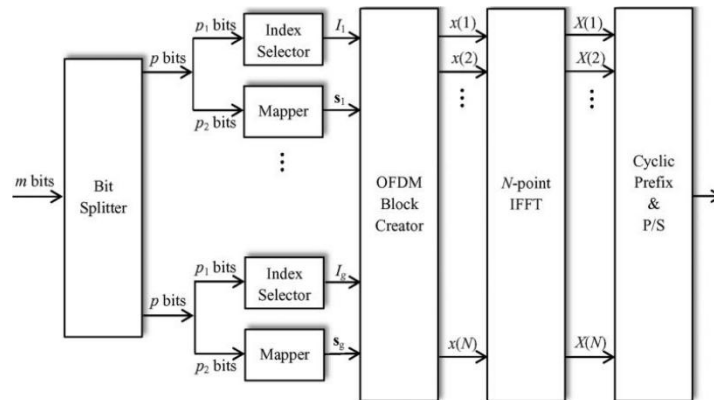


Fig.1 Block diagram of the OFDM-IM transmitter(copied from ^[10])

Their positions also carry information. The next step is the same as for transmission OFDM, the OFDM blocks are processed by the IFFT algorithm, this step not only shifts the signal from the frequency domain back to the time domain but also further reduces the inter-symbol interference induced by multipath propagation by adding a cyclic prefix (CP) before each OFDM symbol in an OFDM system ^[11]. The use of IFFT allows the sub-orthogonality of the carriers to be maintained.

Finally, the tail of an OFDM symbol may overlap with the head of the next signal due to multipath propagation. A cyclic prefix copies part of an OFDM symbol and adds it to the leading end of that symbol, while a cyclic prefix provides a buffer for multipath-induced interference, which reduces intersymbol interference and maintains orthogonality of the subcarriers in an OFDM system. And the channel equalization of OFDM is simplified by the existence of cyclic prefixes. The role of P/S is to convert data that is parallel in the frequency domain into a serial data stream for transmission over a physical channel (e.g. radio waves). In this system, it allows the system to transmit data in parallel over multiple subcarriers, greatly improving spectrum utilization.

Dual Mode OFDM-IM adds a "dual mode" operation to OFDM-IM. In this mode, the system not only transmits information based on the activation status of the subcarriers but also transmits additional information based on the activation mode of the subcarriers ^[12] (e.g. single activation or group activation). With this new modulation, each subcarrier can innovatively operate in two modes. For example, one mode can activate one subcarrier in each group, while the other mode can activate multiple subcarriers. It adds an extra dimension of information through the activation modes of the subcarriers. This successfully overcomes the major drawback of the limited spectral efficiency of classical OFDM-IM ^[12].

In this approach, the symbol mapping of the source sub-carriers is performed in two steps. In the first step, the active subcarriers are selected using the carrier index. In the second step, relocation is performed using the relocation symbol vector. The index of the relocation symbol vector carries additional information.

The schematic implementation of the DMDI-OFDM-IM system in a conventional OFDM system is shown in Fig. 2(a). Similar to conventional OFDM-IM, the available subcarriers are divided into g groups of n subcarriers each, and each group is coded similarly. In each group of n subcarriers, k subcarriers are called valid subcarriers and the other subcarriers are called invalid subcarriers. The indices of the active subcarriers are induced by the matrix I_u , while the system-generated S_u and S' are transmitted by the active and inactive subcarriers respectively ^[13].

In the basic OFDM-IM Transmitter input P_u bits are used to generate symbols transmitted by the inactive subcarriers.

