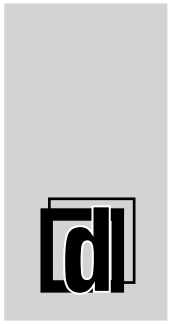
TRIBALS

SOCIO-ECONOMIC AND CULTURAL PERSPECTIVE

SHAKULI SAXENA



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By Rama Chandra Sahoo, Rajan Kumar Sahoo, Manoj Agarwal

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CONTENTS

CHAPTER 1

MODELLING AND EXAMINING THE IMPACT OF CULTURAL VARIATIONS ON ENGLISH LEARNING FROM THE CULTURAL COMMUNITY'S PERSPECTIVE

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ABSTRACT:

From the viewpoint of the linguistic and cultural community, a model of the impact of cultural variations on English acquisition based on data feature decomposition and fusion clustering is suggested. The most effective control of the learning model connects the new information with the old knowledge. The influence of cultural variations on English learning may be modelled and analyzed from the viewpoint of language and cultural community by dissecting pertinent data using data features and fusion clustering method. The simulation results demonstrate that the data fusion performance of the effect model of this approach on English learning is excellent and that the conclusions drawn from the quantitative analysis are precise and trustworthy. Targeted interventions for instructors, students, and teaching managers were carried out in accordance with the findings of the visual data.

KEYWORDS:

Acquisition, Accordance, Dissemination, Linguistic.

INTRODUCTION

Teachers have always been crucial to the teaching of English as well as the development of the English language and culture. Teachers must continually enhance the quality of their instruction since in this process, greater standards are put up for both their academic and teaching abilities. In college English instruction, the dissemination of the English language and culture has traditionally been one-way, with professors passing on pertinent information to students and a complete lack of two-way interactive dialogue. If this scenario is to change, it is first necessary to understand how English language and culture are now taught at colleges. Teachers and students should also be aware of the significance of establishing the status of English language and culture. Increased interactive teaching ties between instructors and students would help students learn English language and culture via practice. instructors should also enhance the teaching materials and methods to hasten the acquisition of English.

To improve English learning and educational quality, it is crucial to investigate how cultural variations affect English learning from the viewpoint of the language and cultural community. The majority of conventional techniques are parametric approaches based on ambiguity detection and feature vector fusion, as well as community-based research on the impact of cultural variations on English learning [1], [2]. A model to direct English learning interest is proposed in Reference and is based on multivariate quantitative recursive analysis. The constraint factors for directing English learning interest are built using descriptive statistical analysis. And a multiple linear regression model is created using the guiding model of English

learning interest in micro classes. Create every explanatory variable needed for a reliable regression analysis. The model assesses the students' English learning interest and forecasts the quality of English learning using multivariate quantitative recursive analysis. It also analyses the relationship between the guidance of English learning interest and the learning quality. This approach simulates the directing function of English learning interest in the small-classroom format. The outcomes of quantitative analysis are precise, the assessment of English learning interest is trustworthy, and the impact of raising the standard of English instruction is clear. However, the computational cost of this approach is high. Reference looks at how Chinese learners' spoken English difficulty changes over the course of one academic year using multilevel modelling. Additionally, the group growth trend and individual development trajectory of the learners are simulated. It has been discovered that the growth of each learner's oral complexity in several dimensions is unique. At the group level, learners' units lengthened greatly, the master-slave relationship strengthened, and the length of phrases marginally shrank. In order to further examine the development trend and causes of learners' complexity in high-growth groups and low-growth groups, the research further used change point analysis and semi structured interviews. According to the findings, the complexity development of the high-growth group shows an upward trend after the transition point and that of the low-growth group shows a negative trend when various learning motivation and emotion are considered. This approach demonstrates how the multilevel modelling approach may enhance comprehension of the oral development process, and the study findings are beneficial for instructors in improving the design of oral teaching activities.

Based on data feature decomposition and fusion clustering, this research suggests a model of the effect of cultural variations on English learning from the viewpoint of the language and culture community in light of the aforementioned issues. The index parameter distribution model of the effect of cultural variations on English learning from the standpoint of language and cultural community is built using the differential semantic feature detection approach. To realis the modelling and quantitative analysis of the influence of cultural variations on English learning from the standpoint of language and cultural community, relevant data gathered on the English learning platform, including learners' learning logs and learning successes, is employed. The findings of the experiment demonstrate how effective this strategy is at better simulating the impact of cultural variations on English acquisition.

Theory of Clustering Algorithms:

There are presumptions made by every clustering method about the data set itself. The algorithm's output will be worthless if the data set's distribution does not match the assumption; in certain cases, it may even provide the erroneous distribution or impose a fictional distribution on the data set. In order to get better results than a single algorithm, clustering mixes the outcomes produced by many algorithms or by applying various parameters to the same algorithm. In clustering fusion, the data set's various cluster members are first formed, and the clustering outcomes of these cluster members are then combined using a consensus function. To create the necessary cluster members, we execute the -means method many times with various beginning points chosen at random. We create data subsets using random sampling, and then for each data subset, we create clusters using the -means algorithm to identify the members of each cluster. High-dimensional data are randomly projected into low-dimensional space, and various data subsets are created by performing numerous projections. Each

projection subset is then clustered using the EM clustering technique to produce cluster members. Cluster members are produced by choosing various algorithms, different beginning values for an algorithm, different selections of objects, and different subsets of characteristics, then projecting them into the data subspace [3], [4]. The method is used to assess how similar the data points are to one another. In the final clustering findings, points bigger than 0.5 in the matrix are regarded as belonging to the same class. The clustering fusion approach performs well on average over a wide range of areas and experiments and is adaptable to the majority of them. Additionally, the outcomes of clustering fusion are not significantly impacted by noisy data or aberrant data. As a result, the resilience, flexibility, and stability of the clustering method are benefits. As a result, the learning model created by the clustering fusion technique is used in this work, which serves as a foundation for the analysis of following pertinent data.

DISCUSSION

The following are the key sources of evidence for the process model of how cultural variations affect learning English: Students keep track of their progress through platforms, mobile devices, software, etc. These data may be used to analyses how users learn and can show how platforms and users interact with one other. Instructional materials, learning statistics, and learner-related data. Managers may use the analysis of these two types of data to provide feedback on both the teaching and learning of instructors and students. To create technological, social, and educational individualization or adaptation, these two types of data are analyzed using conceptual cognition, social network analysis, influence, and success or failure signals, then data monitoring and prediction. Theoretical assistance for junior high school English personalized learning instructional design backed by network teaching platform is provided by learning analysis and process model. By fusing semantic feature analysis and the scheduling method, a feature matching model of the index parameters of the influence of cultural differences on English learning from the perspective of linguistic and cultural communities is created. This model represents the approximate set of feature quantity of the index parameters of the influence of cultural differences on English learning.

A deep hash coding approach is used in accordance with the information fusion matching outcomes of the feature layers. This study uses the index parameters of the impact of cultural diversity on English learning from the viewpoint of linguistic and cultural groups to carry out depth feature identification. Additionally, from the viewpoint of each language and cultural community, the gradient values of the index parameters of the effect of cultural differences on English learning are determined. The convergence value of depth hash coding is determined using the data's intrinsic sparsity as follows: wherein reflects, from the viewpoint of linguistic and cultural groups, the correlation parameter between cultural variations and the feature set for English acquisition. consists of random feature size.

Additionally, from the viewpoint of linguistic and cultural communities, the frame sequence moment of the index parameters of cultural variations' effect on English acquisition. The joint feature distribution set of the index parameters of cultural differences' influence on English learning from the perspective of linguistic and cultural communities is expressed as follows, per the parameter fusion results of the index parameters of linguistic and cultural communities' influence on English learning: from the viewpoint of linguistic and cultural groups, where is the source information of the semantic distribution of index parameters of cultural differences on English acquisition. from the viewpoint of linguistic and cultural groups, is the combined

distribution feature amount of indicator parameters of cultural differences on English learning. is furthermore the sparse representation classification model's basis function. We speculate. It is necessary to read in the related features of cultural diversity and English learning from the perspective of linguistic and cultural communities in the first frame and combine the coding of these features to produce the output fuzzy feature code element sequence described below.

The number of features in the joint feature distribution set produced by formula may predict how the parameters will be distributed. The distribution of joint characteristics is more visible the bigger the is. As a result, it is possible to assess how cultural variations have affected the distribution of English learning parameters. The required data will be gathered on the English learning platform, and the new and old information will be integrated to create new knowledge experiences. To realis the integration of the indicators and parameters of the effect of cultural variations on English learning from the viewpoint of linguistic and cultural communities, learners' learning logs and learners' learning accomplishments will be summarized analyzed. The support vector machine algorithm is used to restructure the characteristic data of the influence of cultural differences on English learning from the perspective of linguistic and cultural communities, extract the feature distribution set, and realis the influence of cultural differences on English learning from the perspective of linguistic and cultural communities. the particular procedure is shown. The differential semantic feature detection approach is used to build the index parameter distribution model of the effect of cultural variations on English learning from the standpoint of linguistic and cultural groups.

From the viewpoint of linguistic and cultural communities, constructivism establishes the deep learning model of the effect of cultural differences on English learning utilizing the techniques of knowledge ontology structure reconstruction and semantic feature fusion cluster analysis. And from the viewpoint of the language and cultural community, sparsity characteristics breakdown the gathered link between cultural diversity and English acquisition. In Figure 3, the particular procedure is shown. Information reorganization is made possible by the hash coding outcomes of the index parameters of cultural differences on English learning from the standpoint of linguistic and cultural community. Additionally, the support vector machine's coding model is built using the information reorganization structure. The cluster centers of the index parameters of cultural differences on English learning from the viewpoint of linguistic and cultural communities are and, and the structural sparseness of data is represented by complexity, according to research employing the cluster analysis technique. The corner information of cultural differences on English learning index parameters from the perspective of linguistic and cultural communities is extracted, along with the reliability matching degree of cultural differences on English learning index parameters [7], [8].

The following is how the hierarchical alignment method from coarse to fine is expressed:

This is the distinctive association between learning English and cultural diversity from the viewpoint of the linguistic and cultural community. is the Gaussian mixed sparse characteristic distribution collection time interval. is the distance measurement parameter, is the weighting coefficient, and is the kernel matrix of the Mahala Nobis distance. The generalization model parameters of the vector machine regression model were determined based on the results of the semantic information detection of the index parameters of the influence of cultural differences on English learning from the perspective of linguistic and cultural communities and the analysis results of the moment invariants of the correlation between cultural differences and English

learning from the perspective of Multiview attribute coding linguistic and cultural communities. By regulating the distribution of the resources resulting from cultural variations, the resources are chosen and produced in the form of a combination of generative and original resources in the modelling of influence relationships. Answering materials, instructors' solutions to frequent issues, student discussion and sharing of personality issues, teachers' assessment and summaries of personality issues, and evaluation forms are all included. The challenges that instructors have with their pupils after they preview are summarized in the Q&A material. Teachers will concentrate on addressing the typical issues raised by students in class. Teachers will have small-group conversations with students about the particular difficulties before evaluating and summarizing the talks' outcomes.

By extracting the frame recombination sequence of the correlation features between cultural differences and English learning from the perspective of the linguistic and cultural community, students will evaluate themselves and their classmates according to the contents in the evaluation form, resulting in the robust multimodal multivariate sparse features, which are expressed as follows: 5. Testing and Simulation A total of 60 students were chosen as test subjects, 30 in each of the two experimental courses for each grade. The simulation experiment is conducted in a MATLAB environment using a machine running Windows 10 and 4 G of RAM. Students' landing times on the platform represent their personal traits most clearly in the experimental investigation. The "ability sky" platform's tracking of learning time mostly pertains to students' online activity. Teachers may determine if students' learning time fits their requirements by tracking their login times on the site. The data table of students' login times is created based on the test and analysis of the MATLAB platform, and the students are numbered sequentially. Figure 4 displays the specifics of the 60 students' learning time on the platform. More than 95% of students are happy with the instructional materials and learning environment set up by instructors and are eager to utilize the Ability Sky platform to assist them in finishing their coursework. With the aid of the Ability Sky teaching platform, they can acquire, internalize, and consolidate their existing knowledge. They can also increase their interest in learning English and their learning effectiveness.

The Ability Sky platform also supports personalized learning and can aid students in learning a lot through teachers' analysis and feedback of their individual student data. The junior high school English lessons delivered via the Ability Sky teaching platform are beneficial to the students' individualized learning, as seen by their attitudes towards the execution of the curriculum. illustrates how personalized learning strategies for students based on online teaching platforms may assess the degree to which cultural variations affect English learning. The western culture. The personalized learning strategy used by pupils utilising the online teaching platform, which incorporates elements of both Eastern and African cultures, contributes more than 75 percent of the way that English is learned. With an average score of roughly 85, the method's influence to African and Oriental cultures is very clear. The accuracy of the assessment of the impact of various cultural variations on English learning is examined at various degrees of difference, and the comparative findings. The results of the picture comparison in Figure 6 show that the approaches in this study have an accuracy of over 90%, up to 100%, with an average value of roughly 95%. The linear equalization algorithm's accuracy is 70% to 90% better than the two other techniques, with an average accuracy of roughly 85%. Analytical regression calculations have the lowest assessment accuracy, with a

range of 60% to 70% and an average accuracy of 65%. By comparing the three techniques, we can see that this method's accuracy is the greatest, demonstrating that it is more accurate.

According to the analysis of students' test scores, attitudes towards learning English, and English learning techniques and questionnaires, it is clear that junior high school students' English achievement has not significantly increased as a result of the individualized English instruction provided by the network teaching platform. However, the individualized junior high school English instruction assisted by the network teaching platform has significantly improved students' attitudes towards English learning and learning techniques, as shown by the comparison of before and after the trial. Students now prefer studying English-related topics over they did before the trial. Through the questionnaire, it can be shown that the vast majority of students choose junior high school English instruction that is supported by an online teaching platform that not only considers their learning style but also successfully mixes English learning with their interests. The network platform's assistance for junior high school English personalized learning improves the use of conventional evaluation techniques and allows for the objective assessment of individual learning via personalized data. Through the learning process data recorded on the platform and the analysis results of the data, students can also gain an objective understanding of their own learning situation. They can identify their own learning weaknesses and quickly change their learning strategies in response to the feedback of personalized data [9], [10].

CONCLUSION

Based on data feature decomposition and fusion clustering, this research proposes a model of the impact of cultural diversity on English acquisition from the standpoint of the language and cultural community. On the English learning platform, pertinent information is gathered, including the learning logs and successes of the students. The quantitative investigation of the effects of cultural diversity on English learning is realized from the viewpoint of the language and cultural community. The personalized junior high school English instruction supported by the network teaching platform has significantly enhanced students' attitudes and learning techniques towards learning English, according to the analytical findings of the simulation test. The model created by this technique has strong data fusion performance, and the conclusions of the quantitative analysis are accurate and trustworthy. It examines how cultural variations affect English learning from the standpoint of the language and culture community. In the future, it is anticipated that this approach might be used to teach other courses and generate exceptional students who are well-rounded.

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CHAPTER 2

THE PERSPECTIVE OF BANGLADESH, AND DESCRIPTIVE ANALYSIS OF THEIR SOCIOECONOMIC

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ABSTRACT:

The purpose of the paper is to examine from Bangladesh's viewpoint the socio-economic and medical issues that occur in the current scenario. With relevant material, we thoroughly explain the outbreaks that have occurred repeatedly in Bangladesh. The initiation and treatment policy's constituent parts, together with their accompanying characteristics and effects, are clearly identified. Real-time data is used to illustrate the impact of problematic treatment-related problems. We explain how new technology advancements are being used in epidemiological elements and how they are currently compatible in Bangladesh. Using illustrative and tabular techniques, we statistically analyse the real-time data. The data structure and its observable specifications are examined using several pertinent metrics of central tendency and dispersion. The Box-Whisker plot is used to analyses the component scores to provide a clear depiction. We've found that the collected data show characteristics that are not compatible with a normal distribution, are wildly positively skewed, and are dominated by the earliest occurrences.

KEYWORDS:

Demographic, Epidemiology, Reconstructive, Transportation.

INTRODUCTION

Epidemiology is the study of how diseases spread naturally and how they affect populations as well as the prediction of public health risk factors for a given community. In essence, it has to do with research on the demographic habits of any given target population. The word epidemiology is currently receiving substantial attention with practical relevance due to the need for preventative measures the present public health-related challenges with the introduction of improved healthcare technology. Infectious illnesses including influenza, TB, Ebola, Nipah, and Zika are very important to epidemiology. The most notable epidemiological event employing unexplained transfusion mechanisms at the moment is the extremely infection. The World Health Organization declared potentially severe acute respiratory syndrome to be the cause of the terrible in early 2020, after the incident in the Chinese city of Wuhan in December 2019. This natural tragedy quickly spread to practically every country, including Bangladesh. has a negative impact on many facets of society and is particularly destructive to those who are a part of the most disadvantaged socioeconomic groupings.

Humanity is hidden in the unhindered natural world of nonhumans. The WHO estimates that outdoor air pollution kills 7 million people annually and exposes more than half of the general population to it. Heart disease, stroke, lung cancer, chronic lung diseases, and respiratory infections account for more than 4 million fatalities worldwide annually. The pandemic had a considerably greater impact on those problems. Climate and air quality are significant factors

in the scenario. Most hospitals were found to be in lethal condition during the lockdown owing to a lack of a clean environment [1], [2]. is an RNA-based virus with erratic strains and epidemic variations that may spread quickly across the globe. As a result, several irregular and subsequent transmission waves have been seen lately. Variants of cause variable numbers and patterns of infections, fatalities, and recoveries. has several eminently deadly and globally distributed forms. The WHO has recently classified the horrifying disease as a pandemic. Bangladesh is a South Asian developing nation with stunning natural scenery. Bangladesh's economy is expanding quickly and is on the path to achieving the Sustainable Development Goals. Every aspect of life, including women's empowerment, has seen significant growth during the last ten years. However, the pandemic has severely impacted every area in Bangladesh. In the first quarter of 2020, communal transmissions in Bangladesh began and rapidly increased. Prior to the epidemic, Bangladesh's economy was expanding quickly and generating a rise in yearly revenue on average.

However, the Bangladeshi government claims that as a result of the epidemic, the rate of rise in yearly revenue was lower than planned, coming in at. The worldwide economy has been significantly impacted by the epidemic. The effect has had the greatest impact on the world economy so far, according to the International Monetary Fund, and this effect has been more severe than any other. The safety standards severely decreased workplaces and workforces, which notably impeded international commerce and business. According to the International Labor Organization, over 1.6 billion workers or approximately of all labor lost their jobs. In a number of business and economic sectors, more than 50% of employers worldwide are feeling the effects of. During service-providing authorities, retail merchants, and manufacturers are all experiencing extreme difficulty. Bangladesh's economy, which is a component of the global economy, was badly impacted by the issue as well. The sector of ready-to-wear clothing has dramatically decreased as a result of importers' inaction. Small and medium-sized businesses are on the verge of extinction, and organizations that provide services have let most of their staff go since there is no employment due to the lockdown [3], [4]. Those with lower or lower-middle incomes suffered the most since they lacked savings for their survival in the future. The current COVID-19 epidemic downgrades almost everyone in every economic class, and the chain of socio-economic command is set to suffer serious consequences.

Additionally, Bangladesh's agriculture industry has suffered because of the transportation crisis brought on by the lockdown. The UNICEF booklet, issued by the United Nations International Children's Emergency Fund, contains comprehensive information on the global economic crisis and a comparison to the situation in Bangladesh. The virus outbreak was reported by the Bangladeshi government in March 2020. The first three instances were reported by the Bangladeshi epidemiology institution, the institution of Epidemiology, Disease Control and Research, on March. From that point on, the virus began progressively taking over the county, and the number of infected patients rose as well. On March confirmed cases and 5 fatalities were discovered as a result of community transmission, according to daily data released by the Directorate General of Health Service. The most important victims are those who have ever had a respiratory illness of any kind. Long-term lung complexity was reported by a patient who recovered. The spreading waves mostly impact elderly people and those with chronic illnesses, such as cardiovascular disease, diabetes, and other respiratory illnesses. Through coughing, sneezing, and inhaling, the virus may spread from an infected person's mouth or nose as tiny liquid particles, ranging from aerosols to droplets. Medical professionals are concerned that

there won't be enough test kits available to locate affected individuals in the nation. The most recent news, awareness, and symptoms were broadcast on social media, newspapers, and print media.

Over the nation, the authorities established isolation centers. The patient remained in such quarantined areas or at home. Intensive care unit and medical-grade oxygen were in insufficient supply in Bangladesh throughout the epidemic. Despite the fact that several vaccines have been developed and that an impressive number of individuals have received vaccinations globally, no absolute preventative measures have been established to stop owing to the recurrent development of newer versions. Quarantine, isolation, and lockdown are just a few of the measures being taken internationally to raise public awareness. There are a number of factors that contributed to the treatment program's failure, including a lack of medical infrastructure, communication breakdowns, the veracity of the data collected, and the general public's apathy and resistance to the programmed. Numerous research is being conducted all over the globe as spreads. Statistics in provide a thorough study of the status in China.

The statistical analysis of examines the importance of a number of infection-related indicators in Saudi Arabia. investigates a regression analysis-based prediction approach for infections in India. Real-time data are used to give statistical measurements of the parameters influencing community transmission in Pakistan. Using statistical information presented in, a comparison of -related mortality in urban and rural areas of the United States is explored. Reconstructive transmission dynamics using stochastic modelling approach have recently been explored in, based on the extensive data of in Thailand [5], [6]. From the viewpoint of the people of Bangladesh, we are prepared to examine in-depth the socioeconomic and healthcare situation of spreading in this study, including the treatment's components and any related problematic aspects that may be impeding the use of treatment procedures. The influence of the information age and the Internet of Things on the issue and its relevance in Bangladesh are topics of debate. Additionally, the statistical manifestation and comparable conversations with guiding ideas will be offered.

DISCUSSION

Two fundamental categories may be used to divide the current work. The first is a descriptive review of the situation and any related socioeconomic and medical issues, and the remaining is a statistical analysis of real-time data gathered from several reliable sources. Beginning in Section the development of in Bangladesh is described step-by-step. This section discusses the start of sequential phenomena, information about Bangladesh's healthcare authority, and the monitoring body. The components and the obstacles to therapy in Bangladesh are covered in Sections and respectively. Section includes an explanation of lockdown, quarantine, isolation, variations, and immunizations. Contrarily, Section 5 discusses the causes of the treatment barrier, including the general public's ignorance and reluctance, the lack of treatment facilities, the impact of many versions, the economic crisis, and the effects of illiteracy. The topic of the Internet of Things and the information age's significance in safety measures is covered in Section. This section also discusses how such circumstances are in Bangladesh. The fundamental objective of this effort is outlined in Section. This section includes the method of collecting and their statistical analysis. To display the real-time data in Bangladesh, both graphical and tabular methods are used. Measures of central tendency and dispersion, as well as an investigation into the Z-scores of the -related components, are looked at to provide an

intelligible analysis. Each component is examined separately via graphical and narrative examinations. Also described is a thorough observation of the immunization procedures. The component wave-based analysis is offered together with time and location. Section 8 presents the conclusions and discussion. On March 3, 2020, the first case in Bangladesh was identified. Three non-resident Bangladeshi men from Italy and Kuwait arrived back in the country on March together with a woman. The next day, a family of three people from Italy arrived back in the country. These individuals had symptoms, which facilitated the disease's spread across the population.

On March the first fatality brought on by the outbreak of occurred. On March 22, a doctor passed away and other individuals were confirmed to be infected. Healthcare professionals have been identified as infected as of March two additional returnees were from Bahrain and India. On March locals and several Saudi Arabian returnees were found to have morbidity; a second female fatality that occurred was connected to a local transmission. According to the ruling authority, recovery rates grew and reached 1000 on May 3, 2020. The overall number of cases in Bangladesh on June was higher than the total number of cases in China. The entire number of recoveries in Bangladesh has surpassed the total number of recoveries in China only two days after surpassing the total number of infections. According to Bangladeshi government organizations, around 15,000 people have recovered from as of June 15th, 2020. Outside of hospitals, many persons who recovered from infection by using conventional home-made treatments were not even included among the affected.

Sequential Phenomena:

The people of Bangladesh first disregarded the deadlines and the government's announcements on healthcare regulations and crises since they were ignorant of them. A significant number of persons were left out of the planned operations to stop the spread of due to the lack of trained medical personnel. Community transmission quickly followed as a result. Community transmission reached a subservient stage as a result of the healthcare authority taking control of the problem over time. Bangladesh is a heavily populated nation, thus there weren't enough labs to examine a large number of individuals. Beginning in December 2020, the government steadily improved the healthcare service facilities with hands-on training with the assistance of WHO. Coronavirus cases were first tested using only the real-time reverse transcription-polymerase chain reaction technology. The government declared a nationwide "lockdown" from 23 March to 30 May, and took other appropriate measures to raise public awareness of the infection to limit its spread. On April 11, 2020, the nation saw a higher-than-average infection rate, the highest in Asia compared to March 2020. On May 6, the administration officially declared that all districts were affected. The number of confirmed cases has surpassed the number of confirmed cases in China, where the epidemic first appeared on June 13 for an undetermined reason.

Additionally, on July 5th, Bangladesh passed the grim milestones of 160,000 cases and 2,000 fatalities. Between July 2020 and June 2021, there were certain peaks in the numbers of infections and fatalities; however, towards the beginning of 2022, both numbers progressively decreased to below 100. In contrast, the number of recoveries was negligible at the beginning of spread, but it steadily increased with the government's push, and by June 2021, it reached a rapid rate of increase, providing respite from the fatal danger [7], [8].

The Monitoring Body and the Healthcare Authorities:

The importance of healthcare organizations and their monitoring bodies is necessary to oversee the situation and make important choices. The primary authority to monitor, assess, and decide on matters pertaining to public health in Bangladesh is the DGHS, which remained constant in matters pertaining to. The statistical information for was gathered, saved, and released. Additionally, it disseminated public education materials and suggestions for the government's obligations throughout this epidemic. In addition to the DGHS, Corona Info offered the general public access to information on in Bangladesh in the form of a figurative data representation. is a government-funded institution for experimental research that focuses on the prevention and treatment of infectious and epidemiological illnesses in Bangladesh. The scenario was made practicable by IEDCR and DGHS working together. IEDCR offered hotline numbers, email addresses, and a Facebook page for anyone to use if they have questions or believe they may have. The monitoring body for healthcare issues in Bangladesh is the Ministry of Health, which was structured to best match the combined efforts of DGHS and IEDCR in the breakout.

Treatment-Related Elements:

The highly contagious epidemic disrupted every aspect of the nation's healthcare system and spread quickly to large numbers of individuals. The deadly virus, now known as is spread between people in a variety of ways. Initially, keeping a social distance, donning a mask, and maintaining proper hygiene were the primary ways of therapy for this illness. Then, one or more institutional control measures, such as isolation, quarantine, and lockdown, are put into motion. Numerous variations of have been identified, and new variants are continually being discovered in sequence since is an RNA-based virus with the ability to modify its strain. Therefore, infection therapy was intrusive. Once time-consuming vaccinations were identified, immunization drives were subsequently conducted throughout the nation. A few vaccines were found, manufactured for the market, and distributed by several WHO-supported international healthcare corporations. The following discussion focuses on the obvious and significant aspects of therapy.

One of the most effective methods to lessen the spread of the infection in the community was social isolation. The Bangladeshi government issued various zone-wise lockdown declarations as part of the treatment policy requirements. The lockdown was maintained by closing down all businesses save hospitals and other healthcare institutions in order to manage the situation. People who are under quarantine are kept out of social situations. The populace has little option but to quarantine themselves during a pandemic like because to the chain of lockdown. People had to cooperate when first appeared in Bangladesh owing to economic and social developments, and many of them were silent carriers.

Many of the laborer’s and employees were forced to enter quarantine as a consequence. It was impossible for many healthy individuals to live in such a setting; thus, everyone was required to follow quarantine for a short while. Some of the suspected incoherent individuals confined themselves for at least two weeks after the quarantine period was over after discovering minor symptoms. Others, on the other hand, returned to society because they no longer had symptoms. The government imposes some rules during the quarantine to manage in Bangladesh. In order to reduce or halt the spread of the virus, steps are being attempted to enhance social distance between individuals. Keeping a safe distance from people, avoiding big gatherings, limiting

the number of visits to your house, working from home, contacting friends and family online rather than in person, and, if required, donning personal protection equipment are some examples of what this entails. Thus, the maximum number of patients has decreased and the virus's propagation has halted, relieving pressure on hospital facilities and requirements. By limiting the number of cases brought on by the virus, quarantine relieves the strain on available resources and lowers hospital demand. People started to have issues as a result of a decline in physical exercise, a lack of social engagement, and boredom from being home. Things became very complex during the epidemic stage due to restrictions on social contact and staying inside. People were more fearful and anxious, making working from home difficult for some. The research of psychological behavior during quarantine in Bangladesh is mostly connected to symptoms of stress and loneliness.

According to research on the quarantine in Bangladesh, the psychological consequences of the house confinement are closely related to the physical components and had a significant influence on psychological issues during the epidemic. The main barriers to quarantine in Bangladesh were a lack of medical options, financial security, and healthcare knowledge. The term "isolation" comes from the fact that cases are rising while hospitals are unable to accommodate everyone. In such a case, physicians urged patients to avoid going to the hospital unless their illness was immediately life-threatening. They were split into two groups before being placed in isolation: those who had been tested for and those who had not, and the two groups were kept apart. Some of the isolated individuals had low oxygen saturation and were diagnosed as ill, requiring medical attention. Some persons later made a recovery, while others passed away. After the isolation, it was discovered that the number of recovered patients was growing daily and that the incidence of afflicted individuals had decreased. Some individuals viewed seclusion negatively. Living alone throughout the illness brought on by the infection was extremely difficult, and it had a significant psychological impact on the patients. They had anxiety and a dread of dying during that critical period.

After enduring certain illnesses persisted in their bodies permanently. So, it's important to talk about this issue since else they won't be able to combat the infection. It is exceedingly challenging to reverse the effects of anxiety and sadness since our bodies respond how we want them to. One of the key drivers of mental instability during its isolation. Researchers in Bangladesh found that more than solitary persons had anxiety and depression; to be precise, these conditions are known as and, respectively. Out of them, a substantial portion of solitary individuals displayed severe anxiety and sadness, which is unquestionably a deadly extent. Everyone found it difficult to face the epidemic scenario alone. Since no family has separate bedrooms for each member, it may be exceedingly challenging to manage and keep everyone safe if one family member tests positive for. Additionally, people who were abandoned cannot be cared for by others. Throughout the pandemic era, there were a few instances of attempted suicide. According to a meta-analysis, the statistical prevalence of anxiety and depression among isolates is striking, and their rates are and, respectively.

New viral versions or varieties may emerge as the pathogen spreads. In most cases, variations have little impact on how the virus works. They do, however, sometimes alter their behavior. The virus is under study for its variations by researchers from across the globe. Scientists are now better understanding how mutations can impact human health if some spread more quickly than others. RNA is the genetic building block of coronaviruses. DNA and RNA are related,

yet they are not the same. In order to spread, a virus has to attach to human cells, enter them, and create copies of its RNA. If a replication mistake occurs, RNA is altered. Viruses often undergo genetic changes and acquire the ability to transmit as they spread among individuals over time. When these adjustments completely depart from their original form, we refer to them as "variants". Researchers examine the genetic structure of the virus to look for variances before comparing them to determine if any modifications have occurred. Following the virus's global dissemination, viral variants that cause have arisen and been found in a number of nations. Delta variation is yet another case.

On May 11, 2021, the WHO designated the delta version as a variation of concern. At the time, it was the most commonly distributed variant globally. The delta virus strain spreads more quickly and is to blame for more illnesses and fatalities globally than earlier viral variants. All presently available licensed vaccines are safe and effective and provide protection against the delta variant. As the delta variation spread during the third wave, the number of new cases increased to right before the lambda variant appeared. Additionally, 264 deaths—the greatest number ever were recorded at that time. Different variations produced various symptoms, which had an impact on the category of treatments for handling worrying instances. This became a motivating force for the treatment center and the broader public to maintain higher levels of safety. Different waves of variations from the roots of the variations occurred during lockdown in our nation. The characteristics of variations vary. Some of them are very contagious, quite lethal, and precursors to other healthcare complications, including heart, kidney, and lung infections. Therefore, the constant arrival of variations created barriers to precise treatment, which worsened the situation's shortage in Bangladesh. Table 3 lists the variations that were found in Bangladesh, along with information about where they came from and when they were discovered.

Ignorance and resistance to treatment:

The majority of Bangladeshis are unaware of the symptoms and effects of pandemics. They were perplexed by the and other flu-related fevers' symptoms. They were unaware of the mortality of this infectious sickness and were unaware of the aftershock of the variant waves. The community transmissions were greatly increased as a result of people's lack of awareness of spread and resistance to healthcare interventions. Due to the existence of desirable antibodies, some individuals were naturally immune to the illness; this fact greatly encouraged the uninformed and bothersome to be resistant to the actions made by the government to reduce the number of infections. Another reason for hesitation was that some persons were overly overconfident about their health problems and believed the infections would not impact them. Due to a lack of confidence in the defensive mechanisms, a few instances of ignorance were created. The basic causes of ignorance include a general lack of good healthcare education and inadequate awareness of pandemics.

As a result, the Bangladeshi people were hesitant to get therapy, which caused the infection rate to noticeably increase. Limited Treatment Options Bangladesh is a third-world nation, therefore its citizens have limited access to healthcare because of inadequate infrastructure and a shortage of qualified medical workers. Hospital conditions began to deteriorate during the era. Both those who were admitted and those who were sent away from the hospital experience the same thing. At that time, not even all physicians routinely visited the hospitals. Managing everything proved to be difficult for the family. Although the grade of medical equipment and

training is rising with time, there are still not enough of either to meet the current demand. The current pandemic situation was terrible since there was an inadequate ventilation system and expensive treatment. The Bangladeshi population is not used to contracting infectious illnesses like; hence the response plan was out of proportion. The indifference of certain healthcare officials is another reason why there are now more victims in Bangladesh, even though a lot of medical equipment was handled at the infection's height. The scenario as a whole experience some challenging swells. Variants of all kinds came and passed, but each one brought with it new kinds of instances and symptoms. Every variety has different symptoms and a different method of therapy. Before administering therapy patterns to patients, suitable instructions must be provided. The course of therapy should worry those who have other ailments. However, the lack of understanding and optimism among the populace makes it hard to eradicate. This is a serious problem that has to be addressed among the populace. If any new varieties with new symptoms emerge, it is difficult to change since it might damage the infrastructure.

Lower Economic Structures:

People in Bangladesh, a developing nation, do not lead healthy lifestyles because they lack access to resources. The issue here is poverty; they cannot afford the cleaning supplies to keep the precautionary scenario in place. Their lesser economic capacity or some of their lower-paying jobs do not support additional costs. Rickshaw drivers, workers, and small business owners cannot thrive under strict precautions. They often fail to keep a clean atmosphere. Because of this, hygiene knowledge is insufficient to address this issue. The primary prerequisite for is maintaining basic hygiene. However, they lack sufficient instructions, and a lack of knowledge increases misery [9], [10].

CONCLUSION

The non-uniform shape and asymmetrical arrangement of the components are revealed by statistical analysis of the data collected. The intended data did not show a pattern of a normal distribution with a clear positive skewness. Beginning with Bangladesh, the preponderance of the components' causes is shown. It is clear from the metaphorical comparisons of the quantities of tests, infections, fatalities, and recoveries that Bangladesh's condition was fairly comparable for all of the aforementioned factors from the beginning to the third quarter of 2021. July 2020, April 2021, August 2021, and January 2022 all had notable cusps, with the third one being the highest. All of the aforementioned elements were gone after January 2022, with the exception of a few minor scatterings in July 2022. The trend of the number of infections is accurately tracked by the number of tests, deaths, and recoveries. When compared to the number of infections, the number of fatalities was disgraceful, and the number of recoveries greatly outperformed it. A division-by-division analysis revealed that the Chittagong division trailed the Dhaka division in both the quantity of tests and illnesses. The number of tests and illnesses, however, were lowest in the Barisal and Mymensingh divisions.

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CHAPTER 3

SUCCESSFUL AGEING OF THE ELDERLY IN ANGOLA: SOCIAL AND DEMOGRAPHIC FACTORS

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ABSTRACT:

Elderly populations are increasing more quickly than those of any other age group. Indeed, among them, the oldest old are the group whose proportion of the aged population is growing at the highest pace. The number of old people in the Angolan population is rising, necessitating urgent study in this field. The research intends to investigate sociodemographic group variations in reported health, life satisfaction, and social relationships among senior Angolans within the theoretical framework of effective ageing. Three of the elements of what has been referred to as effective ageing are the dependent variables. Data were obtained from a cross-sectional study of senior citizens in Luanda. The sociodemographic characteristics, perceived health, life satisfaction, and social support of 1003 senior Angolans were questioned. To check for mean differences in the dependent variables, MANOVAs were computed. The findings support the conclusion that age and institutionalization were the variables linked to the biggest inequalities on the quality of life and social relationships of the elderly in Angola. The interactions between a number of variables and ageing revealed that the oldest old were unquestionably a group in whom the lower quality of life brought on by ageing could not be offset by other variables, as it was in the group of young old.

KEYWORDS:

Elderly, Institutionalization, Sociodemographic, Unquestionably.

INTRODUCTION

Global ageing is a problem. The percentage of old persons is increasing faster than that of any other age group in practically all nations. Furthermore, the oldest group of the senior population, which is defined as individuals who are 80 years of age or older, is expanding more quickly than its younger group. In actuality, the average yearly growth rate of those 80 years of age or older is twice as high as that of those over 60. The majority of population ageing is a medical success, but it is also a political, economic, and social challenge. This may be particularly true for developing nations, which must deal with an ageing population while also battling malnutrition, infant mortality, and the control of infectious diseases. Angola is one of the nations in the region, which has the greatest proportion of old people in the whole continent of southern Africa. With over 13 million people, Angola has 2.7 percent of the world's population that are 65 or older. Older individuals will become more integral to society's growth in a rapidly ageing globe.

And it is true that senior Africans continue to make critical contributions to the welfare of their families, communities, and societies. However, such development-related contributions can only be made if senior persons have appropriate levels of health and quality of life. However,

there is relatively little study on the ageing processes in Africa, and therefore in Angola, and several writers have emphasized the necessity for research in this area. Therefore, it is important to promote research on the relationships between sociodemographic factors and social support and quality of life [1], [2].

The current study, which builds on a large body of research committed to understanding the elderly and, in particular, the oldest old quality of life, examines the relationships between age, gender, marital status, educational attainment, and institutionalization, with quality of life and social support. Both subjective measures of life satisfaction and wellbeing as well as health and functioning have been the focus of this work. Successful ageing is one of the key theoretical frameworks to comprehend wellbeing and its antecedents in old age. Successful ageing has been defined as having excellent physical health, retaining cognitive and physical function, and participating actively in social and productive activities. Additionally, it has been suggested that happiness might be a sign of good ageing and psychological adaptability. The WHO defines health as a condition of whole physical, mental, and social wellbeing, which is consistent with these theoretical contributions. All of these theoretical contributions emphasize how important it is to take into account how sociodemographic characteristics may affect one's health, happiness, and social functioning. Numerous sociodemographic factors have been linked to health and life satisfaction as well-being indicators. Life satisfaction has been linked to age, and the majority of research have revealed a minor decline in life satisfaction among the elderly. The statistical significance of this inverse link hasn't always been clear, but [3], [4].

Finally, there is a substantial body of research supporting the positive and significant association between social networks and life satisfaction. Given that maintaining a supportive social network is essential for effective ageing and that being socially engaged with others is a component of that success, the research on social interactions and networks is pertinent in this situation. Numerous research on the senior population have shown a connection between older persons' life satisfaction and the size and quality of their social networks. Social network and/or loneliness are consistently linked to life satisfaction, according to meta-analyses on this topic . Given the possible impacts of sociodemographic factors on this well-known predictor and/or dimension of quality of life and effective ageing, taking into account social support and social interactions as a dependent variable within the research appears appropriate. Given the prevalence of social networks, gender inequalities have sometimes come to light. Women reportedly have wider networks than males. Additionally, Antonucci et al. discovered some variations between men and women in social networks' numeric features but not their qualitative ones.

However, Meléndez-Moral et al. identified variations in the primary role providing support to men compared to women in a study of the Spanish population. However, a number of research have also shown gender variations in the social network quality [5], [6]. The elderly who are institutionalized get greater official and informal social care, according to a research by Cava and Musto. As previous research have shown, this outcome could vary depending on whether the participant lives alone or not. Because of this country's expanding old population as well as the paucity of scientific study in this field in Angola and, by extension, across Africa, studies of the elderly Angolan population should be promoted and embraced. The purpose of this research is to investigate the multivariate relationships among a number of sociodemographic variables and senior Angolans' perceptions of their social relationships, life satisfaction, and

health. The following presents certain sociodemographic characteristics and associated theories. Age is one hypothesis. Oldest elderly and young old have both been taken into consideration. The oldest elderly is thought to have worse quality of life, which includes decreased perceived health, life satisfaction, and social support, since the shift from the third to the fourth age seems to be a significant psychological difficulty. According to Smith et al, very old age may eventually be an overwhelming factor that dampens or limits the capacity to experience positive emotions. As such, it is hypothesized that it may interact with other factors, making it one of the main or primary factors in this study. Gender is the second theory. Women will be viewed as being in poorer health and having greater social connections than males. Marital Status is the third hypothesis. The average life quality of widows and widowers is thought to be poorer than that of older married people. The fourth hypothesis: education. It is hypothesized that education level will enhance quality of life, including greater reported health, life satisfaction, and social connections. Living Situation Hypothesis. It is predicted that institutionalization would lead to increased degrees of social connections and worse perceptions of health and life happiness.

Design, Participants, and Procedure:

Cross-sectional surveying is the method used in the study. Since there was no comprehensive list of nursing homes and daycare facilities, nor was there a census of the older population in Luanda, the sampling technique was no probabilistic. The 1003 participants were chosen from nursing homes run by the government of Angola, daycare facilities run by religious organizations, and an NGO that helps elderly people who live alone in Luanda, Angola. Several Luanda-area nursing homes for the elderly as well as daycare facilities dependent on religious organizations and non-governmental organizations that support older persons living alone were requested to participate in the study with the prior approval of the Ministry of Social Welfare. While some surveys were performed in respondents' homes, others were completed in nursing homes. Trained interviewers were utilized when old people's advanced age and/or cultural level rendered self-completion challenging. Traditionally, an interview would run for around 30 minutes. 73.5 percent of the sample's members were under 25. Women made up 65.4 percent. The majority of participants were widows or widowers at the time of the research, followed by 25.1%) by the single or divorced, and 12.5%) by those who were married. Only 15.6% of the sample had a high educational level, whereas 43.9 percent had low educational levels, 40.6 percent had medium levels, and 40.6 percent had high levels.

Nursing homes were home to 76.3 percent of people. With the exception of the measure measuring life satisfaction, all of the scales used in the research were translated back into Portuguese. These were the measurements. Sociodemographic Factors. Age was divided into two subgroups in response to a qualitative interest in examining the differences between the oldest old group and the so-called young old. Other factors included gender, marital status, educational level, institutionalization, and institutionalization. The group of oldest elderly has been identified using a variety of cut-off criteria. The WHO, for instance, uses the 85-year-old-or-older standard. But there are other instances when the 80-year-old or older criteria is commonly used, such in the Survey of Health, Ageing, and Retirement in Europe. It seems sense to apply a somewhat lower cut-off given that Angola has a life expectancy of 51 years for males and 53 years for women, which is much lower than that of Western nations. Additionally, a bigger subsample of the oldest old was produced by applying this cut-off point.

DISCUSSION

Perceived health, life happiness, social connections, and emotional support from friends were some of the dependent variables that were tested for main and interaction effects using multivariate analyses of variance. When using different categories of independent variables, = compares the centroid of the means of the many dependents. Because Pillai's criteria test is the most resistant to breaches of the underlying assumptions, it was chosen. Post hoc univariate -tests of group differences were used to identify which group means vary substantially from other groups when the overall -test revealed that the centroid of means of the dependent variables was not the same for all the groups. Then, pairwise multiple comparison tests were used to further explore group differences. Effect sizes were evaluated using partial eta-squares. Cohen's criteria, which are. for minor, medium, and large effects, respectively, were used to interpret the size of those effects. all statistical analyses were carried out. It was not feasible to estimate a single given the available sample size and the number of categories in the independent variables.

As a result, a number of MANOVAs were computed, including as age was thought to be the primary independent variable. ANOVAs were carried out to examine the impacts of the main and interaction effects on the various dependent variables. The primary impacts of marital status on reported health and social relationships were statistically significant. Married persons reported greater social ties than widows and widowers, while married people reported better perceived health than the other groups. Age and marital status have a substantial impact on social relationships and life happiness. Married elderly persons saw a greater decline in life satisfaction and social relationships as compared to the other categories, making them more likely to be among the oldest old. On the same dependent variables, a third between-subjects were conducted. As previously stated, for clarity's sake, the primary impacts of age group are not provided. Using Pillai's criteria, institutionalization and the age-institutionalization interaction had a significant impact on the combined dependent variables. The findings showed a weaker, partial correlation between institutionalization and the total number of dependent variables. Additionally, the interaction's impact magnitude was only partially significant.

To investigate the impacts of the main and interaction effects on the various dependent variables, four ANOVAs were conducted. With greater means for senior people who were not institutionalized, institutionalization had a substantial main influence on life satisfaction, perceived health, and social relationships. On life happiness, social connections, and emotional support, the age institutionalizations relationships were statistically significant. In every instance, there was a significant difference that favored the elderly who were not institutionalized in the group of the young old. When it came to the group of the oldest elderly, this difference vanished. The same dependent variables were subjected to a fourth and final between-subjects multivariate analysis of variance. The major impact for age group is not given, as in earlier studies. Using Pillai's criteria, it was shown that both the interaction of educational level and its effect on the combined dependent variables had a significant impact on the outcomes. The findings showed a weaker, partial correlation between educational attainment and the total number of dependent variables. The partial interaction impact was even more negligible. Univariate analyses of variance were carried out to look at how the main and interaction effects affected each dependent variable separately. Table 3 displays the findings of these additional studies. All four dependent variables showed a significant main impact of

educational level. As education level improved, the general tendency was that means increased. Age, educational attainment, and perceptions of one's health and social relationships all showed substantial interaction effects on life satisfaction. The interaction was brought on by a group of people with higher educational levels seeing a sharper decline in life satisfaction and social relationships. In other words, the group with higher educational levels saw a greater decline in life satisfaction and social relationships as they aged. Contrarily, the group with high educational level was less affected by the decline in perceived health than were those with lower educational levels. The entire population is ageing, but the African subregion is experiencing it more quickly, according statistics from the UN [7], [8]. The study's findings demonstrate the relationships between sociodemographic elements and the quality of life of the elderly in this African setting, and they should be evaluated in the context of the effective ageing theoretical framework. When the cultural and sociohistorical backgrounds of Africa and Angola are taken into account, the significance of the present findings is increased. The elderly in this group has all experienced Angola's 40-year era of conflict.

Along with the war, Angola has experienced significant sociological and economic changes, including rapid urbanization, which is widespread in Sub-Saharan Africa and is thought to have weakened family ties that supported the elderly in the past, due to a decline in the number and proximity of social network members, and a change in the traditional African cultural view of how the elderly will be treated. In addition, the Sub-Saharan area has had a high adult death rate owing to leading to a large orphan population that is often raised by grandparents. The aged in Sub-Saharan Africa are, in short, characterized by growing inadequacies in customary family support systems, vulnerability to poverty, and exclusion from health services. Studies on cultures other than those in western nations should be appreciated since persons with diverse value systems and cultural backgrounds may view and comprehend good ageing in different ways.

Regarding hypothesis 1, a key finding was that age and, in particular, being among the oldest elderly, had a significant impact on the quality of life. The perceived health, life happiness, social connections, and emotional support of the oldest people were poorer. This overall result was consistent with the majority of the evidence in the health literature, as well as the literature on social networks and ageing and the slight decline in life satisfaction observed in several studies. However, the evidence in this case was a little more ambiguous. This finding is consistent with Bowling and Browne's research, which found that close connections are necessary for successful support and that age-mates often provide this close support. The elderly is thus more at danger of losing this assistance. In times of stress, spouses and close family members provide the most assistance, according to Greenblatt et al. As people age and become widows, informal social involvement such as communication with family and friends increases but formal participation stays the same. We concur with Smith et al. that the group of the oldest elderly was particularly damaged in their ability to enjoy the good things in life.

Given that there were some significant gender-related differences, as hypothesized, all of them were of very minor magnitude, the findings only partly support hypothesis two. These changes are consistent with those on health indices discovered by Antonucci et al. and Nygren et al. According to research on gender variations in perceived health, women usually report feeling worse than men do, a finding that is equally true of older women. The findings support those made by Troll, who claimed that women had greater social networks. However, there were no

gender differences in the life satisfaction of the elderly, which is consistent with some earlier research but not all of it. Two significant interactions between age and gender were also discovered, although these again only partially explained the variation. These interaction effects on emotional support and life satisfaction both showed that males had a more pronounced decline than women.

Evidence largely confirmed the impacts of variations based on marital status, but once again, the amount of variance in the dependent variables explained was very little. The perceived health and social relationships of widows and widowers, however, were worse than those who were married or single/divorced. This finding is consistent with a number of other research, which revealed that widows and widowers had worse reported health and higher levels of despair. When Carr et al. compared widows to married controls, they discovered that widows and widowers had higher levels of anxiety, despair, and longing. Greenblatt et al. observed that spouses are one of the most crucial support figures, and that when a spouse passes away, that support figure is gone. Thus, it seems that married status, and particularly widowhood, are related to both objective and subjective indices of health, even in older Angolans. There was no correlation between marital status and life happiness. This runs counter to other research , including that conducted by Berg et al. , which indicated a substantial linear fall in the oldest old life satisfaction as age grew and that this linear decline was influenced by the death of a spouse, particularly in males.

Additionally, there were two significant interactions between age and married status and life satisfaction and social relationships, although these again only partially explained the variation. The interaction effects, however, were easily understood: in the group of the oldest elderly, the advantage that married young old enjoyed in life satisfaction and social relationships vanished. It could be argued that the coarse measure of educational level used in this study is a proxy for the main effect of educational level, which was quite weak but consistent with the hypothesis and the literature on the positive relationship between income and quality of life and educational level. In other words, as in other research, there was a positive but weak correlation between educational attainment and life satisfaction and wellbeing. Finally, research has shown that socioeconomic position and educational attainment, one of its proxy measures, have a beneficial impact on health outcomes. Oliver et al.'s research discovered a connection between education level and the capacity to carry out everyday tasks. Several interactions between age and education level were discovered in our data, despite their minor size. The interactions revealed that highly educated elderly people had a greater decline in life satisfaction and social networks as they aged. Intriguingly, the opposite was true for perceived health: more educated seniors felt greater health, a finding that may be tied to higher education and potential prosperity in Angola.

Finally, and in contrast to earlier findings, institutionalizations had significantly greater impact sizes, particularly on reported health and social relationships, and the findings were unmistakable: older people who were institutionalized were in poorer circumstances than those who were living at home. This finding is in line with part of the research on health and quality of life for institutionalized older people, which noted a negative relationship between institutionalizations and health. According to various studies cited by Aleppo, poor health is a major factor in the institutionalizations of older people. Other research, either showing no changes for health issues or focusing just on exercise levels, have been less clear. However,

ageing in this research mitigated these connections. The strong interaction effects revealed that when the study group was the oldest group of elderly, the advantage of the noninstitutionalized elderly over those in nursing homes vanished.

In general, the interactions of various factors with age pointed out that the oldest old were clearly a group in which the decreased quality of life could not be compensated by other factors, as it is the case for the youngest old. The results allow us to conclude that the factors with the largest effect sizes on quality of life and social relations of the Angolan elderly were age and institutionalizations. This outcome supports the claim made by Smith et al. that the oldest elderly may have passed the point of no return in terms of adapting to deteriorating health. Of course, this also involves the likelihood of social interactions. For instance, social interaction and connections with others are important sources of happy emotion. There are a lot of advantages and disadvantages to this research. One of the research's advantages is that it was conducted in Angola, an African nation. Although Africa has had a slower rate of ageing, by 2025 and 2050, it is expected to have an old population of 6% and 11%, respectively. The Oxford Conference on Research on Ageing, Health, and Poverty in Africa produced a number of recommendations, one of which recognizes the "vital need for enhanced research on ageing in Africa and the paucity of data and information in this area. In a similar vein, Stuart-Hamilton urges writers to try where possible to include a significant cross-cultural element in their writing. Because research has been almost exclusively concentrated in a limited number of Western industrialized cultures. Stuart-Hamilton serves as editor of a recent manual of gerontology [9], [10].