The inactive subcarrier symbols are in the low energy range to distinguish between active and inactive subcarriers at the receiving end. The input P_u bits are used to generate symbols transmitted by the inactive subcarriers. The inactive subcarrier symbols are in the low energy range in order to differentiate between active and inactive subcarriers at the receiving end. After that, the OFDM block collects and arranges each subcarrier of the IFFT block, and finally, the time domain signal is generated according to the conventional procedure for

OFDM signals Its channel impulse response is (generally assuming a frequency-selective Rayleigh fading channel)

3. THE THEORETICAL ERROR PERFORMANCE

In section III, we compared the BER and SNR of conventional OFDM-IM and dual-mode OFDM, BER is a measure of the proportion of erroneous bits during data transmission. A lower BER means a more reliable system. And SNR is the ratio of signal strength to background noise strength. A high SNR means that the signal strength is higher than the noise level and has better transmission quality. Then we use a graphical approach to demonstrate the superiority of OFDM-IM and DM OFDM-IM.

The BER performance of the two different modulation schemes for different values of E_b/N_0 . As the SNR increases, the BER decreases for both systems. This is because the higher the signal-to-noise ratio, the lower the probability of errors.

The BER of the OFDM-IM system is lower than the BER of the classical OFDM system for every value of SNR, indicating that the OFDM-IM system offers better performance for the same SNR in this comparison.

The BER of all systems decreases as the SNR increases. This is due to the increased strength of the signal with respect to the background noise, which reduces the probability of BER. In the region of lower SNR values, there is a large difference in the BER of the three systems; as the SNR value increases, the difference in their performance decreases. In the region of high SNR, the BER curves of the three systems converge. This may imply that at high signal quality, there is little difference in the performance of these systems. The "Dual-Mode" system shows better performance than single-mode OFDM or OFDM-IM at most SNR values, which suggests that this system may have advantages in processing signals and resisting noise.

The figure Fig.5 shows that for $M_a = 2$, the DMDI-OFDM-IM system is the most efficient, followed by DM-OFDM-

IM, then OFDM-IM, and the conventional OFDM system is the least efficient. When the modulation order is increased to $M_a = 4$, the efficiency of each system increases, but the order

of efficiency ranking remains the same: the DMDI-OFDM-

IM system remains the highest and the conventional OFDM system remains the lowest.

4. FUTURE DIRECTIONS AND CONCLUSIONS

We can see that OFDM-IM and Dual Mode OFDM-IM, as two new OFDM-based techniques, outperform conventional OFDM in most cases, but still have their own drawbacks. Future research directions are likely to focus on further improving spectral efficiency, reducing complexity, and improving robustness under different channel conditions, and may include the integration of advanced algorithms with other emerging technologies such as MIMO, deep learning, and so on. The challenges revolve around the challenge of balancing improved spectrum and energy efficiency with the computational complexity of the system, which can increase hardware requirements and power consumption. Simultaneous integration with existing and future network infrastructure remains a key challenge. This report discusses OFDM schemes: OFDM-IM and DM-OFDM-IM. The aim is to improve spectral efficiency and error performance in frequency-selective and fast-time-varying fading channels. The OFDM-IM scheme provides information by indexing activated subcarriers instead of multi-signal constellations in conventional OFDM. The DM-OFDM-IM scheme provides additional information transmission through dual indexing by repositioning symbols and selecting the repositioning vectors in activated subcarriers, as well as using inactive subcarriers to provide additional information transmission, thus improving frequency performance. Simulation results show that both schemes provide a significant improvement in error performance compared to conventional OFDM under different channel conditions, confirming their potential application in efficient wireless communication systems.

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Exploring Higher Education Curriculum Reform under the Wave of Artificial Intelligence

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Abstract: Artificial intelligence has triggered a global wave of the times with its breakthrough intelligent technology features such as autonomous learning ability, self-attention, and reasoning ability, which has also led to a huge change in the demand for talents in the society, and various industries are inclined to the composite innovative and high-quality talents with cross-field and multi-disciplinary backgrounds, so that the reform of higher education curriculum empowered by artificial intelligence has become an inevitable trend. It is found that although many colleges and universities have gradually opened general education and professional education on artificial intelligence, the reform of higher education curriculum still faces various problems such as monotonous teaching mode, lagging teaching content, academic ethics and morality. In order to effectively deal with these problems, this paper provides corresponding suggestions from the perspective of expecting the joint efforts and close collaboration between universities and enterprises.