CONCLUSION

The consistency of the sociodemographic parameters' influence on the dependent variables across cultures and countries is another highlight of this research. The findings of this research mostly supported theories that were discovered in quite diverse cultural situations. The cross-sectional character of the research design, which makes it exceedingly difficult to prove causal relationships, is one of the study's shortcomings. The sample's lack of probability or the lack of information on the medical status of the elderly are further drawbacks. More research is required, particularly data from rural regions, information on comorbidities, drug use, disability, and functional level. This will deepen our awareness of the impacts of urbanization in Angola and Sub-Saharan Africa, as well as the knowledge of the ageing process. Further understanding of the underlying causal mechanisms behind the identified relationships might be possible with random sampling and long-term monitoring.

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CHAPTER 4

TREATMENT DELAY OF A PATIENT WITH LATE-ONSET SCHIZOPHRENIA DUE TO SOCIO-CULTURAL FACTORS

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ABSTRACT:

Up to 23.5% of schizophrenia patients have disease onset beyond the age of 40. We describe a case of a 57-year-old woman who spent 2.5 years sitting continually on the toilet due to somatic symptoms of passivity and persecutory beliefs. She was identified as having late-onset schizophrenia, and risperidone helped her symptoms. In this case report, we analyse the socio-cultural causes of her long-term untreated psychosis and explain the phenomenology of her psychotic symptoms. We come to the conclusion that more can be done to raise public awareness about mental health issues and lessen the stigma attached to mental illness. In 1943, Bleuler made the first description of late-onset schizophrenia, which manifested between the ages of 40 and 60. Even though the age criteria were removed from later versions of the DSM, the updated DSM-III included the diagnosis of late-onset schizophrenia. Women are more likely than males to have late-onset schizophrenia.

KEYWORDS:

Bleuler, Phenomenology, Schizophrenia, Symptoms.

INTRODUCTION

In 1943, Bleuler made the first description of late-onset schizophrenia, which manifested between the ages of 40 and 60. Even though the age criteria were removed from later versions of the DSM, the updated DSM-III included the diagnosis of late-onset schizophrenia. Women are more likely than males to have late-onset schizophrenia. Persecutory delusions, influence delusions, and hallucinations were found to be the three most prevalent symptoms in a study of the phenomenology of late-onset schizophrenia. Numerous investigations revealed that complete symptom remission occurred with therapy in 48%–61% of late-onset schizophrenia patients. In patients with a first episode of psychosis in Singapore, the median duration of untreated psychosis is 12 months. In this case report, we analyse socio-cultural elements that may have contributed to the long duration of untreated psychosis in a 57-year-old female patient with late-onset schizophrenia who had been sitting constantly on the toilet for 2.5 years.

After being transported by ambulance, a 57-year-old lady was taken to a tertiary mental hospital in Singapore. Before being taken to a hospital for treatment, she had been sitting continually on the toilet for 2.5 years. She was the second youngest of 12 children in a Malaysian Chinese family of ethnic Chinese descent. Due to financial difficulties at home, she had completed basic level education up to that point. She worked odd jobs before moving to Singapore at the age of 23 to work as a seamstress. At the age of 24, she got hitched and started a family [1], [2]. She had remained in a three-room home with her husband and her son, a 27-year-old journalist. Her spouse, who took care of her alone and with whom she had a deep connection, played a little

role in her care. She had a small group of friends, and she only spoke on the phone sometimes with one of her siblings. She had no serious medical conditions and no known family history of mental illness. She was characterized as an outgoing, laid-back lady who loved shopping and meeting new people before becoming unwell. She was a law-abiding individual who never smoked, drank alcohol, or used illegal substances. When she was 47 years old, she first noticed a weird feeling of a powerful force forcing her shoulders down while she sat on the toilet. She started spending a lot of time in the bathroom because she was continually experiencing incomplete voiding in her belly, even after defecating. Her gastrointestinal pains had brought her to the doctor twice, but no biological explanation could be identified.

Even when she relocated to a new home, her problems lingered. She had auditory hallucinations a few months later. She had overheard a discussion about her being carried on by three strange male and female voices. Additionally, she had once seen a dark shadow in the bathroom. She sought religious assistance because she believed that her third sister had used black magic to harm her. However, during the next ten years, her problems lingered and became worse. Due to the ongoing stomach pain, she was spending more and more time sitting on the toilet while attempting to empty her bowels. She stayed sitting on the toilet, watching television, eating her meals, and sleeping despite the persistent feeling of a powerful force forcing her shoulders down. She had dropped more than 20 kilograms and was so weak from her extended immobilization that she needed help to walk and needed aid to take a shower. When she heard sounds outside her door, she was quickly alarmed. Every time her husband had convinced her to get help, she had made suicide threats. Before her husband sent an ambulance to transport her to the hospital, she had been sitting continually on the toilet for 2.5 years [3], [4].

Care, Results, and Follow-Up:

She was seen to be malnourished and unattended upon entrance, with hollow cheeks and excoriations covering her back and lower limbs. She had severe kyphosis, substantial atrophy of her lower limbs, and was unable to walk on her own. She also expressed a number of physical ailments while becoming anxious and angry. Additionally, she verbalized persecutory beliefs concerning her third sister and had physical passivity signs. She was mentally unwell, but she didn't understand it. Basic blood tests were performed to rule out any biological factors. Except for the low vitamin D levels, all tests for the whole blood count, renal function, electrolytes, liver function, and thyroid function were normal. She was prescribed fluvoxamine 100 milligrams daily, risperidone 4 milligrams daily, and clonazepam 0.5 milligrams daily after being diagnosed with late-onset schizophrenia. For her vitamin D insufficiency, daily calcium carbonate and vitamin D pills were also begun. Her somatic passivity symptoms and persecutory delusions in the ward improved with therapy. She didn't describe any other visual or audio hallucinations. As the intensity of the powerful force keeping her down diminished, she spent less than 30 minutes each day in the bathroom.

Despite receiving intense rehabilitation, she was confined to a wheelchair. Eventually, after spending 18 days in the hospital, she was released. Over the course of the next ten years, she was followed up at the outpatient clinic, and her schizophrenia was controlled with fluvoxamine 100 milligrams daily and a decrease in risperidone to 3 milligrams daily. She still had some lingering bodily symptoms of passivity, which she ascribed to her mental condition. She gained a better understanding of her sickness and let go of her steadfast conviction that her

third sister was using black magic to harm her. She continued to follow therapy and follow-up instructions.

DISCUSSION

As far as we are aware, this is the first psychiatric case report of a 57-year-old lady who spent 2.5 years sitting nonstop on the toilet because of her psychotic symptoms. Similar news coverage on a 35-year-old Kansas woman who spent two years using her boyfriend's toilet was published in 2008, although there was no explicit mention of the lady's mental health issues. Our patient's extended psychotic symptoms and functional impairment were more consistent with a schizophrenia diagnosis than with a dissociation process brought on by cultural beliefs. The lengthy DUP in our patient serves as a reminder of the treatment gap for those suffering from mental illness. In 2009, a nationwide assessment on mental health in Singapore's population revealed significant treatment gaps for individuals who had mental illness.

Only 31.7% of persons sought out mental health professionals for assistance, 8.4% went to medical practitioners, and 7.6% went to religious healers. Research of mental illness in Asian cultures also shown that lower socioeconomic class relatives of patients with mental health concerns often had sentiments of anxiety and hostility, while higher socioeconomic class relatives frequently experienced feelings of shame and guilt. The biggest issue, in Goffman's view, is not the functional constraints of disability, but rather the judgements of negative difference and the negative social reactions they elicit. One of the biggest obstacles to getting assistance is the stigma around mental health. Due to the heavy load of acute shame and guilt, Chinese families are stigmatized in the psychiatric community. This is connected to the Chinese culture's anxiety of showing others their humiliation. In order to combat stigmatization, denial and somatization are often utilized.

Singaporeans are similarly undereducated on mental health issues. 2014 research of 3006 Singaporeans aged 18 to 65 found that there is a lot of stigmata towards those who have mental illnesses. The bystander's impact may also be responsible for her neighbors' disregard for her poor health. Her lack of education may have contributed to her protracted DUP. People with elementary or secondary education are more prone than those with a university degree to link mental health difficulties to physical reasons, according to Pang et al.'s research. Psychological anguish manifested as physical symptoms was the most typical symptom reported in Chinese psychiatric patients. This may have been a result of Confucianism's emphasis on emotional restraint as a means of maintaining societal peace. She had both somatic sensations of incomplete voiding and somatic passivity, which caused her to sit on the toilet for extended periods of time.

Although her husband had often taken her to the doctor for her stomach pain, he had never mentioned her out of the ordinary behaviors. Her family members' rejection of her mental condition may have delayed her access to psychiatric care. The explanatory model of mental disease also heavily incorporates cultural views. There is a belief among the locals that black magic can be used to cast a spell on them, and females tend to direct their paranoid ideas towards their family members. Tsoi reported a special culture form of delusion common in Southeast Asia of being affected by a special type of black magic known as Kong tow. Her family's conviction that her strange conduct was caused by black magic being performed on her has prevented her from getting treatment sooner [5], [6]. Patients who experience black

magic tend to have hazy symptoms and are often unable to elucidate. Psychological patients may experience symptoms for a long time before seeking treatment. More than half of the Chinese patients who attended a new case clinic had experienced symptoms for more than a year before seeking psychiatric assistance, and 10% had symptoms that had persisted for more than nine years.

On Singapore's island, which has a total land area of around 719.2 square kilometers, access to psychiatric outreach is simple. Through the mental health helpline, patients or their families can activate community mental health services like the Community Mental Health Team and mobile crisis team. Identifying and referring such situations to mental health services is possible with the help of community partners including family assistance centers, day activity centers, and the police. A group called the Carers Alliance exists to help carers. However, there is still a delay in obtaining psychiatric care. In fact, more may be done to raise public awareness of mental illness and lessen social stigma associated with it. This can be done by building networks with general practitioners, schools, and counselling services as well as via public education initiatives including media, forums, and exhibits. Elderly populations are increasing more quickly than those of any other age group.

Indeed, among them, the oldest old are the group whose proportion of the aged population is growing at the highest pace. The number of old people in the Angolan population is rising, necessitating urgent study in this field. The research intends to investigate sociodemographic group variations in reported health, life satisfaction, and social relationships among senior Angolans within the theoretical framework of effective ageing. Three of the elements of what has been referred to as effective ageing are the dependent variables. Data were obtained from a cross-sectional study of senior citizens in Luanda. The sociodemographic characteristics, perceived health, life satisfaction, and social support of 1003 senior Angolans were questioned. To check for mean differences in the dependent variables, were computed. The findings support the conclusion that age and institutionalizations were the variables linked to the biggest inequalities on the quality of life and social relationships of the elderly in Angola. The interactions between a number of variables and ageing revealed that the oldest old were unquestionably a group in whom the lower quality of life brought on by ageing could not be offset by other variables, as it was in the group of young old [7], [8].

Global ageing is a problem. The percentage of old persons is increasing faster than that of any other age group in practically all nations. Furthermore, the oldest group of the senior population, which is defined as individuals who are 80 years of age or older, is expanding more quickly than its younger group. In actuality, the average yearly growth rate of those 80 years of age or older is twice as high as that of those over 60. The majority of population ageing is a medical success, but it is also a political, economic, and social challenge. This may be particularly true for developing nations, which must deal with an ageing population while also battling malnutrition, infant mortality, and the control of infectious diseases .6 Angola is one of the nations in the region, which has the greatest proportion of old people in the whole continent of southern Africa. With over 13 million people, Angola has 2.7 percent of the world's population that are 65 or older. Older individuals will become more integral to society's growth in a rapidly ageing globe. And it is true that senior Africans continue to make critical contributions to the welfare of their families, communities, and societies. However, such development-related contributions can only be made if senior persons have appropriate levels

of health and quality of life. However, there is relatively little study on the ageing processes in Africa, and therefore in Angola, and several writers have emphasized the necessity for research in this area. Therefore, it is important to promote research on the relationships between sociodemographic factors and social support and quality of life. The current study, which builds on a large body of research committed to understanding the elderly and, in particular, the oldest old quality of life, examines the relationships between age, gender, marital status, educational attainment, and institutionalizations, with quality of life and social support.

Both subjective measures of life satisfaction and wellbeing as well as health and functioning have been the focus of this work. Successful ageing is one of the key theoretical frameworks to comprehend wellbeing and its antecedents in old age. Successful ageing has been defined as having excellent physical health, retaining cognitive and physical function, and participating actively in social and productive activities. Additionally, it has been suggested that happiness might be a sign of good ageing and psychological adaptability. The WHO defines health as a condition of whole physical, mental, and social wellbeing, which is consistent with these theoretical contributions. All of these theoretical contributions emphasize how important it is to take into account how sociodemographic characteristics may affect one's health, happiness, and social functioning. Numerous sociodemographic factors have been linked to health and life satisfaction as well-being indicators. Life satisfaction has been linked to age, and the majority of research have revealed a minor decline in life satisfaction among the elderly. The statistical significance of this inverse link hasn't always been clear, but. Finally, there is a substantial body of research supporting the positive and significant association between social networks and life satisfaction.

Given that maintaining a supportive social network is essential for effective ageing and that being socially engaged with others is a component of that success, the research on social interactions and networks is pertinent in this situation. Numerous research on the senior population have shown a connection between older persons' life satisfaction and the size and quality of their social networks. Social network and/or loneliness are consistently linked to life satisfaction, according to meta-analyses on this topic. Given the possible impacts of sociodemographic factors on this well-known predictor and/or dimension of quality of life and effective ageing, taking into account social support and social interactions as a dependent variable within the research appears appropriate. Given the prevalence of social networks, gender inequalities have sometimes come to light. Women reportedly have wider networks than males. Additionally, Antonucci et al. discovered some variations between men and women in social networks' numeric features but not their qualitative ones. However, Meléndez-Moral et al. identified variations in the primary role providing support to men compared to women in a study of the Spanish population. However, a number of research have also shown gender variations in the social network quality. The elderly who are institutionalized get greater official and informal social care, according to research by Cava and Musto. As previous research has shown, this outcome could vary depending on whether the participant lives alone or not.

Because of this country's expanding old population as well as the paucity of scientific study in this field in Angola and, by extension, across Africa, studies of the elderly Angolan population should be promoted and embraced. The purpose of this research is to investigate the multivariate relationships among a number of sociodemographic variables and senior

Angolans' perceptions of their social relationships, life satisfaction, and health. The following presents certain sociodemographic characteristics and associated theories. Cross-sectional surveying is the method used in the study. Since there was no comprehensive list of nursing homes and daycare facilities, nor was there a census of the older population in Luanda, the sampling technique was no probabilistic. The 1003 participants were chosen from nursing homes run by the government of Angola, daycare facilities run by religious organizations, and an NGO that helps elderly people who live alone in Luanda, Angola. Several Luanda-area nursing homes for the elderly as well as daycare facilities dependent on religious organizations and non-governmental organizations that support older persons living alone were requested to participate in the study with the prior approval of the Ministry of Social Welfare. While some surveys were performed in respondents' homes, others were completed in nursing homes. Trained interviewers were utilized when old people's advanced age and/or cultural level rendered self-completion challenging. Traditionally, an interview would run for around 30 minutes.

Around 73.5 percent of the sample's members were under 25. Women made up 65.4 percent. The majority of participants were widows or widowers at the time of the research, followed by 25.1%) by the single or divorced, and 12.5%) by those who were married. Only 15.6% of the sample had a high educational level, whereas 43.9 percent had low educational levels, 40.6 percent had medium levels, and 40.6 percent had high levels. Nursing homes were home to 76.3 percent of people. The entire population is ageing, but the African subregion is experiencing it more quickly, according statistics from the UN . The study's findings demonstrate the relationships between sociodemographic elements and the quality of life of the elderly in this African setting, and they should be evaluated in the context of the effective ageing theoretical framework. When the cultural and sociohistorical backgrounds of Africa and Angola are taken into account, the significance of the present findings is increased. The elderly in this group have all experienced Angola's 40-year era of conflict.

Along with the war, Angola has experienced significant sociological and economic changes, including rapid urbanization, which is widespread in Sub-Saharan Africa and is thought to have weakened family ties that supported the elderly in the past, due to a decline in the number and proximity of social network members, and a change in the traditional African cultural view of how the elderly will be treated. In addition, the Sub-Saharan area has had a high adult death rate owing to HIV/AIDS, leading to a large orphan population that is often raised by grandparents. The aged in Sub-Saharan Africa are, in short, characterized by growing inadequacies in customary family support systems, vulnerability to poverty, and exclusion from health services. Studies on cultures other than those in western nations should be appreciated since persons with diverse value systems and cultural backgrounds may view and comprehend good ageing in different ways. Regarding hypothesis 1, a key finding was that age and, in particular, being among the oldest elderly, had a significant impact on the quality of life. The perceived health, life happiness, social connections, and emotional support of the oldest people were poorer. This overall result was consistent with the majority of the evidence in the health literature, as well as the literature on social networks and ageing and the slight decline in life satisfaction observed in several studies. However, the evidence in this case was a little more ambiguous. This finding is consistent with Bowling and Browne's research, which found that close connections are necessary for successful support and that age-mates often provide this close support . The elderly are thus more at danger of losing this assistance. In

times of stress, spouses and close family members provide the most assistance, according to Greenblatt et al. . As people age and become widows, informal social involvement such as communication with family and friends increases but formal participation stays the same.

We concur with Smith et al. that the group of the oldest elderly was particularly damaged in their ability to enjoy the good things in life. Given that there were some significant gender-related differences, as hypothesized, all of them were of very minor magnitude, the findings only partly support hypothesis two. These changes are consistent with those on health indices discovered by Antonucci et al. and Nygren et al. According to research on gender variations in perceived health, women usually report feeling worse than men do, a finding that is equally true of older women. The findings support those made by Troll, who claimed that women had greater social networks. However, there were no gender differences in the life satisfaction of the elderly, which is consistent with some earlier research but not all of it. Two significant interactions between age and gender were also discovered, although these again only partially explained the variation. These interaction effects on emotional support and life satisfaction both showed that males had a more pronounced decline than women.

Evidence largely confirmed the impacts of variations based on marital status, but once again, the amount of variance in the dependent variables explained was very little. The perceived health and social relationships of widows and widowers, however, were worse than those who were married or single/divorced. This finding is consistent with a number of other research, which revealed that widows and widowers had worse reported health and higher levels of despair. When Carr et al. compared widows to married controls, they discovered that widows and widowers had higher levels of anxiety, despair, and longing. Greenblatt et al. observed that spouses are one of the most crucial support figures, and that when a spouse passes away, that support figure is gone. Thus, it seems that married status, and particularly widowhood, are related to both objective and subjective indices of health, even in older Angolans. There was no correlation between marital status and life happiness. This runs counter to other research, including that conducted by Berg et al., which indicated a substantial linear fall in the oldest old life satisfaction as age grew and that this linear decline was influenced by the death of a spouse, particularly in males.

Additionally, there were two significant interactions between age and married status and life satisfaction and social relationships, although these again only partially explained the variation. The interaction effects, however, were easily understood: in the group of the oldest elderly, the advantage that married young old enjoyed in life satisfaction and social relationships vanished. It could be argued that the coarse measure of educational level used in this study is a proxy for the main effect of educational level, which was quite weak but consistent with the hypothesis and the literature on the positive relationship between income and quality of life and educational level. In other words, as in other research, there was a positive but weak correlation between educational attainment and life satisfaction and wellbeing. Finally, research has shown that socioeconomic position and educational attainment, one of its proxy measures, have a beneficial impact on health outcomes. Oliver et al.'s research discovered a connection between education level and the capacity to carry out everyday tasks. Several interactions between age and education level were discovered in our data, despite their minor size. The interactions revealed that highly educated elderly people had a greater decline in life satisfaction and social networks as they aged. Intriguingly, the opposite was true for perceived health: more educated

seniors felt greater health, a finding that may be tied to higher education and potential prosperity in Angola.

Finally, and in contrast to earlier findings, institutionalizations had significantly greater impact sizes, particularly on reported health and social relationships, and the findings were unmistakable: older people who were institutionalized were in poorer circumstances than those who were living at home. This finding is in line with part of the research on health and quality of life for institutionalized older people, which noted a negative relationship between institutionalizations and health. According to various studies cited by Aleppo, poor health is a major factor in the institutionalizations of older people. Other research, either showing no changes for health issues or focusing just on exercise levels, have been less clear. However, ageing in this research mitigated these connections. The strong interaction effects revealed that when the study group was the oldest group of elderly, the advantage of the noninstitutionalized elderly over those in nursing homes vanished [9], [10].

CONCLUSION

Finally, and in contrast to earlier findings, institutionalizations had significantly greater impact sizes, particularly on reported health and social relationships, and the findings were unmistakable: older people who were institutionalized were in poorer circumstances than those who were living at home. This finding is in line with part of the research on health and quality of life for institutionalized older people, which noted a negative relationship between institutionalizations and health. According to various studies cited by Aleppo, poor health is a major factor in the institutionalizations of older people. Other research, either showing no changes for health issues or focusing just on exercise levels, have been less clear. However, ageing in this research mitigated these connections. The strong interaction effects revealed that when the study group was the oldest group of elderly, the advantage of the noninstitutionalized elderly over those in nursing homes vanished.

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CHAPTER 5

SOCIO-EMOTIONAL WEALTH: INNOVATIVE INVESTMENT PATH

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ABSTRACT:

Family businesses are expanding both in size and quantity as a result of social development in China. As a result, the question of how to ensure the healthy expansion of family businesses has become inescapable. More and more family firms are switching from a single market model to cross-industry operation in an effort to find new growth opportunities amid the fiercer market competition. Multiculturalism is a product of a certain period, and it is directly tied to the significant social changes that took place during that era, including new developments in the areas of family, marriage, religion, education, and racial relations, as well as in the global setting. Theoretically, multiculturalism responds to these developments and embodies the most recent trends in international academics' cultural studies. In a multicultural setting, socio-emotional riches and an inventive atmosphere are especially crucial for family enterprises. The article begins by introducing social emotional wealth and the innovation investment of family enterprises. It then focuses on the impact of the innovation environment on the innovation investment of family enterprises and analyses the influence mechanism of social emotional wealth and innovation environment on family innovation investment, putting forward appropriate countermeasures and suggestions.

KEYWORDS:

Intergenerational, Inheritance, Multiculturalism, Sustainability.

INTRODUCTION

In the past, the growth of traditional family businesses mainly focused on the economic expansion of the company and overlooked the management of family businesses' responsibilities to the environment. Family companies now understand that environmental sustainability is the foundation of economic prosperity. Family businesses are increasingly concentrating on building for environmental protection, energy efficiency, and sustainable growth of the firm. So, the essence of the planet serves as the inspiration for this paper on environmental responsibility. Multiculturalism refers to the idea that as human society becomes more complex and information circulation becomes more advanced, cultural renewal and transformation are also accelerating, the development of various cultures is faced with a variety of opportunities and challenges, and new cultures will continue to emerge in an unending stream. Cultural pluralism, or multiculturalism in a complex social environment, results from the need for a range of diverse cultures to support society's progress under the conditions of today's complex social structure [1], [2].

Innovation is a crucial strategy for businesses to develop long-lasting competitive advantages, which is crucial for their continued success and development. The position of innovation in company development strategy has risen to a new prominence as a result of the continual expansion of innovation-driven development strategy and "double creation" strategy, and

market passion for innovation has never been higher. However, family firms often struggle with a lack of investment in innovation, while playing a significant role in preserving China's fast economic development. As a result, studying family businesses' innovation and investment orientation has attracted a lot of academic interest. This study defines a family business as follows, integrating the research of earlier researchers with the material to be studied: A natural person or family is the real controller of the business; the actual controller directly or indirectly owns the company's shares and is its biggest shareholder. The motive for family business innovation investment is mostly examined in the literature from the perspectives of resource foundation theory, agency theory, and housekeeping theory. Traditional economic theory, however, does not entirely apply to the study of family business management, and theory and practice often diverge.

A notion specific to family business was initially put out by Fregatid et al. in 2007 and is known as social emotional wealth. According to the idea, families often place a high value on maintaining and advancing noneconomic objectives including intergenerational inheritance, social relationships, and family power in addition to their economic aims. Since the notion of social emotional wealth was first put forward, it has progressively been crucial to investigate the motivation behind creative investment in family businesses from this theoretical standpoint. For family companies to boost their investment in innovation, the gain and loss of social emotional wealth is a crucial decision point. Radke, for instance, thinks that family firms would exhibit a propensity for risk aversion in order to safeguard their social emotional value, hence lowering investment in innovation. Additionally, Yan Rosen and Xiao Sha discovered that family firms cut down on innovation spending to preserve strong social ties and prevent the loss of social and emotional wealth. Protecting social emotional wealth does not, however, necessarily result in a decrease in the level of innovation investment in family firms, according to certain research. To protect and pass along their socio-emotional riches, family firms will boost their investment in innovation [3], [4].

What effect does family preservation of social and emotional wealth have on family businesses' investments in innovation? Although previous research has emphasized the value of family motivation for safeguarding social emotional wealth in the choice of enterprise innovation investment, the mechanism by which social emotional wealth influences the innovation investment of family enterprises has received less in-depth exploration and verification. However, since social emotional wealth is a multifaceted notion and the majority of the research to date does not further break it down, it is ignored how various social emotional wealth aspects affect the investment in company innovation. As a result, this article will further define social emotional wealth and examine the distinct traits and immediate consequences of its multiple aspects on the investment in innovation made by family businesses. This study has some guiding relevance for the innovation management and practice of Chinese family businesses and is helpful for further extending and enriching the research findings on family firm innovation. Louis A. Thompson, the dean of Arizona State University's business school, is an authority on social emotional wealth. Gomez-Mejia claimed that family firms had intangible wealth, or social emotional wealth, in addition to economic wealth in 2007 research of the decision-making behavior of more than 1,200 family businesses in Spain. Social emotional richness, as seen in Figure 1, is what sets family businesses apart from other types of organizations. The non-monetary advantages that families get from family enterprises as a result of their roles as owners, managers, and decision-makers are referred to as essential

qualities. This non-economic interest encompasses a broad variety of topics, including intergenerational family inheritance, family control over company, family members' identification with business, intimate social relationships, and emotional bond between family members. Aversion to the loss of socially affective wealth drives strategic actions that have the potential to jeopardize a family's current social emotional riches. The family's decision-makers won't use this tactic. Numerous academics have thus noted that the family's quest of social and emotional riches would have an impact on how family firms see R&D and innovation operations. First off, the family business's R&D and innovation efforts are constrained by the family's fight for corporate control. It's common to see maintaining family ownership of the company as essential to society's emotional richness.

On the one hand, traditional "home culture" has long had an impact on domestic family companies, and family control has also gotten increased attention from the family. On the other hand, in order for certain aspects of socio-emotional riches to be realized, family influence over the company is also necessary. For instance, leaders who respect family responsibilities often give family companies to family members without consideration. Family members benefit from improved working and living circumstances and career prospects because to family business resources. And the only way to reap these advantages without obstacles is by acquiring a high level of control over the business [5], [6]. A family will be more wary of investing in novel ventures the more influence they have over the company. On the one hand, outside investment from R&D and innovation initiatives may erode familial authority over company ownership. R&D efforts often demand significant and continuing capital expenditures, and the inclusion of outside investors weakens the family's influence over the company and creates new claims over the company's strategy, financial management, and day-to-day operations. However, innovation and R&D operations sometimes call for individuals with sophisticated knowledge and abilities, and the inclusion of these individuals may endanger the family's real managerial control of the company. The organizational structure and management of authorization needs are often increased by the introduction of professional talents, which lessens the family's management authority over the associated R&D and technical departments. As a result, when a family seeks a high level of control over the company, it will aim to avoid taking risks, avoid borrowing money from other sources, and avoid designating family members as key managers in the long run-in order to keep ownership and management of the family business. These elements also restrict how much money businesses may spend on R&D and innovation.

DISCUSSION

Second, family businesses' motivation to engage in innovative R&D activities is also diminished throughout the intergenerational succession process, particularly in the early phases of the process. It has corporate control and management so that the succession may go smoothly. The hazards of intergenerational succession are often avoided by the whole family. It is difficult for the second generation to demonstrate its effect on the firm at such time since the majority of senior managers in the company are prone to mistrust the second generation's successor. In order to accomplish certain goals and establish their authority quickly, the second generation tends to focus more on the present interests and short-term performance of the company at that time. Family companies aim to reduce uncertainty since R&D is a long-term and very unpredictable process. Additionally, family-owned businesses' pursuit of social links,

particularly political relationships, might sometimes be a role in the reduction of their creative R&D operations. Due to their political connections, family businesses are more likely to be protected by local policies. Additionally, even if they don't engage in innovative activities, they can still maintain a large market share, which reduces the market competition's ability to spur innovation in family businesses. Additionally, when businesses profit handsomely from their political connections, they often reduce investment in other fields, particularly in innovation and R&D, and put more money into keeping their political connections strong. The study has some guiding relevance for the innovation management and practice of Chinese family businesses and is favorable to further extending and enriching the research findings on family firm innovation. Ownership has been used as a dividing line between family firms and nonfamily enterprises by American academic Gerick. According to Dinickels and Frohlich, a company may only be referred to be a family firm if family members possess more than 60% of it.

According to some academics, family management control where a family or many families with strong relations directly or indirectly oversee the administration of a certain enterprise represents the core of family business. Additionally, some academics take into account several facets of ownership and operational control. For instance, the American scholar Chandler described a family business as having strong ties with managers, retaining management decision-making authority, and the founder and its closest partners holding the majority of the equity. Chandler wrote this in his masterpiece The Visible Hand" in 1987. The degree of ownership of management rights is how Pan Bashing categorizes the various phases of growth of family enterprises and views family ownership as a fundamental requirement. Some academics believe that pass ability a term based on the traits of intergenerational inheritance is the key to identifying family companies. Yin Guoliang and others consciously highlight the legal inheritance of corporate ownership, management, and residual rights within the family when defining what constitutes a family firm. A firm is considered a family business if family members own the majority of the company's stock, engage in its management, sit on its board of directors, and intend to pass it down to next generations.

A significant portion of China's nonpublic sector is the private economy of family businesses, and private businesses significantly contribute to the country's economy's fast expansion. Family members run their own enterprises and take an active role in management. On the one hand, this might weaken the division of powers and solve agency issues. Family members, on the other hand, will often exhibit a desire to avoid risks when making choices to safeguard family wealth and may reject worthwhile ventures when presented with unclear or dangerous chances. The involvement of family members in company management is a double-edged sword which may both benefit the family firm and increase its independence. The extensive engagement of family members in company administration is a characteristic trait of a family business. Family members take a more active role in corporate governance since they are so intimately tied to the business's interests. On the one hand, they can lessen the issue of agency in corporate governance, but on the other hand, there are more concerns about the management process due to the fact that family managers have less management knowledge and experience than professional managers, which raises the possibility that they will make decisions that are conservative and unfavorable to the growth of businesses [7], [8]. The benefit of having family members manage the firm is to have a better knowledge of the business and to reduce agency issues brought on by the division of the two powers of the business, improving the business

performance of the business. Family management has a favorable effect on the value of small and medium-sized family businesses by lowering agency costs and enhancing execution effectiveness.

Family management has a larger favorable effect on the value of small- and medium-sized family businesses when they operate in a sector with intense competition. Enterprises have a dominating position among those involved in innovation, which is a key factor in both economic development and social advancement. Growing numbers of family enterprises may provide China's economy a sustained boost, create a large number of high-quality employments for the population, and have a significant impact on the development of the nation and society. Following the introduction of the "innovation-driven development" policy in China, family businesses there heeded the government's call, engaged in active corporate innovation operations, and worked to increase their scientific and technical prowess and market competitiveness. Family businesses' creative endeavors may support the high-quality growth of China's economy and foster the creation of more exceptional talents and technologies for use in practical production and societal application. When compared to other company kinds, family firms have several distinct management traits, as seen in Figure 3. For instance, a family controls the majority of a family business's capital, the family holds the majority of the company's leadership positions, the family controls the management and management rights of the family business, and the power and resource allocation of the enterprise is determined by blood ties. Innovation investment, which is the labor employed by businesses to accomplish innovation, demonstrates their desire and capacity to do so.

Realizing technical and product innovation is predicated on having more financial and material resources. According to Schumpeter, generating benefits via corporate innovation is the way businesses may gain a competitive edge. According to Schumpeter, enterprise innovation is the process of creating benefits and is the means through which businesses may obtain a competitive edge. The major justification for the investment is that, according to Zhong Teng's investment theory, innovative investments differ from conventional ones in three ways: first, they have higher sunk costs and adjustment costs; second, they have higher risks; and third, they have longer cycled. Due to these traits, investing in innovation need not only the inventive mindset of management, but also enough funding from the business to support new initiatives. In contrast to nonfamily businesses, family businesses spend more in innovation themselves due to their high degree of innovation activities, as seen in Figure 4. Family firms spend very little in innovation due to their high risk and lengthy cycle. Promoting domestic enterprise innovation and achieving the transition from epitaxial "quantitative" growth to endogenous qualitative mode of enterprise growth necessitate not only state-owned enterprises to play a bellwether, but also a wide range of innovative activities in private enterprises to achieve the healthy and balanced development of social innovation. Family companies have a crucial and necessary role in the private sector. Family businesses' contribution to China's real economy's fast growth cannot be separated.

The Environment for Innovation:

The Regional Economic Research School, represented by the European Innovation Environment Research Group, was the first to put out the idea of the "Innovation Milieu," emphasizing the interdependence between the primary and collective efficacy of innovation in the industrial zone and the behavior of innovators. The innovation environment, as the

fundamental support of the innovation system, plays a crucial role in enhancing the effectiveness of innovation. It should contain physical infrastructure and associated soft aspects. The unique environmental indicators in the early research concentrated on infrastructural elements in addition to taking the most fundamental economic environment into account. Financial development has been included into the innovation environment, as illustrated in and information infrastructure has recently been welcomed by the scope of the innovation environment more and more. The environment for innovation is an external influence that drives business innovation vitality and encourages investment in corporate innovation. The innovation environments of various provinces and cities in China, however, are quite distinct at this time of economic change because of the diverse macroeconomic circumstances, market demand potential, institutional backgrounds, and cultural traditions of different places.

According to Cai Xiu ling, the institutional element that creates different possibilities and political assurances for creative activity is the innovation environment. It serves as a collective noun for national management frameworks, markets, and services. The institutions, laws, and customs in the area that are utilized to coordinate the inputs and outputs of diverse innovators in the region, according to foreign academic Adalat, are the key components of the innovation environment. The notion that economic behavior is profoundly based in social action is comparable to that put out by Marc Grabove, a sociologist at Stanford University in the United States. The innovation system founded in the distinct innovation environment is the main focus of both thoughts. I think that the content of the innovation environment should encompass aspects like the main body, the management system, the service system, and the cultural milieu in which it is placed after synthesizing domestic and foreign literature and the study aims of this work. The innovation environment put out by Fromhold in 2004 serves as the generally recognized justification for these ideas. The innovation environment, which includes all informal, is first and foremost a social contract. In order to develop new goods, it is also a network that fosters cooperation and supports one another. Second, since communication between individuals is near and restricted by the actor's geographical distance, material circulation happens quickly, leading to a higher efficiency rate. In addition, the atmosphere for innovation exists both within and outside. This overlay will encourage subjects to behave consistently going forward.

Identification of the Environment for Innovation:

Companies may be seen as both products of their environments and sites where creative businesses are fostered, according to the European Research Group on the Environment for Innovation. Technical expertise, regional connections and inputs, closeness to the market, and availability of skilled labor are all elements that influence regional innovation. The environment is essential for innovation. Enterprises should make use of environmental resources to collaboratively construct new types of localized production organizations and foster an innovative environment with other businesses, training facilities, technology transfer centers, and local government agencies. GREMI broadens the environment for innovation from a relatively small community to a region; an environment for innovation is linked to sociocultural concepts as well as science and technology. Additionally, knowledge and information are shared via informal and "invisible" channels like human-to-human interaction in addition to more formal channels like communication and computer networks. The market

space, manufacturing space, and support space are all factors in the innovation environment. All of this offers fresh suggestions for developing an inventive atmosphere. Scholars and professionals both domestically and internationally have conducted study on the innovation environment, and the collaborative innovation environment contains a number of characteristics that may influence the occurrence of the full collaborative innovation activity. Research currently being done focuses on creating an environment for creativity and how that environment will affect collaborative invention. The concept of the innovation environment, which was first put forth by GREMI, is currently not unified by the academic community. It is defined as the external environment in which various innovative subjects can collaborate with one another in the complex social relationship of enhancing the ability of technological innovation.

According to Campagna, the environment for innovation includes local production systems, the various players involved, and the impact of their industrial cultures. These factors interact with markets, cooperative efforts, or networks to produce a localized and dynamic process of learning together. According to Stored, the environment for innovation is made up of a variety of institutions and laws, and the external environment created by this combination plays a part in fostering both reciprocal collaboration and mutual learning. Jia Yanan defines the innovation environment in China as an external environment, such as the material and cultural environment, that can support the region's desire to acquire stronger development capabilities. This enables all innovative entities to more effectively develop in concert and create an external environment that is relatively stable. According to Huang Xiaoqing, the environment for innovation is based on the particular circumstances that exist in China right now, and the innovation topic is capable of overcoming the limitations imposed by the laws, institutions, and external environment that can coordinate the joint growth of diverse inventive subjects. The policy environment, which includes rules and regulations, the present management system, and the economic market and service environment, is what Cai Xiu ling refers to as the "innovation environment" and may promote innovative activities via rule support and institutional structure support.

By combining the pertinent literature, we can discover that the fundamentally agreed-upon definition of the innovation environment and the external environment required by each innovation participant can effectively play their roles and promote collaboration between the innovative subjects, which can provide critical support for the overall collaborative innovation. In order to better understand how the innovation environment and collaborative innovation performance interact, several academics have used various methodologies and performed a number of research at various levels. For instance, Zhao Fuming distinguished between two categories of innovation environments: market- and government-driven. The data of the innovation environment and innovation performance were returned to the panel after sorting and normalizing the pertinent scientific and technological statistics, and a series of evaluations and analyses were conducted on the relationship between the two in accordance with the various scenarios of the empirical results. Zhang Lijun built a regression model after examining the innovation environment, the state of innovation capabilities, and the effects of the innovation environment on innovation capabilities. The results showed that the market demand is currently the factor that has the greatest potential to influence regional innovation capabilities. The innovation environment has a significant impact on the innovation efficiency of high-tech enterprises, according to Zhou Xuedong, who measured innovation efficiency

using the Malmquist index method and then performed a regression analysis of it using panel data from the innovation environment over a four-year period. The findings of a geographic autocorrelation test on the innovation environment and innovation input conducted by Wang Peng using the Moran's I index approach revealed that metrics like loan balances of financial institutions had blatantly favorable impacts on the overall innovation efficiency. Wei Xinmin investigated how the innovation environment affects the success of high-tech businesses using interaction term models and panel data.

By collecting pertinent literature, we can observe that while researching the present state of the innovation environment, academics from various fields use various techniques to create pertinent index systems that correspond to their specific requirements. The "China Regional Innovation Capacity Report" is the most representative source for the assessment of collaborative innovation performance in the innovation environment, however the study does not explicitly specify the particular indicators at each level of the innovation environment. As shown in Figure 7, the majority of researchers now base their own levels of the innovation environment and particular indicators at each level on the information provided in the report on the building of the innovation environment mixed with the current state of affairs. Based on this, several assessment techniques were used to examine the link between the two. It is clear that proper indicators and methodologies must be chosen in order to undertake a number of evaluations of the effect of the innovation environment on the effectiveness of collaborative innovation [9], [10].

CONCLUSION

Families and companies interact and link in a complicated way in family firms, and they give equal weight to noneconomic and economic aims when innovating. This study looks at how family companies invest in innovation in a pluralistic setting by examining the effects of social emotional wealth and the innovation environment. The findings indicate that: The innovative environment of the area where the family firm is situated will also have an influence on the innovation investment of family companies. The impact of various dimensions of social emotional wealth on the innovation investment of family enterprises is diverse. The following suggestions for policy are made in this study in light of the findings of the research: In order to reduce the negative effects of social emotional wealth, family businesses in China should be aware of the dual effects that social emotional wealth has on their investment in innovation. They should also be aware that they cannot simply reduce the intensity of their innovation investment in order to preserve family control and family identity because doing so will have a negative impact on the family businesses' transformation and long-term development.

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CHAPTER 6

PUBLIC RESPONSES TO LOW-CARBON ENERGY: TECHNOLOGIES INFLUENCE THE UK ENERGY SYSTEM

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ABSTRACT:

There are many intricate ways in which people comprehend and interact with low-carbon energy technologies and the evolving energy system as a whole. Low-carbon energy technologies are not implemented in a social vacuum. However, in developing decarbonization routes to 2050, little consideration is given to the public's socio-environmental sensitivity to low-carbon energy technology and their reactions to energy installations. Resistance to specific resources and technologies based on specific socio-environmental sensitivities would change the portfolio of options available, which could shape the energy system's decarbonization process and affect the process's price and viability. In order to demonstrate how various socio-environmental sensitivities may affect the evolution of the energy system and the decarbonization route, this study offers a series of three simulated scenarios. The three possibilities are local protectionism, which limits systems to their current geographical footprint, risk aversion, which avoids the deployment of potentially dangerous large-scale technology, and environmental awareness, which prioritizes the conservation of natural resources. There are many potential solutions for each of the three sets of restrictions; some seem a little improbable, and all exhibit higher costs.

KEYWORDS:
Energy, Technologies, Nimby system, Nuclear, Power, Decarbonization.

INTRODUCTION

The UK government has become more conscious over the last ten years that energy system reform would be prompted by serious challenges like climate change and energy security. Deploying low carbon energy technology together with initiatives to decrease energy consumption are necessary to minimize the UK's contribution to global warming and provide a secure, resilient energy system. The academic and policy groups, however, have concentrated their efforts on creating and implementing technologies to accomplish decarbonization. In general, less focus has been placed on the effects of effectively voicing public concerns about low-carbon technology and how this would affect the evolution of the whole energy system. However, given public opposition to certain technologies will change the range of accessible possibilities, this is a crucial issue in determining the potential paths to decarbonization. In the Energy 2050 project, the UK Energy Research Centre projected potential futures for the UK energy system. It looked at how public acceptability, driven by certain socio-environmental sensitivities, may influence the use of particular resources and technologies, with repercussions for the whole energy system. In certain Energy 2050 scenarios, it was possible to change the paths to the UK energy system's decarbonization by accelerating the development of low-carbon energy supply technologies. These accelerated technological development scenarios,

however, do not take into account the possibility that public reactions might limit the adoption of energy supply technologies [1], [2]. These socio-environmental restrictions may influence the UK's energy system and potential decarbonization routes.

Research on the potential effects of public perceptions and actions on the energy system as a whole has just lately begun. There are studies that focus on specific technologies, such as biomass, carbon capture and storage, and nuclear power, but there aren't many that take a comprehensive approach as Carr-Cornish et al. did for Australia. While Poortinga et al. looked at lifestyle and motivational aspects that affect energy supply and demand, they did not completely examine how these elements affect the whole energy system. This research fills the information vacuum by investigating the potential influence of people's reactions to certain energy technologies on the UK energy system. Three separate simplified scenarios that highlight how a particular public concern or motive may express itself in the form of opposition to certain technologies and resources are used to explain socio-environmental sensitivity in this study. The three scenarios and are examples of the kinds of public reactions that may be seen given specific, simplified motives.

Based on case studies of specific developments and siting issues as well as existing research on public attitudes towards technology, the three option scenarios' motives are qualitatively defined. However, they do not accurately represent the nuanced nature of public opinion in the actual world. These reactions wouldn't be seen in isolation or remain constant over time as they do in these circumstances. The general public's perception is not necessarily a hindrance though; it may sometimes play a significant facilitating role. However, the scenarios provide a great chance to investigate how various public reactions can influence the potential routes towards the decarbonization of the energy system. Without taking into account the potential barriers to societal acceptability, the UK may experience unanticipated setbacks on its route to decarbonization since socio-environmental sensitivities may play a significant role in determining if, how, and how much it will cost to accomplish decarbonization. Therefore, further study is needed to better understand the possible effects on the energy system of socio-environmental sensitivity. Public sensitivity to innovative technology is shown by the discussion in Britain over the extraction of shale gas and the effects of demonstrations, which will at the very least cause delays and additional costs, but may even prohibit the development of the technology [3], [4].

The UK MARKAL model, a market allocation economic model that employs linear programming to represent change across 5-year time increments, was used to simulate the UK energy system in UKERC Energy 2050. It is referred to as "bottom-up" and contains comprehensive data on various energy platforms and sources, as well as a representation of the whole energy system, including the needs for energy services throughout the entire economy. UKERC Energy 2050 studies have employed the elastic demand version of the model, in which demands adjust to changes in supply price under hypothetical policy scenarios. In this model iteration, bigger demand decreases are caused by generally higher energy costs. However, the cost savings from lowering demand and using less fuel are offset by the cost of demand reduction as defined by because they result from forgoing the relevant energy services. Based on the value of the energy services relative to the cost of providing them, the model optimizes this balance. In other words, it maximizes the total surplus from producers and consumers. The publications written by Strachan and his colleagues include information about the UK version

of the model and its applications. Three variant scenarios were created using the low carbon scenario, one of the cores UKERC Energy 2050 scenarios, as a baseline scenario. These scenarios modelled different storylines about how people might react to and limit the deployment of important low carbon energy supply technologies and resources. The LC baseline scenario achieves 80% decarbonization by 2050 and is based on concrete and financed plans as of the Energy White Paper of 2007.

As a result, by 2050, all the alternative scenarios discussed in this research accomplish 80% decarbonization. The socio-environmental work's alternative possibilities are referred to as. The research on public views and reactions to energy technology, as well as case studies of specific developments and siting issues, have been interpreted to provide the basis for the qualitative definitions and plot of the scenarios. The circumstances must, however, be simplified. With a few exceptions where there are significant sectoral crossings, the scenarios mostly concentrate on the technology and resources of the electrical sector. Each scenario's plot was then converted into quantifiable effects on the deployment of certain technologies using existing research and expert input. The effects on the technologies discussed in this book are not intended to be exhaustive or "scientifically objective" assertions; rather, they represent a hypothesized picture of how the general population would react to the technology under certain circumstances.

Each scenario was then simulated using the new technology and resource restrictions in the energy system model. The model is used in this study as a tool to investigate the problem of socio-environmental limits, and the modelling findings are intended to show pertinent concerns for further investigation rather than to make predictions about the future. is a techno-economic perspective of the energy system that goes into great depth into the prices and availability of resources and technologies. The model, however, does not go into any depth about the social context in which the energy system is placed, such as, in this example, societal views and any limitations imposed by societal objections. In order to use the MARKAL model in a unique manner, these socio-environmental restrictions were represented in the model in this study. The ensuing modifications to the energy system are assessed in terms of the overall shift in the energy system's composition as well as the expenses of the energy system and decarbonization. Following that, a discursive analysis is done of the possible effects of rapid development of low carbon energy supply technologies on various socio-environmental situations [5], [6].

DISCUSSION

The NIMBY scenario is a narrative in which the general population protests specific energy initiatives when they believe the developments will directly harm their way of life and community. Visual intrusion, which has been identified in several research as a major factor in people's resistance, is the main direct influence taken into account in this scenario. As a result, in the NIMBY situation, individuals show considerable opposition to significant changes in their environment. Gee emphasizes that people's perceptions of their landscape play a role in influencing attitudes: the type of perception of the landscape that would play a key role in this scenario is that which acknowledges the recreational, spiritual, and aesthetic benefits that the landscape can provide. Devine-Wright has described this type of opposition "as a form of place-protective action, which arises when new developments disrupt pre-existing emotional attachments and threaten place-related identity processes. As a result, in NIMBY, a person's connection to their landscape serves as the main motivating factor for their objection to the

place-disruption they feel will result from a certain energy development. The deployment of visually intrusive technology is severely constrained in the NIMBY scenario based on this definition of NIMBY as a kind of place-protective activity with substantial concerns for the visual landscape. This applied to both newly developed technology and older ones with potential for significant aesthetic consequences. Therefore, if technology and infrastructure are already in place, new advances will often be welcomed. However, certain technologies will be restricted in areas where that kind of development is unknown and is met with opposition due to its aesthetic effect on the terrain.

In the NIMBY scenario, the word "people's landscape" refers to a person's whole physical environment, not just their immediate neighborhood. In this situation, a person's landscape is more widely defined to encompass sites to which that person has some form of relationship, contrary to studies that have indicated that proximity to a development is not necessarily directly connected with support or opposition. People may feel a connection to their own neighborhood as well as destinations like vacation sites, national parks, or other exceptional landscapes. Additionally, research indicates that a person's "backyard" or landscape may not even end at the shoreline and that sometimes individuals may regard offshore regions to be a part of their landscape. It should be noted that this project's definition of NIMBY differs significantly from the traditional and hotly debated definition of NIMBY, which is defined as "not in my backyard." This traditional definition sees the NIMBY objection as opposition to a project which is based on self-interest rather than opposition to a particular project based on technology. True NIMBYs, according to some, show support for a technology while simultaneously expressing free rider preferences. Numerous studies have claimed that this traditional definition of a NIMBY is incorrect and misleading since it obscures a broad variety of diverse motives and fails to represent people's genuine intentions. Additionally, several research have shown little to no support for the traditional self-interest definition of NIMBYism. It seems that the word "NIMBY" has evolved into a derisive one often used to downplay people's legitimate concerns. Despite controversy about the word in academic literature, NIMBY is nevertheless used as the moniker for this situation, in large part because it has solidified as a well-known phrase. However, the term NIMBY has been precisely defined above as a kind of place-protective activity based on adverse visual landscape effects in order to avoid the difficulties associated with it.

Impacts Quantification for the NIMBY Scenario:

The deployment of onshore wind power is constrained in the NIMBY scenario due to the visual effect of the turbines, which has been noted as a major factor in people's objections to certain wind farms. The NIMBY scenario presupposes that there would be such a significant backlash against onshore wind projects due to their aesthetic effect that none will be approved by the planning department. However, a few of the projects that have already begun construction or have gained planning approval are permitted to proceed. This restriction results in a maximum onshore wind power capacity of 8.9 GW being permitted in the MARKAL model. In the NIMBY scenario, public opposition to offshore wind farms is also possible due to their aesthetic effect. Visual effect is a major aspect affecting people's perceptions of wind farms, according to several studies. According to Hogget, the issue of aesthetic effect is not immediately resolved by just placing wind turbines offshore. As a result, projects in NIMBY are only permitted outside a 12 nautical mile buffer since there would be less public opposition

and the turbines would be less obvious. The available offshore wind power is estimated to be 80 GW using information from the Strategic Environmental Assessment Report of the Department of Energy and Climate Change [7], [8]. This served as the only restriction on offshore wind power in scenario. In the NIMBY scenario, the Severn tidal barrage is prohibited since it would have a detrimental direct effect on the neighborhood. Concerns have been raised about how the barrage would affect the terrain, including possible changes in the types of landscape, local senses of place identity and place connection, and historic ports. In the NIMBY scenario, nuclear power facilities cannot be built in new areas.

However, in places near already-existing nuclear power plants, it is considered that the plant is already a part of the environment and community; in this case, the local population would likely be open to accepting more nuclear power. Studies have shown a greater level of support for expanding nuclear power among those who live close to such plants, but potentially a temporary acceptance with an ebb and flow of worries. In the NIMBY scenario, existing nuclear power plants are permitted to be rebuilt at the end of their lifetimes and, in some cases, expanded, despite a general "reluctant acceptance" of nuclear power to help combat climate change. This scenario provides for up to 30.4 GW of nuclear electricity, based on the assumption that additional 1600 MW EPR reactors would be constructed on current commercial nuclear power facilities. In the NIMBY scenario, public opposition to the immediate landscape effect of new power plants, capture plants, and accompanying infrastructure like pipelines and storage facilities limits coal carbon capture and storage. As a result, only a small number of current coastal power plant locations or other large current industrial sites are permitted to use coal CCS. CCS technology seems to be poorly understood by the general public and is new to the majority of people. Only a few studies have looked at how people feel about CCS, and they found some opposition to CCS storage and pipelines. According to a different research, attitudes may vary based on the planned form of storage, as well as the environment in which the technology is taken into account. This is understood to imply that CCS would be restricted in a NIMBY situation. However, a few coastal locations would presumably be exempt from NIMBY complaints. So around seven locations were deemed acceptable for the NIMBY situation. According to this estimate, 10.5 GW of built coal CCS capacity would be possible.