Keywords: Artificial Intelligence; Higher Education; Curriculum Reform; Compound Talents

1. Introduction

Some researchers and scholars believe that the future of artificial intelligence may eliminate some jobs, while some other jobs will be changed or created, it can be said that artificial intelligence has gradually become a key force to promote economic growth, social progress and industrial upgrading, so we need to rethink the way to use technology to solve problems. As an important base for talent cultivation, in order to meet the development needs of the new quality productivity, universities at home and abroad have been using AI to empower the reform of higher education curricula to carry out general education and professional education on AI, with a view to cultivating more innovative talents with cross-field and multi-disciplinary backgrounds. However, the process of AI-enabled higher education curriculum reform is still faced with various problems such as the transformation of educational concepts, monotonous teaching modes, and limitations in the application of technology, which requires the joint efforts of colleges and universities, enterprises, and all walks of life to strengthen cooperation and communication, and to think about the development of higher education curriculum reform under the wave of AI.

2. Artificial intelligence empowers higher education curriculum reform

The development of artificial intelligence provides strong support for the reconstruction of the talent training model, and at present, colleges and universities are urgently required to solve three tasks in order to cultivate “artificial intelligence + X” composite innovative and high-quality talents.

The first is to cultivate professionals in artificial intelligence. At present, many domestic and foreign colleges are carrying out general education in artificial intelligence, expanding professional education in artificial intelligence, expanding the audience of artificial intelligence education, cultivating a group of compound innovative and high-quality talents adapted to the needs of the country, localities, industries and industrial development, and cultivating a new era of workforce for the scientific and technological progress and industrial development of China.

Secondly, cultivate professional composite talents adapted to the background of artificial intelligence. Colleges and universities should not only carry out artificial intelligence professional education and general education, but also broaden the content of artificial intelligence professional education on the basis of the original specialties, and build a mechanism for cultivating talents based on the intersection of disciplines, cultivating “AI+X” top-notch composite talents of various specialties.

Thirdly, cultivate innovative and entrepreneurial talents adapted to the needs of society. Artificial intelligence technology has been rapidly rising since 2017 and slowly penetrating into all aspects of human daily life, including health, transportation, education, medical and

business, etc. Accordingly, the U.S. Bureau of Labor Statistics expects that the number of jobs for data scientists, information security analysts, statisticians, software developers, and other related fields will grow by 25-35% in the next ten years, which urgently requires artificial intelligence to This urgently requires AI to empower the reform of higher education curricula, integrate knowledge transfer into the process of students' discovery and creation of knowledge, and cultivate innovative and entrepreneurial talents who can adapt to the needs of the future society.

3. The dilemma of higher education curriculum reform under the wave of artificial intelligence

3.1 Teaching model not upgraded

Many colleges and universities at home and abroad have upgraded their traditional disciplines, set up artificial intelligence majors, and built artificial intelligence colleges or artificial intelligence research institutes, but there is still a wide range of new curriculum resources are not enough and the problem of unbalanced educational resources, and most of them have not set up a new type of multidisciplinary cross-fertilization of the teaching and research platform of artificial intelligence, which is too much focused on the teaching of theoretical knowledge and lacks the practical application of links between production and education, and the separation of production and education.

3.2 Integration of disciplines is at risk

Although AI has been developing rapidly in recent years, it is very different from humans in terms of learning, thinking, and generating explanatory capabilities, and its ability to make value judgments is no different from that of a child's, which may generate inappropriate or meaningless outputs without warning. Therefore, the current cross-fertilization of AI with other disciplines carries certain risks in terms of personal privacy and data protection, data acquisition, algorithm design, technology development and ethics, as well as the phenomenon of algorithmic bias.