In the NIMBY scenario, there would be less bioenergy because of people's objections to big tracts of land being converted to agricultural usage for bioenergy. Bioenergy refers to the use of biomass for the generation of heat and electricity as well as biofuels for transportation. Large-scale land conversion for biomass production for bioenergy would clearly change the nature of the landscape and raise NIMBY issues. Divergent land use interests, according to Heiskanen et al. are one of the main disputes that may be seen in case studies of the public's adoption of bioenergy. Therefore, a geographical mapping technique study was conducted to ascertain what proportion of UK productivity may be accessible or permissible for the production of bioenergy in the event of a NIMBY scenario. According to this research, just 37% of the UK's output would be permitted to be grown for conventional crops for energy usage under strict NIMBY restrictions. Furthermore, second-generation, specialized energy crops like Miscanthus and willow which are uncommon and have a very distinct appearance from conventional crops in the landscape were found to be undesirable under NIMBY circumstances, and none were permitted in the NIMBY scenario. In order to provide energy, only first-generation, traditional crops are permitted.

Ecological Case Definition:

According to the public's view of harmful effects on the environment and ecosystem services, the ECO scenario indicates popular opposition to certain technologies and resources. Low carbon technologies are justified in the ECO scenario on more than just the basis of reduced carbon emissions; other environmental effects are also given weight. According to certain studies of energy projects, such as Firestone and Kempton's examination of the Cape Wind offshore wind project in the United States, the public's opposition to energy projects are primarily motivated by a concern about potential environmental harm. This illustrates a "green on green" conflict of environmental ideals between the preservation of the environment via the use of low-carbon energy technology and the potential harm to other environmental factors brought on by the use of those low-carbon technologies. The use of certain technologies is complicated due to this conflict between various environmental ideals.

This scenario seeks to portray resistance to important ecological consequences as seen by the general people, hence the precise impacts mentioned may sometimes differ from an expert's perspective. These public impressions are influenced by the impact's overall level of knowledge as well as media coverage, prominent scientists and NGOs, friends and family, and other factors. Based on the perceived competency and motivation of the important players in an energy development, the public might be regarded to have varying degrees of confidence in them. The public's perception of the project's environmental effect should be influenced by the various degrees of trust, understanding, and media coverage. The public opposes several planned onshore wind farms in the ECO scenario because they are worried about how the project would affect bird and bat mortality as well as how it will affect the terrain surrounding the turbines. Even if a person does not express their overall stance towards wind power, studies have shown that worries for birds may directly affect their choice to oppose to a particular wind project. However, not all wind farms are considered to be environmentally dangerous.

Onshore wind power development is not completely prohibited in the ECO scenario; rather, a portion of projects are predicted to be fiercely fought on environmental grounds and fail to get the required planning permission. Based on 25% of the total 20 GW resource available in the MARKAL model being rejected by ECO concerns, this restriction was converted into a total capacity limit of up to 15 GW of onshore wind that would be permitted in the UK under the ECO scenario. In the ECO scenario, it is also predicted that public worries about the possible ecological damage would moderately restrain offshore wind production. However, given that early research reveals decreased biological consequences further offshore, these worries are expected to be smaller for offshore wind farms that are situated there. under order to reduce possible ecological repercussions on, for example, bird life, offshore wind development is only permitted under the ECO scenario outside a coastline buffer of 12 nautical miles. The limit on the installed capacity of offshore wind in MARKAL was based on DECC's estimate that there is 80 GW of offshore wind power available beyond 12 nautical miles.

Uncertainty exists on how the general public perceives the effects of wave and tidal power on the environment. Marine energy gadgets are not well-known to the general population. Additionally, since demonstration projects are not usually required to do an environmental impact assessment, there hasn't been any definitive study on the devices' effects on the environment. However, the possible ecological effects of wave and tidal devices are beginning to get greater attention. For the purposes of the ECO scenario, it is expected that more study

will lead to the identification of certain detrimental ecological effects, such as harm to marine ecosystem brought on by operational characteristics or fluid leaks. As a result, in the ECO scenario, the general public protests the construction of certain vulnerable locations as well as specific wave and tidal devices. For the purposes of this exercise, it is assumed that 25% of the wave and tidal resource cannot be developed owing to ecological issues. The public's worry that the Severn tidal barrage would harm the environment would prevent its implementation in the ECO scenario. The public in this scenario is presumptively expected to agree with a coalition of well-known organization that opposes the barrage as an environmental error, including the National Trust, RSPB, and WWF. Public resistance to the Severn barrage will also be influenced by reports from bodies like the Sustainable Development Commission that determined that there may be a major effect on the environment if the barrage went through. As a result, the Severn barrage is prohibited in ECO. In the ECO scenario, the sustainability benefits of imported biomass and biofuels are a major source of public concern.

The general public has heard headlines about the destruction of rainforests, the high carbon intensity of particular crops, and scientific studies that cast doubt on the sustainability of biofuels since this has become a hot subject in the media. Public views of bioenergy are influenced by this coverage. In this case, the public believes that native crops can handle sustainability challenges, but they lack confidence in the sustainability of imported crops. Only limited parts of the UK would be accessible for the production of bioenergy in order to control the sustainability of crops for domestic consumption. Only 11% of UK production, according to a geographical mapping study utilizing Joint Character Areas, might be used. Due to popular concerns, imported biomass and biofuels are totally outlawed in the ECO scenario. The resource accessible in the model is constrained by the high degree of detail in the MARKAL model, which includes the difference between domestic and imported biomass. In the ECO scenario, the public also believes that transport biofuels have the potential to harm the environment more than they benefit it, hence neither local nor imported transport biofuels are permitted in the UK. The availability of fossil fuels is the last restriction imposed by the ECO scenario. Because of ECO concerns, certain environmentally sensitive areas would not be allowed to be exploited and particularly environmentally damaging methods of extraction, like fracking for shale gas, would also not be allowed. As a result, global fossil fuel prices are assumed to be much higher in the ECO scenario than they are in the low-carbon core scenario. As a result, the price of fossil fuels is significantly raised under the ECO scenario. Open cast coal mining is not permitted in the UK because it is too destructive and detrimental to the environment. The DREAD scenario is built on the idea of a dread reaction, in which people think that a certain technology has some unknown, unavoidable, and perhaps disastrous hazards. As a result, in the DREAD scenario, the public absolutely rejects some technologies because they believe that they represent a major danger to human health.

Instead of using mortality numbers or other quantitative measurements of danger, this scenario's potential harm to human health is determined by how individuals perceive the hazards. Based on elements including voluntariness, fear, knowledge, controllability, and advantages, risk perception is determined. For instance, there is a larger dread of nuclear catastrophes despite the reality that more people die in vehicle accidents than in nuclear accidents. This is largely because people perceive a nuclear accident's risk very differently from how they perceive the risk of a car accident. People perceive a car accident's risk as less catastrophic, and they see a more obvious benefit from driving a car that outweighs the risks.

However, the public may be less prepared to tolerate a high level of perceived risk for low levels of perceived advantages with nuclear power since the benefits might be less clear-cut. Deployments of technologies that would lead the public to react with DREAD are therefore entirely forbidden in this scenario since widespread resistance to such technologies would prevent the approval of any new projects. This scenario just tries to illustrate a very risk-averse environment without passing judgement on whether the public's worries are legitimate or not. In the DREAD scenario, apprehension about potentially disastrous outcomes causes people to utterly reject further nuclear power technologies. In this scenario, it is presumable that past nuclear disasters like Windscale, Three Mile Island, Chernobyl, and Fukushima continue to have a significant impact on society and people's perceptions of the nuclear danger. In the DREAD scenario, people continue to express widespread worry about the possibility of nuclear accidents and storage safety despite assertions that future nuclear power stations would be safer.

Nuclear reactor accidents, radioactive waste, and other related radioactive dangers are categorized as highly feared threats in the psychometric framework. According to Hinman et al. the public is also very worried about the possibility of catastrophic accidents and the storage of waste. More recently, a poll by Corner et al. revealed that only a minority of individuals had shown complete approval of nuclear power, and the general public was still split on the issue. According to Plumadore et althea Fukushima tragedy significantly raised public safety concerns and led several countries to halt nuclear development. In order to prevent the construction of new nuclear power plants, the public opposes any new nuclear projects in DREAD. Existing nuclear power stations keep running until they reach the end of their useful lives; lifespan extensions are not granted. Although it is highly unknown, public acceptability of coal CCS technology might prove to be a significant obstacle to their adoption. According to certain research, individuals may reject to CCS technology because of concern about the impact the technology would have on human health. The psychometric theory of public risk perception is used by Singleton et al. to assess how the general public perceives the danger associated with the geologic storage of carbon dioxide for CCS. According to Singletons et al.'s rankings, geologic storage of carbon is more feared than conventional fossil fuels but less feared than nuclear accidents, despite the fact that CCS with geologic storage is a relatively new technology.

As a result, in the DREAD scenario, it is predicted that the public would respond negatively to CCS, which will prevent any CCS power plants from being built in the UK. The DREAD scenario assumes that the public would react negatively to hydrogen and fuel cell technologies, absolutely forbidding any deployments. Regarding the public's awareness and perception of hydrogen and fuel cell technology, there is a knowledge gap. There are, nevertheless, certain widely held misconceptions regarding the risks associated with hydrogen. For instance, the image of the Hindenburg tragedy endures despite evidence to the contrary. This is an illustration of how strongly media coverage may influence public opinions and how significant historical precedent can be. Speaking clearly to the fear factor is rhetoric about the risks of hydrogen, such as that found in Shinar, which implies that terrorists may turn a hydrogen fuel cell automobile into a weapon. Public fear of hydrogen technology would rise as a result of this advertising and hyperbole, which would probably have a negative impact on public adoption. Therefore, the dangers of hydrogen fuel cell technologies are seen as being highly unknown and possibly catastrophic under the highly risk-averse DREAD scenario. Deployments of

hydrogen and fuel cells are thus not permitted under the DREAD scenario. Each of the scenarios employs a different strategy to continue meeting the energy system requirements at the lowest possible cost when modelled with the additional socio-environmental constraints on technologies and resources, as described in the previous section. The distribution of sectoral emissions, the choice and shifting of technologies, and the decrease of demand are the three main aspects of these plans that may be compared.

The distribution of sectors CO2 emissions reveals the first crucial aspect of the various techniques used in the scenario. Regarding the sequence and pace of decarbonization of the various sectors which is also referred to as the decarbonization pathway the three scenarios each adopt a different strategy to decarbonizing the energy system. Regarding which energy system sectors such as transportation, industry, etc. bear the greatest burdens of decarbonization, the scenarios use various approaches. It is important to note that all three variants decarbonize electricity more aggressively than the core scenario on which they are based because of the constraints imposed by different sectors. All scenarios initially start with decarbonization in the electricity sector, but they do so to varying degrees. The sectoral distribution of CO2 emissions by 2050 varies significantly amongst the scenarios, with the ECO and DREAD scenarios deviating the most from the core LC scenario. For instance, in ECO, the extra restrictions like rising fossil fuel prices and the ban on transport biofuels make decarbonizing the transport sector more difficult and expensive. Due to the continued use of diesel and petrol in the transport sector, which results in high levels of transport emissions, the system chooses to make greater emissions reductions in other sectors, where there are lower cost decarbonization options available [9], [10].

CONCLUSION

These socio-environmental scenarios show how prospective socio-environmental sensitivities and public acceptance of technology may affect various routes to decarbonization and the overall energy system. Although the scenarios examined in this paper cannot completely capture the intricacies of the actual world and are not intended to be predictions, they do provide helpful insight into the many effect types that might potentially have on the energy system. The scenarios show that socio-environmental sensitivity might have a big impact on how decarbonization could be accomplished and how much it would cost. Given a probable socio-environmentally limited energy system, accelerating the development of a range of low carbon energy technologies may be a significant method to increase the likelihood of attaining the decarbonization objectives. Having a variety of choices might assist guarantee that there are some acceptable solutions to accomplish decarbonization since it is impossible to foresee how society will react to low carbon energy technology and the changing energy system.

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CHAPTER 7

MEASUREMENT AND EVALUATION OF HIGH-QUALITY ECONOMIC DEVELOPMENT

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ABSTRACT:

This article develops a thorough assessment index system based on four factors: people's lives, green development, innovation efficiency, and economic vitality. Clarify the variations in the high-quality development levels of the 25 counties and cities in the economic zone using the entropy method, and study the spatial agglomeration and dispersion and spatial convergence of regional urban competitiveness using spatial econometric analysis methods. The findings indicate The Huaibei River Eco-Economic Zone's overall high-quality development level is not high, and its overall time and space characteristics are high in the east and low in the west Urban competitiveness and the Huaibei River's spatial distribution exhibit positive spatial autonomy, and this is relevant to the fact that the degree of closeness of spatial associations between cities is generally low; and The gap between Jiangsu Province's and the nation's levels of urban competitiveness is wide. Last but not least, in order to encourage the Huaibei Economic Zone's high-quality growth, we must adhere to the basin's law, the features of spatial distribution, and use focused tactics.

KEYWORDS:
Agglomeration, Communist, Economic Zone, Sustainable.

INTRODUCTION

The Communist Party of China 's report noted that China's economy has transitioned from a high-speed growth stage to a high-quality development stage, and that achieving high-quality development is not only necessary given the country's current conditions but also the way to better and faster economic growth in the future. Following the Yangtze River Delta, the Pearl River Delta, and the Bohai Sea as China's fourth economic growth pole, the Huaibei River ecological economic belt is destined to be a crucial region for China to achieve high-quality economic development. The Development Plan for the Huaibei River Ecological Economic Belt was released in 2018 by the CPC Central Committee and the State Council, and it outlined the implementation strategy for the provinces of Anhui, Jiangsu, Shandong, Henan, and Hubei to achieve better and quicker economic growth. Urban development is a key component of local, regional, and even national economic growth as well as a key driver of social advancement. Enhancing urban competitiveness is a key strategy for fostering regional growth.

Urban competitiveness refers to a city's present and projected capacity to foster regional and national wealth creation in comparison to other cities. It is also the capacity of a metropolis to maximize the distribution of resources for its own growth in its dependent areas. Urban competitiveness is the capacity of the urban system to exhibit internal stability, sustainable development, external attractiveness, and radiation. And it is cities' capacity to assert their own advantages and foster favorable internal and external environments that allows them to collect,

disperse, and make use of a variety of resource components. The integrated development plan at the national and regional levels has steadily improved, and regional competitiveness with the center city as the primary engine has intensified [1], [2]. Utilize resources wisely, including transportation, platforms, systems, talent pools, and other assets, so that the central city can effectively drive the core of regional innovation and development, set the course for regional reform and development, gather resources from across the region, and move lines, all while accelerating regional high-quality development through the creation of high-energy central cities. In order to achieve the high-quality economic development of five provinces, it is therefore of great theoretical significance to use the urban agglomeration of the Huaibei River ecological economic belt as the research object, understand what high-quality development means, and build a systematic, comprehensive, and logical evaluation system of high-quality development. There isn't yet a defined assessment method for high-quality development measurement with a reference value in either the nation or the area.

Foreign researchers focus on the quality of economic development's mechanism and the paucity of in-depth studies on the index system based on the state of research today. The majority of domestic researchers focus on the flaws and inconsistencies of high-quality development as well as the meaning and framework of economic growth, which is unreliable and somewhat constrained. Effectively assessing the degree of high-quality development is challenging. This paper establishes an evaluation system of high-quality development of economic belt covering four aspects: economic vitality, innovation efficiency, green development, and people's lives. It does this by analyzing the connotation of high quality and combining it with the characteristics of urban agglomeration in Huaibei River ecological economic belt. The weight coefficient and comprehensive scores of urban agglomerations in the Huaibei River ecological economic region are calculated using the objective entropy technique from 2005 to 2018, and a multidimensional dynamic assessment analysis is conducted. The competitiveness of the internal urban agglomeration in the Huaibei River eco-economic belt should function as a cohesive whole in order to achieve high-quality economic development. Therefore, the spatial correlation approach is used to experimentally analyses the geographical convergence of urban competitiveness, while the convergence method is used to analyses the spatial agglomeration and dispersion features of regional urban competitiveness [3], [4]. Finally, based on the findings of the investigation, it offers helpful recommendations for government agencies to develop relevant policies.

Foreign researchers were involved in the study of urban competitiveness early, and a lot of research findings have come to light. Urban competitiveness is defined by academics in terms of market share, labor productivity, and the functions of production and consumption. Lever and Turok believed that a city's competitiveness refers to the ability of a city to provide products and services and meet the needs of regional, national, and international markets, while increasing actual income levels, improving the quality of life of citizens, and promoting the city's capacity for sustainable development. Malecki assimilated the principles above, produced jobs, attracted local and international investment, skilled migration, and the capacity to produce enough revenue as the implication of urban competitiveness. According to Turok, the relative position of businesses in an area in the external market, internal resources, and resource utilization are the three components of urban competitiveness. Iyer et al. highlighted that both are vying for market share through contrasting urban and national competitiveness. According to research by Gundersen et al. into the intricate link between corporate positioning,

transportation networks, and urban competitiveness, labor, land, money, management, and technical skills are the primary drivers of urban competitiveness and appeal. Urban competition has recently been researched by Chinese academics. Urban competitiveness, according to Ning and Tang et al., is the formation and preservation of urban competitiveness under the combined influence of several elements, including society, economic structure, values, culture, and institutional policies. When resources are distributed throughout a city's subordinate broad regions as efficiently as possible, the city's economy grows steadily. According to Ni , a city must have a larger capacity to compete for, own, manage, and transform resources and markets, increase resident welfare, and produce value if it has more advantages in competitiveness and development compared to other cities.

Foreign academics have provided insightful analyses of the mechanisms behind economic development quality as well. Economics has studied economic development using a variety of models, including the classical growth model, the neoclassical growth model, and the endogenous growth model. The transition from factor input to the study of total factor productivity and innovation, which is the first stage of sustainable economic development, represents. The analysis of the quality of economic growth has replaced the study of economic growth's quantity. According to Krugman, factor inputs are the primary determinant of East Asia's economic growth, and overall factor productivity has little bearing on this region's economic develop. Higher-quality development for developing nations is growth that is more consistently socially responsible. A scale performance, structure, and coordination assessment system for economic development is built by Qi. Domestic scholar Li was of the opinion that, based on the associated ideas of classic development economics, economic development encompasses not only the rate and effectiveness of economic growth, but also the coordination between economic structure and social structure.

From the four elements of economic development structure, stability, accomplishment distribution, and ecological environment, Chao et al. created an economic growth quality index. There aren't many international publications pertaining to the creation of an indicator system for high-quality economic growth [5], [6]. Li develops a framework for measuring a city's competitiveness from the standpoint of an examination of the competitiveness of urban agglomerations, and he classifies cities into competitive endogenous competition. In order to analyze the competition chain network model of large-scale urban agglomerations in the Bay Area, obtain sources of competitiveness in cities, and provide solutions to increase urban competitiveness, the two issues of power and exogenous competitiveness are examined. Urban competitiveness is more often employed in China to gauge the level of economic growth. Among these, Liu and Li investigated 30 cities in China for 22 years while building urban competitiveness indicators from GDP, GDP per capita, and GDP growth rate. Tian and Fang have relatively complete measurement from the six indicators of economic agglomeration, spatial radiation, opening to the outside world, cultural innovation, social services, and ecological protection. The scope of this indicator is relatively limited due to the dynamic changes in urban competitiveness.

Urban competitiveness indicators have been progressively developed in order to increase the competitiveness of the core cities in the Han River Basin, but the dynamic consequences of this development have not been taken into account; He is a relatively new measure of urban competitiveness from an ecological perspective, which is not necessarily applicable. Yang and

Li outlined the transformation of urban competitiveness into urban sustainable competitiveness indicators, introducing spatial networks, and spillover effects have not been empirically tested. Li explained that, from the perspective of five in one," the level of urban development has been constructed more thoroughly, and the calculation panel is shorter, in the most recent research on urban competitiveness. Liu and Song measured urban competitiveness based on economics and people's livelihood but lacked ecological measurement.

DISCUSSION

Scholars have developed a number of models for the empirical study and methodologies of regional economic development quality, including the "maze," "pyramid," "bowstring arrow," steering wheel, "urban value chain," and "flywheel." Using Porter's diamond model in practise, Rogerson came to the conclusion that corporate development plans, the growth of urban core industries, and urban development variables would all have an impact on the level of urban competitiveness. Singhal et al. used a hierarchical model to assess the competitiveness of a number of UK cities, starting with the characteristics of the circular economy and, in particular, the strategy for enhancing cities' competitiveness from the standpoint of business development. They also made recommendations for enhancing cities' competitiveness. Using the fuzzy DEMATEL approach, Jamali et al. quantitatively assessed the causal model for accurate evaluation of urban competitiveness. In his study of the elements influencing urban competitiveness, Begg emphasized the link between input and output as a basis for measuring urban competitiveness. By examining the connection between urban competitiveness and urban economy, Kresl investigates the function of economy in the growth of urban competitiveness. Gardiner et al. investigated the connection between urban competitiveness and economic development using empirical research techniques on European cities. In their assessment of local and international literature, Esmaeilpoorarabi et al. looked at topics including the symbiotic link between quality of life and urban competitiveness and the function of soft measures to promote it.

Based on urban structural capital, Matos et al. decide how to increase the competitiveness and sustainability of cities. In order to understand the connection between financial services and urban competitiveness, O'Neill et al. examined the expansion of financial and business services in Australia's economic history. Effective measurement and evaluation of the high-quality growth of the Huaibei River economic belt is especially crucial since it plays a significant role in encouraging the high-quality development of China's economy. Only a little portion of international literature now exists that examines the Huaibei economic belt. Song and Xie et al. found that the city's economic growth boosted competitiveness and the geographical distribution was not balanced by using dynamic factor analysis to examine the panel data of the Huaibei economic belt towns. It has been further researched in domestic literature. Mao et al. used the theory of industrial coordinated development to empirically investigate the modernization process of the Huaibei economic belt and made recommendations for the coordination development of liaison mechanisms based on their analysis of the low level of regional development.

Urban agglomerations in the Huaibei River economic area have their ecological and economic development assessed by Ma and Peng et al. The paper made the suggestion that we should strengthen reform and innovation, speed up the transformation of the economic development model, and promote the coordinated development mechanism of economy and ecological

civilization based on an analysis of the uneven development of the real economy in each province. According to Ren and Liu et al., the development and use of water resources are necessary for the high-quality development of the Huaihe River economic area. They calculated and analyzed the temporal and spatial differences in the rate and efficiency of agricultural green water resources utilization in various cities, looked at the impact mechanism, and provided decision support for the coordinated development of water resources in the Huaibei River economic belt, using regional agriculture as the research object. Zhou et al. examined the influencing elements from the geographical and temporal dimensions and came to the conclusion that increasing the efficiency of the green economy is the key to the green growth of the Yangtze River economic belt.

Using the three-stage DEA model, Ren et al. assessed the ecological efficiency of the Huaibei River economic belt and, on the basis of their findings, proposed some policy recommendations to reduce the regional ecological efficiency gap development from the viewpoints of industrial transformation, regional coordinated development, and culture and education. When the Huaibei River Ecological Economic Zone's overall economic strength is poor, Sun and Yi et al. recommend changing regional development momentum and changing regional development structure to achieve high-quality development [7], [8]. The aforementioned study contributes to the theory and practice of Huaibei River economic belt high-quality development and successfully encourages this growth. In order to measure and evaluate the high-quality development of the Huaibei River economic belt and to quantitatively comprehend the development situation of the Huaibei River economic belt, a systematic measurement and evaluation system for the Huaibei River economic belt has yet to be established. Therefore, in order to appropriately assess the high-quality growth of the Huaibei River economic belt, which has significant theoretical and practical implications, a systematic assessment mechanism for this development must be established. This work scientifically develops an index system for evaluating high-quality development from the standpoint of statistical measurement based on an understanding of the meaning of high-quality development, which primarily reflects the following elements.

The global industrial value chain's proportion of "two ends" must reach a high level in order to achieve high-quality development; coordinated development of various proportional relationships means that the three major industries have a good structure, the proportion of investment, export, and consumption is high, and the GDP, which represents output level, maintains stable growth. In order to achieve high-quality development, it is required to increase production while using less resources and to increase wealth while using fewer resources. Innovation in science and technology is what encourages high-quality development. We can optimize industrial structure, increase input-output efficiency, expand the function of different productivity determinants, and significantly increase the overall benefit and efficiency of economic growth via scientific and technical innovation. Protecting the ecological environment should be seen as one of the main goals of high-quality development in order to accomplish it. An essential benchmark for assessing the efficacy of high-quality development is the ecological environment. In many ways, the impact of high-quality development is indissociable from the natural environment. Protecting the ecological environment is a powerful tool for encouraging high-quality growth. Numerous real-world examples demonstrate that if economic growth prioritizes ecological environment development from the start, it will significantly improve and advance in terms of structure, effectiveness, and benefit.

High-quality development seeks to fulfil people's desire for a better life. The realization of the wealth of all people should be our ultimate objective if we are to achieve high-quality development. Serving the people with all one's heart is the Communist Party of China's guiding principle. The primary conflict in China right now is between the population's growing desire for a better living and the country's imbalanced and insufficient growth. In addition, there are certain issues with livelihood in our society, such as uneven urban and rural growth, issues with income distribution, and trouble finding a doctor. To improve people's quality of life and satisfy their increasing demands for a better existence, high-quality development should be represented in the action guide. Construction of the Huaibei River Eco-Economic Belt's High-Quality Development Index System In addition to comprehending the fundamental meaning of high-quality development, we need take into account the traits and needs of the Huaibei River ecological economic belt itself in order to assess the Huaibei River economic belt's high-quality development. The state mandates that the Huaibei River ecological economic belt be constructed with the following goals in mind: green development, improvement of the Huaibei River Ecological basin's ecological environment, promotion of regional coordinated development, promotion of economic development quality change, efficiency change, dynamic change, improvement of people's living conditions, and construction of a lovely, livable, harmonious, and orderly ecological economic belt. In order to evaluate the Yangtze River economic belt's progress, a high-quality system is created in this study. It consists of 28 indicators that are divided into five categories: open collaboration, green development, high economic quality, and capacity to innovate.

Economic vitality index: The assessment of the quality of economic development should take into account not only the indicators that can reflect the level of economic development, such as GDP and per capita GDP, but also those that can reflect the quality of economic operation, the level of regional economic activity and the country's capacity to open up to the outside world, the ratio of fiscal revenue to GDP, the country's reliance on foreign trade, and the proportion of actuarial assets to GDP. Innovation efficiency index: As the primary driver behind development, innovation is intimately correlated with a region's input and output. We choose the percentage of scientific and technological expenditure, the number of patent applications per 10000 people, and the index of improving industrial structure for specific performance in scientific and technological innovation as well as the use of scientific and technological innovation to achieve industrial optimization and efficiency improvement. Green development index: The Huaibei River economic belt aspires to "green development" via high-quality growth. Therefore, to indicate green development, the rates of centralized sewage treatment, complete industrial solid waste utilization, and built-up area green covering are chosen. The standard of life for individuals is a contentious topic in Chinese culture. The foundational necessity of the scientific perspective on development is the sharing of development successes by the populace. It is also the fundamental means through which the Chinese people may attain prosperity for everyone.

As a result, the social instability index, the disparity between urban and rural residents' disposable income, the urbanization rate, the urban registered unemployment rate, the proportion of cultural, educational, and health expenditure, the number of health technical staff per 1000 people, and the number of beds in healthcare facilities per 1000 people were chosen. Inverse indicators include the social instability index, the disparity between urban and rural people' discretionary income, and the registered unemployment rate.

This work choosed 25 cities under the jurisdiction of Huaibei ecological economic belt as the basic research unit, closely coordinating with the development plan of Huaibei ecological economic belt, in accordance with the new development concept and high-quality development requirements, as well as the five in one overall layout, and drawing on the high-quality development evaluation index system constructed by Li et al. Data are gathered from 2005 to 2018. The China Urban Statistical Yearbook, as well as the calendar yearbooks for different provinces and cities, the statistical yearbook, and the statistical bulletin for each city, serve as the primary sources for all of the data. On the basis of the information in the statistical yearbook, certain index values are sorted out and computed. This article analyses the high-quality growth of cities in the Huaibei ecological economic belt from the four assessment viewpoints of economic vitality, innovation efficiency, green development, and people's lives [9], [10].

CONCLUSION

This study develops an assessment index system for the Huaibei River ecological economic belt's urban competitiveness, calculates the final evaluation value, and assesses the real condition. Finally, it makes pertinent recommendations by examining the possible link between urban competitiveness and economic development as well as the geographical connection of regional economic growth. The comprehensive score of the entropy method reveals that Yangzhou and Taizhou City were ranked in the top two in terms of urban competitiveness in recent years, but they have somewhat declined in 2018. This has been attributed to the influence of the economic situation radiation of Jiangsu from the south of Jiangsu Province to the middle of Jiangsu Province and then to the north of Jiangsu Province from 2005 to 2017. Since Jiangsu Province and other provinces play a significant role in economic radiation and other provinces and cities should also be encouraged to develop economically, we should give full play to the role of Jiangsu Province and other provinces in this regard.

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CHAPTER 8

RESOURCE-BASED ECONOMIC TRANSFORMATION WITH SYNERGISTIC ECONOMIC AND ENVIRONMENTAL HEALTH

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ABSTRACT:

The resource-based economy has seen fast growth by relying on the benefits of its input elements. However, a number of inconsistencies have significantly decreased the competitiveness of the resource-based economy as a result of the worldwide focus on scientific progress. The majority of resource-based economies have started to execute transformation, either actively or passively, as a result of a new cycle of changes in the global economic pattern and the adjustment of China's growth plan. The planned economy, which made significant contributions to national building and achieved outstanding results in regional economic and social development, is when the resource-based economy was primarily formed and developed. Natural resource development, however, constantly passes through growth, maturity, and decline phases. As a result, resource-based communities likewise have issues with growth, prosperity, and decay.

KEYWORDS:

Demonstrate, Economy, Inconsistencies, Regional Sustainability.

INTRODUCTION

Resource-based economies have signific, antsy aided in the growth of the national economy in my country since they are the main source of key raw materials and basic energy. A major issue that needs to be resolved in the development of the new resource-based economy is how to prevent mistakes from happening again, create high-efficiency industries based on resource advantages, scientifically demonstrate, optimize, and adjust economic development from the source of decision making, and protect economic ecology and the environment while developing the economy. The backcountry, which is mostly made up of tiny, outdated, and underdeveloped regions, is where resource-based economies are primarily built. My nation is a very unusual resource-rich nation in the globe, with a broad range of resources, among which coal, iron, oil, and other resources are mined on a very big scale, playing a significant role in the establishment and development of their respective resource-based economies. The growth of the resource development base has drawn a lot of attention since the founding of New China because of the substantial need for energy and raw materials in the creation of the national economy. These regions now have a lot of job prospects because to the growth of the resource-based economy, which has also sped up the economization process.

The high concentration and extensive growth of resource-based businesses have significantly altered the economic and social structure of the regions around them and accelerated the growth of the regional economy. A global problem is the change of the resource-based economy. owing to the exploitation of natural resources, this sort of economy grows or develops, and

owing to the decrease and depletion of natural resources, it also stagnates or even falls. Regional sustainability is the foundation for the viability of sustainable development [1], [2]. The national economic and social growth of China is significantly influenced by the resource-based economy. The growth of resource-based economies has more challenges than those of other economies due to the nonrenewable nature of natural resources. Currently, my nation is undergoing significant economic change and progress. It is essential to use the idea of green and ecological initiatives to influence economic growth, with the end objective of creating an environmentally civilized society. We cannot create an ecological civilization unless the economic development paradigm is properly altered. This tactical objective has been accomplished. In general, the environmental scheduling issue involves analyzing and applying the constraint model of power scheduling to optimize the economic minimization of resource scheduling as a single aim.

However, the nonconvex Pareto optimum issue is intractable using these techniques. The multi-objective environmental and economic scheduling issue has now been used to the multi-objective optimization method that concurrently processes two or more goals in parallel. The fundamental goal of creating a society that values conservation is to conserve resources in all facets of production, circulation, consumption, and other fields. To do this, we must adopt a variety of strategies, including technology and management, strict conservation, ongoing improvement of resource utilization efficiency, and as much as possible reduction in resource consumption and environmental costs. There is a need for a development paradigm that can accommodate people's expanding material and cultural requirements. A society that values the environment promotes the peaceful coexistence of humans and nature. The relevant study mostly uses economic geography as a research tool, with relatively little use of management theory or economic analytical techniques. It is necessary to enhance the normative theoretical research since the research methodology is relatively straightforward. Additionally, the resource-based economy is excessively reliant on these businesses and has a close association with them.

Based on the fundamental theory of sustainable development and the actual development of the resource-based economy, this paper will examine the unique issues and unique laws in the sustainable development of the resource-based economy, as well as the theory and method of sustainable development of the resource-based economy and the primary implementation strategies. It will provide theoretic underpinnings and practical recommendations for decision-making for the resource-based economy of my nation from the perspective of sustainable development. However, the prior study did not carry out a thorough optimization analysis on the coordinated growth of resource-based economy and environment in the transition of resource-based economy based on adaptive space division. However, it is crucial to resolve or enhance the issue or process of integrated resource-based economy, environment, and economic development in order to change the resource-based economy. The following innovations are therefore suggested in this paper: The intensive-green-chain network development mode is a new style of industrial growth for resource-based economies. This paper studies the connotation and characteristics of transformation based on the theory of sustainable development, analyses the viability of transformation and the theoretical conditions of sustainable development, and designs a dynamic development model on this basis. This paper is based on the analysis of the coordinated development of resources, environment, and economy in resource-based economy transformation. Because the adaptive space division

solves the issue of different subspaces in the multi-objective optimization problem, this paper conducts a multi-objective analysis on the coordinated development of resources, environment, and economy in the resource-based economy transformation. It may be separated into a large number of subspaces in the experimental analysis, and a number of significant theories, including the panel data model algorithm, are provided in the algorithm to achieve a comparison of these algorithms in detection [3], [4].

Feng et al. first analyzed the relationship between "two oriented" social construction and intensive and friendly use of construction land, clarified the connotation of saving and friendly use of construction land, and then created the evaluation index system of intensive and friendly use of construction land in order to increase the level of intensive and friendly use of the construction land in the Chang Zhu Tan area and realize the sustainable use of land resources. In the Chang Zhu Tan region, the factor analysis approach is applied to dynamically analyses the evolution trend of intense and considerate building land use. In order to tackle the multi-objective EED issue, Stevenson et al. suggested a multi-objective particle swarm optimization algorithm based on bi-local optimization and merged it with the constraint processing approach with the best practical solution. According to Halder et al. and others, efforts should be made to build a scientifically sound method of economic growth, social development, rational economic structure, and spatial pattern of resources and environment that does not waste resources but rather improves environmental quality. Based on this, there is no longer any resource waste and no environmental harm.

DISCUSSION

According to the research done by Morais et al. the goal condition for social growth against the backdrop of the new normal is to increase the quality of social development. We can only encourage the smooth transition and optimization of social and economic structure, the improvement of development quality, and the enhancement of ecological civilization building performance by enhancing economic development quality. According to Song et al. and others, the status of natural resources as the primary factor of production has been tainted by the transition into post-industrialization, and the dependence of resource-based economies on resources and the constraints that resources place on economies have turned into the bottlenecks of this economic growth. The resource-based economy started to decline, even faced extinction, as a result of the limitation of the life cycle of natural resource development and the gradual contraction of the traditional product market, and the resource-based economy gradually changed from core economy to marginal economy. According to Wang et al., each target in multitarget tracking systems is continually moving and the number of targets is often unknown and variable. In the multitarget tracking system, the MTT algorithm is crucial. It is possible to establish reliable positioning and tracking of many targets using the target information collected from sensors, such as location information, target properties, and target strength.

According to Chen and Guo's study findings, resources and the environment won't be able to support further economic expansion at the price of quality and the environment. China's economy has likewise reached a crucial turning point of transition and upgrading after witnessing the fast expansion and re-industrialization during this century. According to Yu et al. and others, the practical goal of building socialist ecological civilization is to build a sustainable modern economic model that is coordinated between ecology and economy, which

is mainly manifested in developing circular economy, building an eco-safe economy and society, and realizing the development of ecological green civilization. According to Chatterjee and Dutta's study, the economy is a natural byproduct of the growth of human civilization and economy. Our nation's industrialization and economic development are advancing, and a significant portion of the rural surplus labor is being moved to the economy [5], [6]. This causes the economy to swiftly attract a sizable population. Rapid population growth and economic scale development have resulted in issues such a lack of water and soil resources and ecological harm. Bab Amiri and Marof conducted an analysis of the whole nation. The findings indicate that disparities between developed and developing nations as well as the quantity of state-owned public stops are connected to the issues of forest land loss and sustainable forest management. The sustainable development of state-owned forests is significantly impacted by this gap.

According to Vandalia et al., the performance of multitarget estimation will be significantly impacted by issues with missed detection, clutter measurement, the emergence and extinction of targets, the simultaneous matching of motion models for multiple targets, and the unknowable correspondence between various targets and measurements in a multitarget system. According to Pang et al.'s and other researchers' studies, the most important sectors of the resource-based economy were built around locally favorable resources. This resource-oriented development model is still in the early stages of industrialization and economic growth, and in times of scarcity, the availability of resources on the market has practical importance. According to Marin G, Marino M, and Pellegrin C, the two-oriented development of industry refers to using managerial and technological innovation as a means of enhancing economic, social, and ecological benefits. It also encourages the development of the industrial system in the direction of low resource consumption and less environmental pollution in order to optimize the industrial structure and increase the capacity for sustainable development.

Based on the research mentioned above, it is determined that adaptive spatial division of labor plays a beneficial role in the coordinated development of resources, environment, and economy in the transformation of the resource-based economy, and a new strategy for this development is developed. In-depth analysis and research on the coordinated development of resources, environment, and economy were conducted based on the spatial adaptive division of the resource-based economy in transition. This was done with the goal of making better use of resources, uncovering the value hidden in resource data, and identifying potential issues affecting the coordinated development of resources, environment, and economy in the transformation of a resource-based economy. The multiobjective optimization issue is solved by the adaptive multiobjective evolutionary algorithm based on the split of solution space. The multiobjective optimization problem's solution space is first split up into a sizable number of subspaces. To maintain population variety during algorithm evolution, each subspace maintains a nondominated solution set. The generic continuous multiobjective optimization model may be understood from this.

All of the initial frames are essentially closed for adaptive space partitioning, and all of the goal functions are continuous functions of the decision vectors. Two competing optimization goals the workflow's completion time and cost are what we refer to as multiobjective optimization challenges. Multiobjective optimization issues may be loosely categorized into continuous multiobjective optimization issues and discrete multiobjective optimization issues based on the

value characteristics of variables. Multiple grids are used to split up the multidimensional search space. By exchanging empirical data with other particles that act as guiding particles, the particles in the grid alter their speed and location. A resource-based economy, generally speaking, is a kind of specialized functional economy that describes an economy that grows as a result of resource development or an economy that rebounds as a result of resource development throughout its growth phase. Its core businesses are extractive and primary processing sectors centered around resource development, making it a unique form of economy that was established or developed primarily dependent on resource development. The resource-based economy's high consumption, high investment, and high pollution" industrial growth style has a number of drawbacks [7], [8].

The deterioration of the ecological environment and the over exploitation of natural resources occur as a result of economic development. Its manufacturing and consumption practices are unsustainable. The mechanism governing how resources flow is really rather straightforward; in response to intense pressure, resource-poor countries must forsake the conventional growth mode, embrace technological and institutional innovation, and choose a new path for economic development. Our knowledge and management of economic issues have benefited greatly from the sustainable development theory, system theory, and self-organization theory, which has also given us the fundamental concepts, guiding principles, and methods for the study of the resource-based economy. The fundamental meaning of sustainable development. A broad notion, sustainable development encompasses the economy, society, culture, technology, and the natural environment. The development that not only satisfies the demands of the present but also does not jeopardize the capacity of future generations to satiate their own wants is referred to as sustainable development.

Numerous elements, which fall into the categories of helpful and limiting factors and are together referred to as nuclear factors and factors, will have an impact on the coordinated functioning of the regional system. Both the connection between these two parameters and the state of growth are different. The development process is represented in the struggle between human activities for the leading variables when they play a dominating role, and a lot of people have invested in acquiring enough material and surroundings. This stage of growth has expanded quickly due to the stimulation of competition; the leading factor is gradually being consumed, and the formation of a number of limiting factors impedes regional development. This mainly refers to the economic system as well as a mode of integrated resource and environmental development. Understanding the value assessment of environmental resources is essential to achieving the coordinated growth of the economic and natural resources. We can only more effectively safeguard environmental resources and achieve coordinated development in practice by defining the value of environmental resources. The usefulness, scarcity, and development and utilization conditions of natural resources all contribute to their worth, according to the adaptive spatial division hypothesis.

Economic Development in Transition: Research and General Mechanism Analysis:

The transformation of the economy based on natural resources is a lengthy, intricate, and meticulous effort. It starts with the industrialization of the resource-based economy, which then drives and sparks a variety of multidimensional and multilayer developments in the social, economic, and environmental spheres. As a result, changing the industrial structure should be the foundation for changing the resource-based economy. After that, changing the method of

economic growth should be followed by a thorough system transformation. A complex system made up of a resource subsystem, an environment subsystem, and an economic subsystem should be the core structure of the regional resource environment economic system. Three layers of system coupling development make up the regional resource environment economy system coupling. An individual subsystem's internal connection and coordinated development comes first. Second, the integration and coordinated growth of the two subsystems. Third, how the three subsystems are coupled and developed in concert. The structure of the resource-based economy. For the resource-based economy to successfully transition, both internal and external forces must coexist and develop in harmony. The resource-based economy's internal and external pressures are broken down into many important components in Figure 3. First and first, we should be aware of how important innovation and strength in science and technology are to advancing the economy.

A technical advance has an influence on economic development that might be accelerating, delaying, amplifying, or leading, in contrast to the way that capital and labor encourage economic expansion. The infrastructure shapes the capacity of the economy to draw in talent, technology, money, resources, and other factors, which in turn impacts the industrial scale and industrial structure of the economy. In order to maximize the efficiency of the economic and industrial structure and economic growth, infrastructure building and upgrading may offer facilities for transportation, communication, energy, and electricity. It is challenging to get samples from transition economies, thus it is necessary to create an algorithm model that can grow data processing in the same time frame. In order to satisfy the model's design constraints, this study suggests using the panel data model to develop and process the algorithmic element of the model. The panel data model may be used to precisely depict dynamic changes and decrease the mutual impact and disparities across different economies. When multicollinearity deteriorates, the design accuracy of the model may be increased. Due to influence from the transformation, the three indicators stated above are experiencing more volatility between points 1 and 3 in the graph above.

Naturally, this is also predictable, and the economic change may call for a number of policy modifications. For instance, changes in the market might impede the transformation process. As a consequence, even if the transition poses a danger in practice, the transformation area's general trend is upward, suggesting that the economy is doing better despite the existence of interference items. If the system starts to transition from a resource-based economy to a resource-environmental economy with coordinated development, the system will benefit as a whole. The control of change rate reaches 87.4%, significantly enhancing the model's capture and mastery of unfavorable factors in the transition process. In terms of the logistic change rate, it is found that three different sample sets in the entire change process, particularly in the 0-1 and 4-5 stages, have the same trend change tendency. In the experiment, the model's inaccuracy is intuitively examined. It can be seen from the three sample sets that sample set C2's overall error analysis state is favorable. The model developed in this work is determined to be more accurate after comparing it to the other two sample sets and having greater control over the risk, with a 77.3% improvement in error analysis, since assessment models for various risks are included in sample set C2. are the analysis diagrams of the two, supposing that X1 and X2 are two separate sample sets of coordinated development benefit rate and coordinated development efficiency.

A conclusion that can be drawn from Figures 7 and 8 is that the benefit rate of coordinated development is essentially maintained at a high level. This shows that the model developed in this paper has a very good promoting effect and encourages its rapid growth in the coordinated development of resources, environment, and economy in the transformation of the resource-based economy. Despite the advantages fluctuating in the first three to five phases, they rapidly return to the high-speed growth level, and the transformation benefits' average growth rate often exceeds 56.8%. An essential benchmark is the effectiveness of coordinated development. Under the limitations of the model, it essentially enhances the development efficiency of the economic system after coordinated transformation for the area after adaptive geographical division. Notably, the stability is essentially maintained over the whole quantization axis, which is often difficult to do in practice. However, since the panel data model is included into the model developed in this research, the model's stability is much improved [9], [10].

CONCLUSION

In order to create a theoretical research framework and platform for the coordinated development of resources, environment, and economy in the transformation of a resource-based economy, this paper conducts a systematic, selective, and focused exploratory research and analysis on the sustainable development of a resource-based economy. Sustainable development, long-term competitiveness, a sensible economic structure, a healthy ecological environment, and social harmony and stability are the objectives of resource-based economy industrial development model innovation. To do this, we must adhere to the concepts of efficiency, environmental preservation, intensification, and sustainable development. The resource-based economy needs a mix of internal and external elements to enable a coordinated transition from chaos to order. The resource-environment-economic subsystem is examined at three different levels of study. First, the fundamental state of the resource-environment-economic subsystem is assessed from the angles of the natural environment, resources, the economy, and environmental circumstances. The collaborative model is based on significant theoretical methods like the panel data model when it comes to adaptive space partition. The average growth rate of the advantages of the transformation is 56.8%, and the error analysis has improved by 77.3%.

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CHAPTER 9

ECONOMIC COMPLEXITY AND REGIONAL ECONOMIC MANAGEMENT: *IN- SILICO* MODEL-BASED ANALYSIS

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ABSTRACT:

According to the research concepts from theoretical analysis to empirical analysis to countermeasures, this study upholds the premise of integrating empirical analysis and normative analysis and creates an analytical framework. There were recommendations for my nation's high-quality economic growth as well as strategies for fostering coordinated regional development. This research will use the data from 1993 to 2020 as a unit, accounting for elements like labor costs, consumption, investment, and education expenses, and measuring the level of economic complexity in my nation using SAR, SEM, and geographic panel data models. In order to measure the level of regional economic development and compare and analyses the regional development differences, this study is refined to the county level. We aim to use empirical evidence to scientifically analyses the level of economic complexity and regional development differences, using the spatial panel model, SAR model, and SEM model to fully consider the impact of my country's regional economic growth.

KEYWORDS:
Countermeasures, Complexity, Economic, Non-Monetary.

INTRODUCTION

Due to the diversity of industries, ongoing improvement of the industrial structure, and rising economic complexity, businesses are better equipped to choose a growth path that is rational and in line with societal demands. Last but not least, China urges businesses to pursue green development, advance science and technology, conserve resources, aggressively realize the transformation of the industrial structure, and make China's industrial structure rational and scientific. All of this indicates that China's economic development is now more stable, and that the economy's variety and complexity are also growing. Higher standards are proposed for the measuring of economic development efficiency as a result of ongoing improvements to industrial structure, industrial diversity, and economic complexity. Indicators of measurement that are more detailed, precise, and complicated are essential for China's economic growth and the creation of a contemporary economic system.

All regions actively investigate methods for regional cooperation and mutual aid, and they pay increasing attention to the interaction between the market and the government. They also pay increasing attention to the healthy growth of the market economy. Large regional economic variations and uneven regional social and economic growth are still issues in the present state of regional economic development in China. In recent years, physicists have mostly been responsible for the job of estimating the complexity of socioeconomic systems and financial markets [1], [2]. By integrating physics-related research techniques and models into economic study, they support the field of economics. There is a dearth of research on the degree of

economic development and regional development differences in China, despite the fact that academics have conducted a number of studies on economic development, international economic complexity, regional development balance, and other topics. This is because China's economy is growing from high speed to medium high speed and from high speed to high quality. This research uses an economically complicated non-monetary index to quantify China's economic development and divides China's counties into regions to examine regional economic growth variations. The SEM model analyses the effects of China's economic complexity on variations in regional economic development and advances pertinent theoretical study.

Finally, this study attempts to present the countermeasures to control the dynamic and coordinated development of regional economies from the perspective of economic complexity in order to provide some reference for expanding the research field of economic complexity and regional economy and growth differences. This attempt is based on a number of research evidence. In this experiment, the 1993–2020 baseline data from 31 provinces and cities in my nation were chosen for examination. The exclusion of Hong Kong, Macao, and Taiwan from the research area is due to the possibility of model configuration and parameter calculation mistakes caused by the variations in fundamental listing requirements across different locations. The study's data were gathered from the "China Statistical Yearbook," "China County Statistical firm data that is used to gauge economic complexity in my nation is found. The chosen dataset includes all listed firms' basic financial and registration data from 1993 to 2020 from the Shanghai Stock Exchange and Beijing Stock Exchange. The public official website allows for viewing of the relevant experimental data in, which is legitimate and trustworthy and has some representative importance. The public official website provides access to the pertinent experimental data, which is real, trustworthy, and has some representational relevance.

Moran's I, which indicates that the measurement high-value region is close to the low-value area, is the most popular way to measure the geographic sequence and the spatial autocorrelation. The article begins by establishing the spatial matrix of the 31 provinces and cities that were observed, and in this case, the 0-1 spatial weight matrix of 31 31 is employed [1], [3]. The findings of the global autocorrelation bilateral test on the explanatory variables' Theil index in 31 provinces and cities. Regional economic inequalities in my nation show geographical connections, as seen by the Moran index, which measures the worldwide spatial autocorrelation of regional economic disparities. The test findings are accurate and reliable as a whole, with the exception of the years 1993 through 1997 and 2004, which failed the P test at the 5% level. This demonstrates that, rather than being distinct and independent, the disparities in regional economic development across provinces and cities in my nation from 1993 to 2020 are geographically connected and interrelated. The geographical link of regional economic growth disparities in my nation has shown a pattern of fluctuation overall with the ongoing development of the economy, as illustrated by the trend chart of the Moran index given. Since 1993, the spatial correlation curve has been varying and increasing, peaking in 2009, and then gradually declining. The alteration in the curve is rather steady. This is due to the tighter connections in regional space and the ongoing strengthening of spatial correlation caused by the ongoing growth of the social economy and the building of transport and communication systems. In combination with population movement and policy impact, the

economic development of one region will immediately affect the economic condition spreading to the other areas, resulting in a favorable spatial correlation of economic growth differences.

To more accurately build a spatial econometric model and determine if there is a geographical relationship between the variables that need to be diagnosed. It is important to carry out a Lagrange multiplier test on the estimated outcomes of the geographical model in order to choose a better spatial econometric model in order to carry out a more precise spatial econometric study of the disparities in economic development in my nation. The reference items must be checked for spatial lag and inaccuracy once the spatial weight matrix has been established. The ordinary linear model OLS test is the foundation for the spatial effect test. Prior to the geographical impact test, it was expected that the levels of economic growth variations across 31 provinces and cities in my nation from 1993 to 2020 did not exhibit any spatial autocorrelation. Table 2 shows that among the three spatial error tests, Moran's index, LM test, and RL test all disproved the idea that there is no spatial autocorrelation in the degree of economic development in my nation. The values were all significant at the level of 0.05, the statistical RL test was passed, and the LM test results were generally good in the two tests after the space. The results above disproved the idea that there is no space for the differences i. According to the relevant null hypothesis, it is necessary to do a spatial econometric analysis in order to identify the variables that influence how my country's economic development levels vary from other nations' levels [4], [5].

DISCUSSION

The spatial lag model and the spatial error model are crucial components of the spatial econometric model. They both account for the spatial multidirectional effects between the model's variables. The disturbance term constitute is where the two diverge most. The SAR model gives greater consideration to geographical dependency, and the dependent variable's product and the related spatial weight matrix are the main sources of error in the spatial error model. Through the error term, the SEM captures the spatial dependency between variables. The error term is a product of the associated spatial weight matrix and the spatial lag item. Instead of interpreting the model reference's dependent variable, the SEM model lag term interprets the error term. The SAR model and the SEM model are currently developed to measure and analyses the influence of my country's economic complexity on regional economic growth disparities. It is required to undertake a thorough investigation of the geographic space of our city's Theil index in order to more precisely measure and analyses the variations in the economic development of my country. This article separates the geographical area of my nation into eastern, central, western, and northeastern regions and examines the variations in urban economic growth and development across these regions. The areas chosen include the eastern and central regions as well as the western and northeastern regions since each region has unique local economic features.

In general, there is a big disparity in the rate of economic development in my nation's east. The eastern part of my nation has a high degree of economic growth and is a crucial area for reform and opening up. The creation of special economic zones has also significantly aided the social and economic development of the eastern area. Figure 2 displays the relative high Theil indices for Shijiazhuang, Shanghai, Fuzhou, Quanzhou, Huizhou, Shenzhen, and other cities. These cities stand in for the growth of the tertiary sector, as well as the economic and trade development of my nation. certain individuals in the city have strong economic circumstances

as a result of the effective transformation of international commerce and certain industries. The socially and economically prosperous regions are also appealing to talent. The majority of people can easily move across these locations, and both the quality and quantity of the labour force are increased. It will slow down the growth of the regional economy, support the growth of regional industries, and top up the regional economy.