3.3 Disconnect between teaching content and market demand

The development of artificial intelligence technology is rapidly changing, and new algorithms, models and applications are constantly emerging, and the teaching content in higher education often lags behind the pace of the development of these technologies, resulting in a gap between what students learn and the market demand. Although many colleges and universities have begun to try multidisciplinary cross-fertilization teaching, the degree of integration is often not deep enough, and it is difficult for students to combine what they have learned with practical applications, so it is difficult to truly meet the standards of market demand.

4. The Development of Higher Education Curriculum Reform under the Wave of Artificial Intelligence

In the era of artificial intelligence, schools play a crucial role, covering education, scientific research, technology dissemination, as well as ethics and social responsibility. As far as curriculum reform is concerned, in order to meet the actual demand for knowledge and skills of talents in the future market, schools need to track the latest development of AI technology and update the teaching content accordingly; at the same time, deepen the intelligent change of the teaching mode, in addition to the theoretical teaching of the curriculum, increase the practical aspects, the combination of industry and education, and improve the students' practical ability and problem-solving ability; the talents needed by the future market will definitely be the composite innovative talents who are capable of solving complex problems. The talents needed in the future social market must be compound innovative talents who can solve complex problems, so the school should focus on the cultivation of innovative talents in the curriculum reform, and cultivate students' ability to solve problems by comprehensively applying multidisciplinary knowledge.

As the main body of technological innovation, enterprises usually stand at the forefront of technological development. Under the wave of artificial intelligence, the curriculum reform of higher education needs to follow the pace of technological development, which means that the cooperation between schools and related enterprises is a necessary way to meet the market demand in the era of artificial intelligence, so as to introduce the latest technological achievements and cutting-edge knowledge into the curriculum system, and to ensure that the content

of the curriculum is timely and practical; and enterprises can provide advanced experimental equipment and technical platforms for the practice of related courses in schools. Or cooperate with schools to build practice bases.

5. Conclusion

Under the dual background of accelerated technological development and popularization of higher education, talent cultivation as an important mission of universities will face many new challenges in this context, so universities need to reshape their talent cultivation goals to create a new system of talent cultivation that adapts to the context of the times and guarantees the sustainable development and high-quality development of China's talent cultivation under the dual background. At present, domestic and foreign colleges and universities have opened artificial intelligence general courses and professional courses to cultivate "artificial intelligence + X" composite innovative and high-quality talents, to meet the needs of the development of the new quality of social productivity, but the current curriculum reform is still faced with the imperfection of the new model of industry-teaching fusion, academic ethics and the limitations of the application of technology. To cope with the dilemma this requires collaborative cooperation between universities and enterprises and other parties.

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Nonexpansive Mappings in Fixed-Point Iterations and Their Applications in Game Theory

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Abstract: This paper explores the theoretical foundation of non-expansive mappings in fixed-point iteration and its specific applications in game theory. As a mapping that maintains or reduces the distance between elements, non-expansive mappings provide an effective mathematical tool for finding stable strategies in dynamic games through their inherent convergence properties. The article first introduces the basic concepts of fixed-point theory and defines non-expansive mappings, then analyzes their application in solving Nash equilibria in game theory, with a particular emphasis on the stability and efficiency of iterative methods in the solution process. Additionally, through mathematical modeling and case analysis, this study demonstrates the practical effects and potential applications of non-expansive mappings in multi-stage games and complex strategy updates. This research not only enhances the understanding of fixed-point iteration methods in both theory and practice but also offers new perspectives and methods for addressing high-dimensional strategy spaces in game theory.

Keywords: Fixed-Point Iteration; Non-Expansive Mapping; Game Theory

1. Introduction

The fixed-point iteration method is a numerical technique used to solve fixed points of functions, with wide applications in modern mathematical analysis, economics, physics, and other fields. By repeatedly applying a mapping, the fixed-point iteration method gradually brings an initial point closer to a stable point, known as the fixed point. Non-expansive mappings, as a special type of mapping, possess the property of maintaining or reducing the distance between points, which endows them with excellent convergence properties in fixed-point iterations. Compared to expansive mappings, non-expansive mappings effectively prevent instability in the iterative process, ensuring that the system converges to a fixed point within a finite number of steps.