However, the rapid expansion of economic development will hasten the silence and eradication of other industries, causing outdated and technologically backward industries to cease development and hasten their eradication. The development of transport and roads in such areas is convenient for the development of trade and the improvement of the economic level. However, it is simple to overlook the development of areas without great businesses and accessible transit, which results in certain regions' weak economic growth rates and trailing economic development. The Theil coefficient rises in comparison to certain areas with very high economic growth, and the degree of interregional economic development seems to be different. Because Beijing is the capital of my country, its political importance is greater than its economic significance, and Beijing pays attention to the grasp of macro-control, the economic growth difference between Beijing and Shanghai and Shenzhen is not particularly great. Beijing also occupies a relatively small area geographically. In my nation, the eastern region is a key area for economic growth and has significantly aided China's high-quality social and economic development as well as industrial upgrading and optimization. Therefore, while creating regional development plans, it is more crucial to create scientific development policies and adapt measures to local circumstances.

In general, my country's western regions have had significantly different rates of economic development, and certain cities' Theil indices are more noticeable than others. The economic development of Lhasa, Ninilchik, Shigatse, Shannan, Yushu Tibetan Autonomous Prefecture, Xilingolite League, Yulin, Zuni, and other areas is highly uneven and there are significant variances in economic growth among these regions. There are numerous cities in Tibet, Gansu, and Inner Mongolia with an unbalanced economic development, and there are some common causes for the high Theil index in the western region: first, the provinces and cities in western my country typically have issues with being deep in the inland and difficult to build traffic roads; second, because of the geographical features and development mode of the west, it is challenging to optimize and upgrade industries in some areas; and third, there are many cities with unbalanced economic development in these three regions. In the west, there is a widespread issue wherein productivity limits the advancement of talent education and whereby a shortage of skilled labor causes societal productivity to diminish.

Because the western region is geographically vast and some of its ecological environments are delicate, if other regions' production models are copied, the blind development of the primary and secondary industries will exacerbate ecological pressure and endanger green development. The disparities in economic development between the cities of Xinjiang, Chongqing, and Guangxi are not especially noticeable within the western area. The economies of Xinjiang, Inner Mongolia, Guangxi, and other large, thinly populated areas are generally average. As a municipality directly under the Central Government, Chongqing has achieved some progress in economic growth, continuously bolstering international exchanges, and industrial upgrading. Additionally, its degree of social development and per capita income are quite high. The western region has a huge landmass, uneven economic growth, a sizable population of destitute

individuals and areas, and a clear wealth disparity. The scientific regulation and control policies of the government are therefore faced with difficulties and necessities. It is much more essential when developing development plans and economic development advice. The gap in social and economic development in the central part of my nation is quite minimal when compared to other regions. Adjust measures to local circumstances and increase understanding of regional economic and geographical peculiarities. Theil index of other cities shows minimal variation, with the exception of a few provincial capital cities and cities with significant transit hubs. As provincial capitals, Hefei, Nanchang, Changsha, and Wuhan all have much faster economic development than their neighboring cities. This is because the economic and political centers of a province are in such cities, making it easier for businesses to diversify and for technology to advance scientifically. The infrastructure is more comprehensive, and provincial capital cities are more appealing to talent and labor. The central provinces are crucial to the growth of transit since they provide as a vital link between my nation's north, south, and east.

Additionally, this is the urban core. One of the explanations for the Theil index's comparatively low value was also provided. Due to their excellent geographic location and traffic conditions, Jinjiang City, Yichang City, Zhuzhou City, Shiyan City, and other cities have increased the speed of some counties' economic development, and the gap between that growth and that of the surrounding regions has grown, indicating that the city's Theil index is relatively high. The central region is geographically connected to the entire nation and has a sizable territory. In terms of transportation development, water, land, and air transportation all have significant inherent advantages, and the region's flat terrain and well-developed river channels can hasten economic growth there. Henan, my country's most populous province, also contributes highly skilled labor to the region's development. In general, the central area has tremendous growth potential. The economic growth of the central area will continue to advance thanks to ongoing infrastructure improvements and increased investment. However, it is still important to pay attention to the regional natural and human variables that contribute to growth. The social and economic development model is optimized as a result of the social economy's consistent improvement, which also leads to a constant narrowing of regional economic growth gaps [6], [7].

This research chooses to build the spatial lag model and spatial error model after a series of model verification and considerations in order to analyses the geographical influence of China's economic complexity on the degree of regional economic growth disparity. The analysis of Table 3 reveals that, in the geographical lag model, the difference in regional economic development and China's economic complexity are negatively connected, with a correlation of 0.069. It demonstrates how the expansion of China's economic complexity aids in reducing the disparity between regional economic development. China's economic progress may be explained by the economic complexity index. The findings of the spatial lag model used to examine how China's economic complexity affects regional economies pass the test with a Z value of 1.29, which is significant at the level of 5%. This shows that the SAR coefficient is used well in the model's predictions. There is a spatial effect on the impact of China's economic complexity on regional economic differences, and the model result is more significant, according to the estimated value of the spatial autoregressive coefficient, Rho, which is 0.054. Significant results are shown at the level of 1% by the estimated value. In terms of geographical measurement, the Moran I index demonstrates that there is a spatial link between Chinese provinces and cities in terms of variations in regional economic development. The degree of

regional economic growth disparity in China is highly tied to the surrounding regions and does not exist independently.

Using the spatial lag model to add economic complexity to measure, it can be deduced that if a province or city's economic complexity index changes, the degree of economic growth disparity between nearby regions will also change. This is reflected in the positive economic development and the improvement of the economic complexity index, which will not only reduce the difference of regional economic growth but also reduce the difference of economic growth in surrounding regions. There are several directions in which this impact might be felt. The model's conclusion means that the government must take into account not only the region's actual development but also the policy implementation of neighboring provinces and cities as well as the region's actual situation in order to develop regional development strategies that are appropriate for the region's actual situation. Science-related policy: It can be shown that there are variations in the variable regression coefficients between the two by comparing the outcomes of the OLS panel regression test with those of the SAR spatial lag model.

To analyses the geographical peculiarities of the effect of China's economic complexity on regional economic growth variations, the spatial error model is utilized. The regression coefficient of the spatial error model's SEM error term, which is reported as 0.049 is significant at the level of 1% when taken into consideration. This demonstrates that the spatial error model is plausible and that the model's predictions are accurate and useful. Economic complexity index ECI's geographical effect value on regional economic growth differential TL in the spatial error model is 0.061, which is significant at the level of 5%. The standard error is 0.05328, and the Z value is 1.93. This finding supports the hypothesis that regional economic growth disparities and China's economic complexity index are negatively correlated. Improving the regional economic complexity index may minimize the disparity of economic growth level, accelerate the balanced development of China's economy, promote the coordinated development of industrial development, and expedite industrial transformation and upgrading analysis of the effect of Investment Levels on Regional Economic Growth.

The IIFA coefficients are significant at the 1% level, according to the data of the SAM model's IIFA terms. Investment in fixed assets here serves as a proxy for investment level. According to the statistics, my country's regional economic growth differences are decreasing as investment levels rise. Insufficient regional investment will result in a lack of vigor in regional economic development and widen the economic growth gap. The backward investment level will also result in the slow growth of the regional economy in the surrounding areas, which has a negative impact on reducing the imbalance of regional economic development because of the correlation between various economic growth factors among different regions. The IIFA term coefficient in the SAM model is likewise significant at the 1% level when compared to the investment level parameters in the SEM model. The coefficient value in the SEM model is marginally higher than the investment level in the SAM model, but it also demonstrates that the investment level has an impact on the regional economic growth disparity in my country, and that raising the regional investment level will help to narrow that disparity. The outcome of this study demonstrates the need for regional governments and businesses to consider their understanding of investment level and investment intensity when developing development strategies, to strengthen the formulation of sound investment policies, and to enhance the high-quality development of the regional economy by introducing investment.

From the perspective of spatial measurement, the advancement of scientific and technological knowledge as well as the ongoing development of transportation infrastructure has improved communication between populations in various regions, and changes in people's lifestyles and consumption patterns have resulted in the level and patterns of consumption in our nation. Economic and social development's effects are becoming worse. The purchasing patterns of the local populace will have a direct impact on the economic growth gap between that region and its neighboring regions. It is not conductive to regional economic development, and the opposite will have an impact on people's lives, if the level of consumption in this area declines or there are differences in consumption patterns, which will directly lead to the expansion of the economic growth gap between this area and surrounding areas. The government should actively monitor market characteristics in a timely manner, advise the populace to adopt healthy consumption practices, and continuously raise the level of consumption among the population through the growth of the social economy. Raising the level of consumption among the population will also support the social economy's steady development [8], [9].

The model's findings are shown by examining the educational parameters which have a favorable impact on the variations in regional economic development in the nation. Regional economic development inequalities might become more pronounced if there are too many cultural differences. Additionally, there is some regional talent mobility. The effect of educational elements on the variations in the regional economies of my nation has geographical aspects, which are influenced by the handling of regional talents. Regional economic development varies depending on education levels and educational attainment. The peak gathering of regional economies will result from the assembling of top talent. Regional economic disparities will, however, widen if basic education is inadequate. It is clear how educational characteristics affect the economic disparities in my nation. The advancement of education and the distribution of educational resources should be a priority for my nation. Not only should it focus on the advancement of higher education, but it also shouldn't let up on the growth of primary education. In order to close the economic growth gap in my nation, education development in regions with relatively poor economic development and balanced education development would be important. The degree of human capital has an influence on regional economic growth disparities, although the impact is less significant than that of other variables, according to this study's analysis of the relationship between human capital elements and regional economic development differences.

The degree of economic development in the area and its environs is increasing; if human capital levels fall, the gap in economic growth in this area will also close. It will have an effect on the level of human capital and regional economic growth in the nearby regions, causing a drop in the level of human capital and a narrowing of the gap in regional economic growth. It should be mentioned that the percentage of the government's investment in education in GDP serves as the representation vector of the level of human capital in the article. It takes some time for my country to transition from a nation with a vast population to one with strong human capital, but it is vital. The enhancement of total human resource availability, rational resource allocation, and rational resource organization may support the economic growth of my nation's economy in a consistent, high-quality manner. Only the constant optimization and upgrading of human resources in order to more effectively promote the economic and social advantages of companies is a concern that society and businesses have always paid attention to.

The coefficient of technological innovation is the highest among all evaluation factors, regardless of whether it is the SAR model or the SEM model. This demonstrates that, when compared to other evaluation factors, the level of technological innovation in this model has the greatest influence on the difference in economic growth in my country. Additionally, the difference in regional economic development is positively correlated with the amount of technical innovation. Both the spatial lag model and the spatial error model demonstrate that, as scientific and technological advancements continue to be made in some regions, the economic value that is produced as a result of these advancements will rise significantly, widening the region's economic growth gap with its neighbors. The economic growth gap between an area and its neighboring regions may be narrowed in places with low levels of technical innovation, but there may also be a general lack of economic development momentum, which will have an impact on high-quality social and economic development. Currently, the industrial revolution and the technology innovation revolution are intersecting historically in my nation, changing the economic growth model. Government and businesses need to have a better understanding of and scientifically controlled the technological innovation mode.

In addition to advancing the ongoing development of industrial informatization and intelligence, we should focus on coordinating regional characteristics with various technological advancements, creating technological advancements that are appropriate for local conditions, steadily enhancing my nation's technological innovation capabilities, and advancing new industrial system models with technological and intelligent production models. To close the economic development gap in my nation, social production capability and all-encompassing national strength must be built. The following findings are reached by looking at basic statistical data for 31 provinces and cities in my nation between 1993 and 2020: First off, my nation has a varied range of sectors that have developed, with regional variations in this variety. The growth of the regional economic industries in my country can be classified into four types of regions based on the measurement of industry indicators: high industry diversity and low industry ubiquity, low industry diversity and high industry ubiquity, and low industry diversity and low industry ubiquity. High industry diversity, high industry prevalence, and regions in those industries. Second, although the economic complexity of regional physical locations vary significantly, the economic complexity of the temporal dimension is not particularly varied in my nation.

The eastern area, including Shanghai, Beijing, Tianjin, Guangdong, Fujian, and other regions, has a higher index of economic complexity. Economic complexity was relatively modest in the early stages of the western area. In a later stage, the region's industries continued to diversify and were upgraded as a result of the economy's ongoing growth, the government's macro control’s strengthening, and the development of regional infrastructure. The index continues to rise. Third, the levels of investment, household consumption, education, human capital, and technological innovation in the SAR model and SEM model also show that they are closely related to the regional economy. The regional economic complexity index not only has a spatial impact on regional economic development. Growth disparities are spatially correlated. In my nation, the disparity in regional economic development is lessened as investment levels rise. If regional investment is inadequate, regional economic development will not be as vibrant and the gap between regional and national economic growth will widen [10].

CONCLUSION

This study employs a panel model to explore the fundamental data from 1993 to 2020, combines the economic complexity of my nation with regional economic growth disparities, and uses spatial econometrics to analyses the economic complexity of my country as well as other elements. Measurements were made on the effect of regional economic growth. The non-monetary variables used to calculate economic complexity, evaluate regional economic growth differences at the county level, and combine economic complexity and regional economic growth differences make up the article's study highlights. In general, each model's findings are substantial and the observation time span and sample size are both considerable.

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CHAPTER 10

NIGERIAN GASIFICATION TECHNOLOGY FOR BIOMASS ENERGY UTILIZATION FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT:

About 200 million people in Nigeria lack access to sufficient electric electricity. The most recent governmental initiative to produce 6000 MW of electricity by the end of 2009 was unsuccessful. Only about 40% of the population has access to electricity from the National Grid, with urban areas having more than 80% accessibility and rural areas, which make up about 70% of the total population, having less than 20% accessibility, even though there are less than 6000 MW of electricity generated in the nation. The potential for using biomass gasification technology to satisfy Nigeria's energy needs is discussed in this study. The benefits of the biomass gasification technique are discussed as well as the techno-economic analysis of biomass energy. According to the technical study, Nigeria's total biomass potential is expected to reach at 5.5 EJ in 2020 and climb to roughly 29.8 EJ by 2050. The project's net present value was determined to be positive based on a projected selling price of 0.727/kWh; its cost benefit ratio is better than 1, and its payback time is 10.14 years. These economic metrics demonstrated that the project was economically viable at the estimated cost. Economic study, however, indicates a selling price of 0.727/kWh. Therefore, by developing a gasification system using local materials, planting biomass strategically and effectively for energy production, providing financial incentives to investors, and situating the power plant close to the source of feedstock production, it is possible to lower the capital investment cost, operation and maintenance cost, and fuel cost.

KEYWORDS:

Biomass, Demonstrated, Electricity, Maintenance Cost.

INTRODUCTION

The Nigerian government's main worries have been the nation's rising energy needs, the depletion of fossil fuel resources, and the extent of environmental degradation. Continuous power production consistently fails, and the Nigerian energy producing industry performs poorly. Such heinous incidents may be related to high transmission failure rates, low generating capacity rates, and subpar tax collection when it comes to servicing Nigeria's energy needs. As a result, several alternate methods of producing power have been investigated; currently, more than 70% of the nation's electricity is produced using fossil fuels. On the other hand, the greenhouse gas emissions from these fuels are considerable; around one-third of the country's emissions come from the generation of power [1], [2]. Additionally, fossil fuels are heavily used in transportation networks. Without a doubt, there are price variations for fossil fuels over which end consumers have little or no influence. The amount of high-quality energy source has rapidly decreased as a consequence of our overreliance on fossil fuels. Nigeria is mostly dependent on its enormous crude oil reserves, which total fewer than 40 billion barrels. Crude

oil output was formerly believed to be at 2.2 million barrels per day. While 280 thousand barrels of oil are processed daily for domestic use, most of these are exported.

According to the Energy Information Administration, the proved resource of natural gas is estimated to be about 185 trillion cubic feet. About 430 billion cubic feet were used in Nigeria in 2008, mostly for the production of power. A total of 500 billion cubic feet was reinjected for improved oil recovery, 140 billion cubic feet was vented, and 530 billion cubic feet was flared. It is estimated that 1,600 billion cubic feet of natural gas are used annually in gross terms. The estimated amount of recoverable coal reserves is at 210 million short tones, with annual output at around 9 thousand short tones and annual consumption at about 12 thousand short tones. According to estimates, Nigeria's crude oil reserves will run out in the next 50 years and its known natural gas reserves would do so in around 115 years, supposing no additional oil or gas deposits are found. It is clear from prior studies and Nigeria's anticipated energy needs, as seen in Figure 1, that the country's crude oil reserves will run out shortly. According to a British Petroleum assessment from August 5, 2001, if the current production rate is maintained, Nigeria's 22 billion barrels of oil reserves will run out in 29 years. Between 2002 and 2007 there was a reduction of more than 2% every year. The greatest oil producer in Africa indicated in research that Nigeria's oil reserves which rose to 32.93 billion barrels in 2008—could run out within the next 50 years [3], [4].

Additionally, it is becoming evident to both the Nigerian government and the general public that energy costs would likely continue to rise for a longer length of time in light of the pricing of fossil fuels. Many governments in consuming nations are trying to create more cohesive policies on alternative energy in response to the growing political awareness of global climate change and the growing worry about energy import reliance. For many years, alternative energy has undoubtedly offered a possible solution to the problem of growing carbon emissions and energy insecurity, but at a cost that was thought to be too expensive in comparison to the cost of conventional energy sources. Most alternative energy technologies were mostly inactive from 1986 to 2002 due to low oil prices. The prognosis for certain alternative energy sources has greatly brightened as a result of the ongoing rise in crude oil prices and the fact that some countries are already beginning to assign a penalty to carbon emissions. The quest for a balance among energy, economics, and environment has also been a trilemma that threatens human life not only in Nigeria but globally. The worrisome population growth in Nigeria has subsequently drastically increased the country's energy needs. Additionally, the dangers to human health and the environment are steadily growing as a consequence of carbon emissions from the use of fossil fuels.

The use of many alternative energy sources has been made possible by the continuously rising energy needs and the ongoing declines in high-grade energy sources. For many years, such renewable energy sources have offered a viable solution to the problem of growing carbon emissions and energy insecurity. Additionally, the federal government of Nigeria has created a long-term "energy descent" via the Energy Commission of Nigeria in attempt to address the trilemma of attaining economic development, food supply, and energy resources while maintaining the environment. They are intended to gradually reduce the overreliance on high-grade energy and shift to locally available renewable energy sources as a component of local economies. It is established that Nigeria has a total land area of 92,337, 000 ha, of which 30,200,000 ha are arable, 2,800,000 ha are used for permanent crops, 39,200 ha are used for

permanent pasture, 14,300 ha are forests and woodlands, and 5,837,000 ha are used for other purposes. In this context, there is no question that the nation has sufficient potential for renewable energy sources, particularly for biomass production, and as a result, bioenergy should be taken into consideration as a key component of the nation's future renewable energy mix. Therefore, it is necessary to use this enormous energy potential by using the different biomass technologies and creating appropriate legislation. Since biomass is produced by agriculture, there is also a need to advance the growth of the agricultural sector of the economy [5], [6].

The Prospect of Using Bioenergy to Meet Nigeria's Energy Needs:

Long-term energy demand forecasting is notoriously challenging. However, an estimate of the energy consumption is essential for making short-term strategies. The Model for the Analysis of Energy consumption and Wien Automatic System Planning programmed were used to analyses the nation's energy consumption for the years 2000 to 2030 in accordance with the models created by the Energy Commission of Nigeria. It is evident from the table that the demand for energy is continuing to rise. Laying the groundwork for expedited renewable energy development that will support the economy is one of the most innovative ways to address the rapidly increasing need for energy. Biomass is anticipated to play a significant role as a renewable energy source, according to the European Commission in the white papers' community strategy and action plan in the policies of the European Union. The creation of biomass gasification plants is thought to increase both the environmental acceptability of using agricultural wastes as energy sources and the overall efficiency of converting the chemical energy contained in the wastes into electricity. The abundance of biomass in Nigeria, as noted in literature, is indisputable evidence of the viability of the country's different biomass technologies.

According to the research done by Okolo and Rosalee, Nigeria has a significant biomass potential that was projected to be at least 3.2 EJ in 2010 and could easily meet the country's energy needs. Argo-residues, animal wastes, municipal solid wastes, and forest residues are the biomass sources taken into account. Energy potential is anticipated to keep increasing from around 3.2 EJ in 2010 to roughly 5.5 EJ in 2020, and it might reach approximately 29.8 EJ in 2050. The estimate corresponds well with the projected energy demand and will be crucial for the supply of energy in the future. The government policy decisions that have not promoted the development of biomass technology for the effective use of biomass are to blame for the delay in the use of renewable energy. The federal government, however, changed its mind in 2012 and decided to build the nation's first biomass gasification facility in Ekiti State. The technological and economic potential of biomass energy and biomass gasification technology in the nation must be taken into account before the policy is fully implemented. The techno-economic potentials of the biomass gasification technology in Nigeria are therefore presented in this paper.

DISCUSSION

Nigeria's primary economic activity, agriculture, produces 41% of the GDP and employs the most people in the nation. Although the government of Nigeria prioritizes food production in its agricultural strategy, the potential solid fuels for power generation that go along with agricultural operations in the nation are fairly significant. According to a recent analysis by

Aurela, Nigeria consumes around 43.4 billion kg of fuelwood each year while producing 1.8 million tons of sawdust. The overall estimate for the energy potential of agricultural wastes collected in Nigeria in 2005 is 1.924x1018J, according to Okolo and Rosalee. A number of studies were conducted to determine the technical potential of biomass energy in Nigeria, which provides a five-year estimate of that potential based on the Central Bank of Nigeria's projection of a 6% annual growth in agricultural output. It is assumed that yearly growth in both agricultural produce output and ago-residue generation are equal. According to the data, the energy potential in 2020 will be around 4.6 EJ and might increase to approximately 26.5 EJ in 2050. It should be noted that around 60% of the entire yearly energy potential comes from the following sources: fruit and vegetable wastes, sorghum stalks, maize leftovers, rice residues, and cassava peels. The amount of forest residues generated in Nigeria in 1997 and the energy from each waste are presented, uses the rise in forest production index to indicate the 5-yearly energy potentials of forest residues for full and utilized capacity from 2005 to 2050.

\According to the estimate, the energy potential of forest leftovers in 2020 at the capacity that is now being used would be around 12.3 PJ and may increase to nearly 62 PJ in 2050. The energy potential of forest leftovers, when used to its maximum potential, will be about 28.4 PJ in 2020 and may reach 142 PJ in 2050. According to Dayo, fuelwood accounted for more than 60% of the annual energy consumption between 1990 and 2005. The feasibility of using biomass energy to satisfy Nigeria's energy needs would increase if fuelwood is taken into account in the estimation of the biomass potential. To avoid deforestation, which has a detrimental impact on the environment, Nigeria discourages the use of fuelwood for energy reasons. Therefore, in order to meet the need for energy while avoiding the use of fuelwood, it will be necessary to use energy crops that may be grown in both arable and grassland areas. The potential for bioenergy will rise with the growth of energy crops. Other renewable energy sources including solar, wind, geothermal, ocean, tidal, and wave energy may also need to be heavily used. Sadly, despite the huge potential of biomass in the nation, direct burning has mostly been employed throughout the years to produce energy from renewable sources. Aside from the significant pollution that comes along with this technology, its efficiency ranges from 5 to 15%, which is fairly low. As a result, methods other than direct combustion should be used for conversion. To be able to exploit the majority of the available bioenergy potential, effective usage of biomass must also be ensured. Energy strategies in the nation should also take into account the advancement and modernization of agriculture, investments in infrastructure, and the development and commercialization of biomass technology, in addition to other renewable energy sources [7], [8].

Utilizing the energy produced by renewable resources enables us to achieve significant reductions in the use of our limited supply of fossil fuels, pollution, and alarming climate change. The techno-economic study of biomass for energy production has been used in literature to illustrate the inherent potential of renewable energy sources. Following on from the technical potential analysis presented in the earlier portions of this paper, biomass may be used to address Nigeria's current energy issue. Biomass-based power generating may be run on demand, unlike wind or solar energy. Regarding the biomass energy conversion methods shown in Figure 4, the majority of the biomass resources in Nigeria are now used mostly in rural areas through direct burning. The government policies appear to not have specified how to implement and develop the use of bioenergy in the nation, instead focusing on developing

and financing conventional energy. Of the biomass conversion technologies shown above, biomass gasification offers a significant potential and can act as a key enabling technology for the development of integrated and sustainable bioenergy systems. Additionally, given the advantages of biomass gasification technology over other biomass energy conversion technologies and taking into account feasibility studies, viability of generating, and meeting the energy needs in Nigeria, it is strongly advised that the impending energy crisis in Nigeria could be avoided by the biomass gasification.

Combustible materials are transformed into a gaseous fuel combination with trace amounts of char and condensable chemicals by a process known as gasification. The term gas may also be used to refer to wood gas synthesis gas, producer gas, or coal gas, among others, depending on the context of production. The process of gasifying biomass involves heating the material to a high temperature in a gasifier, which results in a number of physical and chemical changes that lead to the generation of volatile products and carbonaceous solid leftovers. The kind, features, and reactor temperature all influence the volume and content of volatiles generated. The gasifying agent in this procedure might be air, steam, oxygen, or hydrogen. The system's energy output might be converted into thermal energy or utilized to create electricity. The gasification process employs a number of reactors, which may be categorized as either fixed beds or fluidized beds based on the relative movement of the fuel and the gasifying medium. As a reaction occurs and the solid fuels are transformed into gases in fixed bed gasifiers, the solid fuels move either concurrently with or in opposition to the flow of a gas. In a nitrogen environment, weight loss generally happened in three stages: dehydration, active pyrolysis, and passive pyrolysis. In an updraft gasifier, combustion occurs at the bed's bottom, which is the gasifier's hotter area, while product gas leaves the top at a cooler temperature. Both the feed gas and the product gas descend in a downdraft gasifier, and the product leaves at the bottom at a higher temperature, or around 800°C. High temperatures and an oxidizing agent are required for gasification to occur. The gasifier receives heat directly or indirectly, raising the gasification temperature from 600 to 1,000 °C. However, the temperature during gasification must be sufficient. It should be noted that fixed bed gasifiers have distinct reaction zones. Drying, pyrolysis, combustion, and gasification all take place simultaneously in the reactor and are best suited for solid fuel contacting operations that call for precise temperature control, carryover of particles away from the reaction zone, straightforward operation, and minimal reactor body erosion.