Many problems in game theory can be transformed into the problem of finding fixed points, particularly in solving dynamic games and Nash equilibria^[1]. The fixed-point theorem provides the theoretical foundation for proving the existence of Nash equilibria, while non-expansive mappings offer an effective iterative tool for progressively approximating equilibrium solutions in game theory. By introducing the fixed-point iteration method of non-expansive mappings, the solutions to complex games can be simplified, and the stability and convergence of the solutions can be guaranteed. Therefore, this paper aims to systematically study the fixed-point iteration method of non-expansive mappings and its applications in game theory, revealing the potential and advantages of this method in solving complex problems in game theory.

2. Overview of Fixed-Point Theory

Fixed-point theory is a core concept in mathematics, widely applied to solving nonlinear equations, optimization problems, and equilibrium analysis in game theory^[2]. A fixed point refers to a point that remains unchanged under a mapping, meaning that the result of the mapping is the point itself. By studying these special points, we can simplify the solution process for many complex problems, particularly playing a crucial role in iterative algorithms.

In fixed-point theory, the contraction mapping theorem is a key result, which states that certain types of mappings must converge to a unique fixed point. This result provides the theoretical foundation for solving fixed points through iteration and serves as the core principle behind many numerical methods. Within this framework, by repeatedly applying a mapping, the iterative process gradually stabilizes, approaching the fixed point. This method can be applied to solving various mathematical problems, particularly those involving stable states.

In game theory, fixed-point theory holds special significance, especially for proving and solving Nash equilibria. A Nash equilibrium can be viewed as a fixed point in the strategy space of game participants, and studying these fixed points helps to understand the stable strategies in complex games. In multi-stage or dynamic games, the continuous adjustment and updating of strategies can be realized through the

fixed-point iteration method, making the theoretical analysis more concise and intuitive. Therefore, fixed-point theory not only provides a powerful tool for mathematical analysis but also offers new perspectives and solutions to many core issues in game theory.

3. Definition and Characteristics of Non-Expansive Mappings

A non-expansive mapping is a term used in mathematics to describe a specific type of mapping that does not increase the distance between input elements during processing^[3]. More technically, if a mapping T acts on any two points x and y in a metric space, and the distance between the mapped points $T(x)$ and $T(y)$ is no greater than the original distance between x and y , then this mapping is called non-expansive. This property is crucial because it ensures that, during iteration, the sequence of solutions does not become unstable due to expansion, making the solution process more controlled and predictable.

In game theory, the application of non-expansive mappings is especially important. Game theory often involves finding a stable point for participants' strategies, known as the equilibrium state. In such scenarios, non-expansive mappings offer a powerful tool, as they maintain or reduce the "distance" between participants' choices during the iteration process, gradually guiding the system toward equilibrium. For example, in the case of repeated games or dynamic strategy adjustments, using non-expansive mappings can effectively prevent instability in the strategy adjustment process, thereby aiding in the discovery of stable strategies or Nash equilibria in games.

One key advantage of non-expansive mappings is their universality and flexibility. Compared to other more restrictive types of mappings (such as contraction mappings), non-expansive mappings do not require that the distance be reduced during the mapping process; they only need to ensure that the distance does not increase. This relaxed condition allows non-expansive mappings to be applied in a broader range of situations, particularly in complex systems where ensuring contraction conditions is difficult. Moreover, the combination of theory and practice for this type of mapping provides a strong theoretical foundation for understanding and designing stable iterative algorithms.

Thus, non-expansive mappings have demonstrated their unique value in both theoretical research and practical applications. When exploring complex economic models, ecological system dynamics, and various equilibrium problems in social sciences, non-expansive mappings are an indispensable tool. Especially in game theory, their ability to stably solve equilibrium points through iterative methods makes them an important mathematical tool for addressing such problems.

4. Applications of Non-Expansive Mappings in Game Theory

4.1 Nash Equilibrium and Non-Expansive Mappings

Nash equilibrium is a core concept in game theory, describing a strategy combination in which no participant can unilaterally change their strategy to improve their own benefit. The application of non-expansive mappings here lies in their stable iterative properties for finding such equilibrium points. In some game models, the strategy update rules can be constructed as non-expansive mappings, ensuring that, starting from any initial strategy, the iterative process of strategy updates converges to the Nash equilibrium.

4.2 Applications in Dynamic Games

In dynamic games, participants' strategies constantly change, requiring continuous updates to respond to the actions of other participants. Due to their inherent convergence properties, non-expansive mappings are well-suited for modeling such problems, ensuring that each step of strategy adjustment does not deviate from the final stable state, thereby effectively approaching the dynamic equilibrium solution.

4.3 Simplifying Complex Game Models

In multi-stage games or complex games with high-dimensional strategy spaces, non-expansive mappings can simplify the computational process. By transforming complex strategy update rules into non-expansive mappings, numerical methods can be efficiently employed to compute equilibrium strategies, which is valuable for both theoretical research and practical applications.

4.4 Stability Analysis in Game Theory Models

The inherent properties of non-expansive mappings can be used to analyze the stability of game models. For example, by analyzing the

non-expansive nature of strategy update rules in a game model, it is possible to predict the long-term behavior of the model, such as whether it will converge to an equilibrium point and the stability of that equilibrium.

4.5 Algorithm Design and Optimization

In computational applications of game theory, designing effective algorithms is key to solving practical problems. Non-expansive mappings not only provide a theoretical foundation for algorithm design but also offer direction for algorithm optimization due to their excellent convergence properties. By rationally designing iterative algorithms based on non-expansive mappings, it is possible to handle a wider range of strategy updates and optimization problems while ensuring both convergence speed and computational accuracy.

5. Convergence Analysis of Fixed-Point Iteration for Non-Expansive Mappings

In many fields of mathematics and applied mathematics, the fixed-point iteration method is an important tool for solving nonlinear equations and system stability problems. Particularly in game theory, the fixed-point iteration method for non-expansive mappings is widely used to find stable solutions for various game models, such as Nash equilibria. The core characteristic of non-expansive mappings is that the output of the mapping does not spread further than the input. This property ensures that iterative sequences, starting from any initial point, converge to one or more fixed points.

Theoretically, the convergence of non-expansive mappings is based on their distance non-expansion property. This means that each iteration does not increase the distance between iterated values, thus avoiding solution divergence and ensuring the stability of the iterative process. Moreover, under certain non-expansive conditions and appropriate space properties, such as completeness, the convergence of the sequence to a fixed point can be guaranteed, even in high-dimensional and complex strategy spaces.

In applications to game theory, the use of the fixed-point iteration method for non-expansive mappings not only efficiently solves Nash equilibria but also allows for the analysis of equilibrium stability and robustness. For instance, in models from economics or social sciences, the path of iteration to the equilibrium point reflects the adjustment and adaptation mechanisms in actual dynamic processes, providing deep insights into the strategy adjustment process. Therefore, an in-depth study of the convergence of non-expansive mapping iterations is not only a theoretical necessity but also offers valuable guidance for practical applications.

6. Conclusion

This paper explores the application of non-expansive mappings in the fixed-point iteration method, and analyzes its specific role in solving equilibrium in game theory, particularly in dynamic games. By systematically elaborating on the properties of non-expansive mappings and conducting a convergence analysis, we have demonstrated its great potential in stably solving strategy equilibria. Future research could further explore its applications in complex systems and develop new computational methods to address the challenges posed by complex games.

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