Drying, pyrolysis, and gasification all take place concurrently in the reactor in fluidized bed gasifier models, in contrast to fixed bed reactors, which have different reaction zones. The reactor is mixed and so closed to isothermal. By design and the gasifying agent's velocity, fluidized bed reactors may be categorized as bubbling, circulating, spouted, and whirling. In comparison to conventional gasification reactors, fluidized bed gasifiers offer strong gas solids contact, superior heat transfer characteristics, improved temperature control, big heat storage capacities, good levels of turbulence, and high volumetric capacity. Large pressure drops, particle entrainment, and reactor body degradation are drawbacks of fluidized bed reactors. Fluidized bed gasifiers seem to be economically feasible beyond 30 MW thermal outputs due to their intricate and costly control systems. Table 10 provides an overview of the benefits and drawbacks of different gasifiers.

Applications for the Technology of Biomass Gasification:

Both combustible and noncombustible gases are included in the gases created during the gasification of biomass. The gas may be utilized for direct heating, irrigation, vehicle power, energy generation, industrial applications, and the manufacturing of goods with added value. Although the logistical difficulties of transporting biomass to energy production sites make it currently unattractive in urban areas, the technology has become significantly more appealing in industrial shaft power applications in rural areas where grid electricity is either expensive or unavailable. There are now a lot of fossil-powered devices in use, therefore in areas where the supply of fossil fuels is often interrupted, alternate energy sources like producer gas are being explored. There are internal combustion engines that function on the dual-more concept as an alternative to those that just employ producer gas. In such systems, producer petrol is added to diesel fuel as a fuel substitute. In this case, 1.4 kg of wood would be used per kWh of shaft power. The prospect of growing trees that take three to four years to mature always exists in areas where sufficient biomass is hard to come by. Crop leftovers may be used in gasifiers, which has drawn a lot of interest.

Although there are still some technical issues to be resolved about crop leftovers as gasifier fuel, the idea has a lot of potential. Utilizing direct heat gasifiers seems to have few technical or economic issues. The scope of possible usage will expand as more expertise and better design are gained. The biomass gasification system has a number of advantages over traditional combustion technology when it comes to turning solid waste into electricity. The gasifier project's decrease in greenhouse gas emissions is its main advantage. Because solid waste releases an identical amount of carbon into the atmosphere as it did throughout its existence, it is regarded as a carbon-neutral biofuel. On the other hand, since the carbon has been held for so long, fossil fuels increase the quantity of carbon released into the atmosphere.

By reducing air, land, and water pollution, the development and use of biomass gasification systems will further the reduction of serious health concerns. By reducing CO2 emissions, the consequences of global warming on the weather and climate may be lessened. According to the California Biomass Energy Alliance, biomass gasification is two times more effective in reducing GHG than other renewable energy sources or nuclear power. The assertion was made to support the idea that, should biomass gasification technology be implemented nationwide, health care expenses would decrease and that future federal emission requirements are expected to become more stringent. By using biomass gasifiers properly, such a healthy atmosphere may be created, which attracts and keeps companies while also boosting the travel and tourism sector. It may help small-scale enterprises by boosting their marginal profit and decreasing their downtime. Educational institutions may also profit from using the plant since they can use it to power their lab equipment without worrying about unstable or interrupted power supplies.

Additionally, the school will get the chance to investigate, move, and educate its staff and students in a cutting-edge environmental technology. Consequently, if the technology is properly embraced, supported, and developed, there would be a significant decrease in Nigeria's excessive reliance on petrol and the repercussions of petroleum shortages. The application of the technology will improve land management, waste control, nutrient recycling, employment development, and utilization of extra agricultural land. It will also provide modern energy sources to rural areas and regulate waste.

The biomass gasification option is one of the bioenergy technologies that has been found to have the greatest potential for supplying rural power demands for home, irrigation, small and cottage industries, as well as thermal activities. According to the calculations, adopting biomass gasification technology for a power production system has a lower unit cost of electricity than other bioenergy technologies that are now available. Systems for power generation and biomass gasification are well established on an industrial scale. It is a cutting-edge technology that is appropriate for the Village Energy Security Programmed and Remote Village Electrification.

Therefore, it has been shown that biomass gasification technology is an effective approach to use leftover biomass and the gas produced. Because biomass contains relatively little of the environmentally toxic Sulphur, chlorine, or heavy metals, gasification results in less hazardous emissions. The utilization of a range of feedstock and products is the main benefit of gasification, since syngas may be utilized for both power generation and the chemical sector. Nigeria has a great potential for generating electricity from agricultural waste since it is an agricultural nation.

As a result, the factory will get supplies continuously. By empowering farmers and rural residents in Nigeria, a 60 MW plant might provide up to 3,500 sustainable jobs, lowering unemployment and boosting the economy of rural regions. Based on an average household usage of 7.4 MWh per year, the power plants that will need more than 300,000 green tones of solid wastes/biomass annually might generate enough energy for around 30,000 dwellings for a period of 20 years.

The installed capital cost for energy plants operating at this size would probably be about $2 million per MW of capacity. A 30 MW bioenergy facility is expected to cost between $60 and $65 million to develop and commission. The fact that this technology is environmentally friendly, has a decentralized electricity generation system, makes good use of domestic resources, helps save money on energy imports, supports local employment, is simple to operate and maintain, and effectively replaces fossil fuels has also attracted attention in various parts of the world.

Both good practices and technical solutions may effectively reduce the drawbacks associated with utilization. Additionally, the proposed gasification plant has undeniable advantages over other technologies that use high-grade energy produced from fossil fuels due to its highly efficient process, flexibility in applications over a range of output ratings, low initial investment, low cost of power production, better process control and convenience, cleaner combustion in connected equipment, and low maintenance cost.

It is important to objectively assess the cost of energy production and to establish a selling rate for the produced energy that should be agreeable to consumers and appealing to investors in order to guarantee the biomass power industry in Nigeria grows steadily and healthily. Dasappa and Hewitt costs of building biomass gasification plants shown in respectively, were used as the reference points for the economic analysis of the biomass gasification system in Nigeria in order to determine the economic potential of the biomass gasification technology adopting a fluidized bed type in meeting energy needs [9], [10].

CONCLUSION

This study and analysis looked at the techno-economic possibilities of biomass gasification technology in Nigeria. The feasibility and economic viability of the technology to address the current energy problem in Nigeria are established from the technical and economic evaluations. The benefits and range of uses of the technology were shown. With good practices and technical solutions, the drawbacks of the technology, such as its high capital cost and selling price per kWh, standardization of the technology bundles with services, and logistical issues, might be reduced. It is advised that the technology be adopted with lower capital investment costs, operation and maintenance costs, and fuel costs through development of the gasification system using local materials, purposeful and efficient planning, and the use of biomass gasification technology since it will practically and drastically alleviate, if not completely eliminate, the energy crisis in Nigeria, especially in rural areas where there is no extension of electricity grid. This will shorten the payback time and lower the cost of producing power, while also promoting the growth of biomass gasification.

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CHAPTER 11

BASIC INTRODUCTION TO BATS' ECONOMIC AND ECOLOGICAL IMPORTANCE

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ABSTRACT:

Order The second-most numerous and diversified order of mammals, with a wide range of physiologies and environments, is the Chiropteran. As prey and predators, arthropod suppressors, seed dispersers, pollinators, distributors of materials and nutrients, and recyclers, they serve crucial ecological functions. In terms of economics, they have a lot of advantages and disadvantages. Biological pest control, plant pollination, seed distribution, guano mining, bush meat and medicine, aesthetic and bat-watching tourism, education, and research are just a few of the economic advantages that bats provide. Few kinds of bats have negative consequences, despite the fact that they are among the gentle creatures that have many good ecological and economic advantages. They harm people, animals, agricultural crops, structures, and infrastructure. Additionally, they may attack an aero plane, spread illness, contaminate areas, and bite people in self-defense. In response to human-induced environmental stresses like habitat loss and fragmentation, cave disturbance, food resource depletion, overhunting for bush meat and persecution, increased use of pesticides, infectious disease, and wind energy turbine, bat populations appear to be declining. Despite their significance for the economy and the environment, bats are among the most underappreciated animals, thus their preservation is essential.

KEYWORDS:
Chiropteran, Infectious Disease, Plant Pollination, Suppressors.

INTRODUCTION

The second-most varied group of mammalian orders in terms of physiological and ecological variety is the order Chiropteran. When compared to other animal groupings, they are the most numerous and one of the biggest non-human aggregations. More than 1,232 species are still alive today as a result of their evolution that began before 52 million years ago. Although the majority of live bats weigh less than 50 g as adults, they are tiny, with adult masses ranging from 2 g to 1 kg. They have developed a very wide variety of roosting and eating behaviors. Numerous bat species sleep throughout the day in vegetation, caves, rock crevices, tree hollows, below peeling bark, and other man-made structures. They become active at night and hunt for a variety of foods, including insects, nectar, fruits, seeds, frogs, fish, small animals, and even blood. A bat's forelimb is transformed into a wing by lengthened finger bones that are connected by a thin, bulky membrane that covers 85% of the body's surface. Their wing is a unique animal feature that allows for powered, active flying. The skin that covers a bat's wings serves as a load-bearing area that makes flying possible, but it also serves a variety of other purposes, including gas exchange, thermoregulation, water control, insect trapping, manipulating food, and swimming. The primary factor in bats' extensive range and variety is

their strong flying [1], [2]. All continents, with the exception of Antarctica, the Polar Regions, and some remote oceanic islands, benefit from the presence of bats as a result.

Additionally, it has greatly influenced their unusual eating and roosting habits, reproductive techniques, and social behaviors. Echolocation is not a trait shared by all bat species, although it is often regarded as one of their most distinctive traits. Although it is unclear how echolocation works for bats that visit plants, they do employ a broad range of ultrasonic frequencies when foraging. The capacity to correlate echolocation data with bat biology was greatly aided by the commercial production of bat detectors. Bats are a valuable natural resource that contribute significantly to numerous ecological and economic functions. With the exception of research on ecosystem services directly related to the creation of products and services used by people, determining the ecological and economic benefits offered by bats is, however, quite difficult.

Bats' Ecological Importance:

It has long been assumed that bats play significant ecological roles in material and nutrient distribution, prey and predator dynamics, arthropod suppression, seed dissemination, pollination, and recycling. Bats have a variety of eating habits. Some of them include picking from the available prey while others are generalist predators that eat from a broad range of taxonomic groupings. Additionally, they opportunistically ingest food of the right size when it is available in a chosen environment. Depending on the type of bat, its food may range in size from 1 mm to 50 mm. In the diet of bats, remains of 12 orders or classes of prey belonging to 18 taxonomic families of insects have been documented. Acari, Arachnids, Coleoptera, Diptera, Hymenoptera, Homopteran, Isoptera, Lepidoptera, Neuropteran, Orthoptera, and Trichopteran are some of the prey species. They can feed on small animals, fish, frogs, and even the blood of mammals and birds. Some animals also consume strange prey items as spiders and scorpions. Bats have a wide variety of species, and many of them forage cooperatively to prevent conflict. Diverse mechanisms, like as differences in wing design, body size, and sensory signals, may be used to divide resources [3], [4].

It is difficult to get precise estimates of the quantity of prey devoured by bats. Although it varies with prey availability, time of night, species, sex, age, and the bats' reproductive state, its kind and volume are proven. Several methods have been used to determine the quantity and kind of prey ingested by bats, including direct observation, comparison of pre- and postflight body mass, and faucal sample analysis. According to the findings of research done on insectivorous bats, they eat more than 25% of their body mass in insects per night. A 7.9 g tiny brown bat has to devour 9.9 g of insects during the peak night of breastfeeding, which is more than 100% of its body mass. A female Brazilian free-tailed bat that is lactating eats up to 70% of her body weight on insects per night. It typically just chooses the moths' nutrient-rich belly, leaving the wings, head, and appendages behind, considerably increasing the efficiency of feeding and the number of insects devoured. This might mean that a colony of mothers consisting of a million 12 g Brazilian free-tailed bats could consume up to 8.4 metric tons of insects in a single night. These findings provide some evidence for the enormous power of insect eating and the possible contribution of bats to the control of arthropod populations.

A colony of 300 evening bats and 150 large brown bats in Indiana was predicted to ingest 6.3 and 1.3 million insects annually, respectively, based on faucal sample studies. As a result, it is

believed that 99% of potential agricultural pests are constrained by natural ecosystems, a portion of which may be attributable to bat predation. Through interactions that are mediated by density and trait and for natural balance, bat predation may have direct impacts on herbivore groups and indirect effects on plant communities. Many vertebrate predators, including fish, amphibians, birds, reptiles, and mammals, prey on bats over the globe, despite the fact that there have been very few reports of animals eating bats. Owls, hawks, falcons, snakes, and mammals including raccoons, ringtails, and opossums are the principal bat predators. In certain nations, like as New Zealand, imported rats, feral cats, and weasels commonly prey on forest-floor dwelling bats. Smaller bats have been known to be eaten by the bigger phyllotaxis bats. Most predators' diets typically include just a tiny number of bats. In Great Britain, bats made up only 0.003% of the diets of tiny falcons and hawks and 0.036% of the diets of owls. In certain parts of the globe, diurnal raptors prey on bats at dusk, but in temperate areas, owl nighttime predation exerts the greatest impact on bat populations. Although sometimes preyed upon when foraging or flying, the majority of bats are predated while roosting or when they emerge from roosts. The relatively regular patterns of bats' emergence from roosts and the dense populations of bats at roost locations provide substantial possibilities for predators to feed on bats. To reduce the danger of predation, however, methods including reduced reliance on roost locations, timing decisions, and patterns of emergence from roosts and nighttime activity are used.

DISCUSSION

On the surface of the skin and in the fur of bats, a variety of hematophagous ectoparasites such as bat fleas, bat flies, bat mites, and bugs reside. These host-specific obligate ectoparasites are specialized. The coevolution of both species led to morphological modifications in the skin and hair that play significant roles in impacting the parasite's life style in terms of adaptability, feeding, mobility, and egg laying. The host defense against parasite invasion heavily depends on the hair density, surface characteristics of bat hairs, and mast cell distribution. Although bats' dense hair largely protects them from unfavorable microclimates, it also acts as a passive antiparasitic barrier. Large parasites cannot infest due to the high hair density. However, specialized tiny parasites may find a home in some areas of the host's body where there is thick fur. Some bat species, particularly those from the two bat families, play significant roles in plant pollination in addition to suppressing insects via predation. When compared to bird or insect pollination, bat pollination is rather rare, yet it nevertheless includes a staggeringly large number of ecologically and commercially significant plants. Plant-visiting bats, in particular, offer significant ecological benefits by promoting reproductive success and the recruitment of new seedlings, in addition to the economic worth of their services for plant pollination and seed distribution. When it comes to biomass in their ecosystems, several of these plants are among the most significant species.

For example, in dry and semiarid ecosystems of the New World, bat-pollinated columnar cacti and agaves are the predominant plant types. More than 528 species of angiosperms from 67 families and 28 orders throughout the globe are pollinated by bats. According to research, pteropodid bats pollinate roughly 168 species of flowers over 100 genera and 41 families, whereas phyllotaxis bats pollinate about 360 species across 159 genera and 44 families. Few members of these families are obligatory pollinators because nectar and pollen eating need very specialized anatomy [5], [6]. Pollination and seed dispersion, in contrast to predation, which is

an antagonistic population interaction, are mutualistic population interactions in which plants exchange a nutritive reward for an advantageous service. By depositing seeds from one location to another, animals play a significant role in ecological succession. The significance of frugivorous bats in distributing these seeds is enormous, since 50–90% of tropical plants and shrubs yield fleshy fruits designed for eating by vertebrates. Numerous tropical trees and understory plants have evolved so that animals, particularly bats and birds, may disperse their seeds. Fruit bats that hunt at night in particular are more obedient than birds because they traverse great distances at night, urinate while flying, and spread significantly more seeds across cleared areas. The seeds disseminated by frugivorous bats were relatively far away, in contrast to most seed dispersion by vertebrates, which dispersed near to parent plants with just 100–1,000 m.

Additionally, a large number of seeds are dispersed throughout the route of the flying fox migration, which spans more than 1,000 kilometers across the central region of the African continent. Bats, as opposed to birds, often urinate or spit out seeds while flying, facilitating seed distribution in defined areas. Many bats utilize one or more feeding roosts each night where they deposit the overwhelming majority of seeds swallowed far away from fruiting trees, in addition to their propensity to urinate seeds in flight. Many of the seeds left behind by bats are from tough pioneer plants, which are the first to emerge in the hot, dry conditions of clearings and have a germination rate of up to 95%. As these plants develop, they provide protection that promotes the growth of other, more sensitive species. Fruit-eating bats are crucial to the restoration of the forest. By bringing seeds from outside disturbed regions, tropical frugivorous bats also aid in the regeneration of tropical forests and aid in maintaining species diversity, while neotropical frugivorous bats are crucial to the early phases of forest succession. In many tropical woods, bats distribute the seeds of fig and palm trees. Figs often serve as keystone species in tropical forests because they are also consumed by many birds and animals.

Distribution of nutrients and soil fertility:

Due to their relatively high mobility and use of various habitats for roosting and feeding, which allows nutrient transfer throughout ecosystems, bats play a significant ecological role in soil fertility and nutrient distribution. However, compared to microhabitat circumstances, the presumed significance of nutrient transfer by bats in overall ecosystem function is probably minimal. Bats spread guano throughout the night, which has significant ecological potential for soil fertility and nutrient dispersion. Therefore, bats play a significant role in the transfer of nutrients from nutrient-rich sources, such as lakes and rivers, to nutrient-poor environments, such as dry or highland landscapes. For instance, in Texas, a colony of one million Brazilian free-tailed bats may produce 22 kg of guano-derived nitrogen. Arthropods, fungi, bacteria, and lichens that represent various trophic levels may all be found in considerable abundance in bat guano. Species and food have an impact on the variety of creatures that live on guano. For instance, mites, pseudoscorpions, beetles, thrips, moths, and flies are often found in the guano of insectivorous bats, while spiders, mites, isopods, millipedes, centipedes, springtails, bark lice, true bugs, and beetles are found in the guano of frugivorous bats. Bat guano serves as the main organic input to cave ecosystems, which are by nature barren of primary production since bats regularly or irregularly sleep there. They provide crucial organic material that sustains diverse assemblages of indigenous cave flora and animals. For instance, populations of fish,

salamanders, and invertebrate groups that live in caves rely heavily on nutrients from bat guano. The contribution of bats to the maintenance of complete cave ecosystems has, however, received little attention [7], [8].

The globe is now experiencing significant habitat loss and climate change. Understanding how these variables affect complex biological communities requires more than just monitoring temperature change and habitat loss. Ecosystems vary regionally and are by nature complex, while human change responses are nonlinear and scale dependent. Determining and anticipating reactions to climate change and habitat modification thus requires a vast network of monitoring that includes local, regional, and global components of the earth's biota. Determining bioindicator species that exhibit observable responses to climate change and habitat loss as well as those that represent larger-scale implications on biodiversity is crucial. Biodiversity, ecological, and environmental indicators are three different categories of bioindicators. Indicators of biological diversity, such as species richness and species diversity, represent responses from a variety of taxa. Ecological indicators are species or assemblages that are vulnerable to known environmental stressors and show how such stressors affect the biota. When particular environmental disruptions occur, environmental indicators react in predictable ways. The traits of species that serve as biodiversity indicators may be utilized as indices for other species that make up the biota of interest, such as presence/absence, population density, and relative abundance.

As a result, all of these species must share traits that make them simple to identify, simple to sample, and capable of exhibiting graduated responses to habitat degradation that are consistent with those of other taxa. Additionally, since environmental degradation may take place on a number of scales, it is necessary to choose species with wide geographic ranges to monitor the effects of such threats. As volant taxa, bats more effectively meet this requirement than the majority of other taxa. Excellent biological markers of the quality of a habitat are bats. Due to a combination of their size, mobility, lifespan, taxonomic stability, visible short- and long-term impacts, population trends, and global distribution, they offer immense potential as bioindicators to both disturbance and the presence of pollutants. Numerous factors that influence many other species have an impact on bat populations as well. The decline in water quality, intensification of agriculture, loss and fragmentation of habitats, fatalities at wind turbines, disease, pesticide use, and overhunting are just a few of the factors that can contribute to changes in bat numbers or activity. The extent of changes varies considerably from region to region, as do the kind of human activities that modify and demolish landscapes.

Due to their high trophic levels and sensitivity to pesticide accumulations and other poisons, insectivorous bat populations may fluctuate, which can affect populations of arthropod prey species. High death rates seen in bats linked to illnesses may act as a precursor to environmental linkages between pollution, disease prevalence, and mortality. One may hypothesize that the increasing occurrence of illnesses is a result of changed habitats because greater environmental stress can depress the immune systems of bats and other animals. Over two-thirds of the estimated 1,232 species of bat that are still alive are either obligatory or facultative insectivorous animals. They eat nocturnal and crepuscular insect species from a variety of habitats, including wetlands, grasslands, farms, and aquatic environments.

Based on the identification of insect pieces in faucal samples and stomach contents, many species of well-known insect pests have been discovered in the diet of bats. They devour

prodigious amounts of insect pests, which yearly cost farmers and foresters billions of dollars. The June beetles, click beetles, leafhoppers, plant hoppers, spotted cucumber beetles, Asiatic oak weevils, and green stinkbugs are some of these insects. Every night, Mexican free-tailed bats feast on the maize earworm moth, one of the most expensive agricultural problem insects. Each female corn earworm moth may lay up to 500 eggs, and one bat can consume up to 20 of them in a single night, which might result in the production of 10,000 crop-damaging larvae.

A summer's worth of adult cucumber beetle consumption by 150 large brown bats also prevents the hatching of 33 million root worm larvae's worth of eggs, preventing agricultural pest harm. This means that in regions afflicted by the condition known as white nose syndrome, 660–1,320 metric tons of insects are no longer eaten annually. Each night, millions of Brazilian free-tailed bats eat 12 orders and 35 families' worth of prey, totaling roughly 14,000 kg of agricultural pests. A colony of 150 big brown bats in the midwestern United States annually consumes about 600,000 cucumber beetles, 194,000 June beetles, 158,000 leafhoppers, and 335,000 stinkbugs, which are severe crop pests, according to the dietary composition, number of specific agricultural pest species in each pellet, and number of active foraging days per year. One of the many animal species that naturally feed on mosquitoes is the bat. More than 15 tons of mosquitoes are consumed each year by a Florida colony of 30,000 southeastern myotis. Additionally, it is well-known that Myotis septentrional is, or northern long-eared bats, directly prey on mosquitoes to control their numbers.

It might be difficult to estimate bats' economic value in agricultural settings. The lack of fundamental ecological knowledge on foraging behavior and food for many species of bats is a typical obstacle in the research of the use of bats as pest management. For instance, traditional dietary analyses using faucal or stomach contents have only ever been able to identify arthropod fragments at the ordinal or familial level, rather than at the species level. When species identification has been possible, it has typically only been possible for hard-bodied insects, although recent novel molecular techniques have made it possible to detect and identify both hard and soft-bodied insects. However, in Texas, the cost of the pest control services provided by bats varies from $12 to $173 every 0.405 hectare. In the USA, the value of bats is estimated to be between $3.7 and $53 billion annually, discounting the costs associated with the effects of pesticides on ecosystems, as a consequence of lower pesticide application costs owing to insect pest reduction by bat predation.

Tropical bats serve as important pollinators for several local and global economies. Wild bananas, mangoes, breadfruits, agave, durians, and petal are examples of large-scale cash crops that were once pollinated or spread by bats, and durians and petal still depend on bats for pollination today. Southeast Asia's most well-known fruit, durian, which is valued over $230 million annually, blooms at twilight and nearly entirely depends on fruit bats for pollination. All banana species, including the progenitors of edible bananas, that have horizontal or drooping flowers are largely pollinated by bats, with the exception of "ornamental" bananas with upright flowers that are pollinated by birds. Their nighttime blossoming, distinctive scent that draws bats, a lot of readily available nectar, and pollen are all adaptations for bat pollination. Even while other species like monkey’s graze on fruits and distribute seeds, the coevolution of bananas and bats over 50 million years produced adaptations for efficient seed dispersion. The ecological services that bat offer for their wild counterparts are crucial for

maintaining their genetic variety even when they are no longer required to pollinate flowers or disseminate the seeds of edible bananas.

For Agave macro acantha to successfully reproduce, nocturnal pollinators are crucial, with bats playing a particularly significant role in pollination. These pollinators, some of which are migratory bats, have been shown to be progressively disappearing. The effective sexual reproduction of the plant host may be hampered, and its survival may be in jeopardy, if pollinator numbers continue to drop. Bats pollinate the Mahwah tree, often known as the honey tree. These pollination activities highlight one of the commercially and culturally significant ecological services offered by plant-visiting bats. In India, farm cart wheels are made from this tree's wood. The flowers are used to make distilled spirits, sun-dried fruits for human consumption, and soaps, candles, cosmetics, lubricants, and medications. The oil collected from the flowers and seeds is also utilized to make these products. Similar to this, 289 Old World tropical plant species depend on bats for pollination and seed dispersion in order to survive. As a result, these plants help produce 448 bat-dependent goods across a range of categories, including timber and other wood products, food, beverages, and fresh fruit, medicine, dye, fiber, animal feed, fuel wood, decorative plants, and others. But only a percentage of the final product's overall value can be ascribed to bats since their services are only one input in a multi-input manufacturing process. By integrating the pollination dependent ratios with regional crop output and their pricing, the pollination services of bats for 100 food crops were calculated. Of these, 46 crops were somewhat dependent on animal pollinators, accounting for 39% of the value of global output.

Based on crop output and animal-dependent pollination, it is estimated that bats provide $200 billion in overall economic value to the world's pollination services, or 9.5% of the value of the world's food crop production in 2005. Tropical forests all across the globe depend on bats for their existence. Every year, vast areas of rain forest are destroyed for logging, farming, ranching, and other purposes. Fruit-eating bats are well adapted to spread the seeds of "pioneer plants," from which a diversified and robust forest might reappear. As a result, bats contribute significantly to the economic worth of forests. For instance, it is estimated that bats' seed distribution services are worth $212,000 for seeding acorns and $945,000 for planting saplings to the regeneration of gigantic oak. One of the bat-dispersed plants is the tropical almond tree, Terminalia catalpa, which has several benefits for humans, including shade, fuel wood, edible nuts, lumber, and tannin. Large leaves may also be used as wrapping paper and offer a variety of medical benefits, including diaphoresis, stomach relief, dysentery prevention, and headache relief.

Due to its high concentrations of limiting elements like nitrogen and phosphorus, bat guano has traditionally been extracted from caves for use as fertilizer on agricultural crops. Some of the best natural fertilizers in the world are available there. A market for the commodity may be seen in the approximately 950 bat guano products. Depending on the container size and the composition of the product, the cost of bat guano organic fertilizer ranged from $1.25 to $12.00 per 0.5 kg. From Bracken Cave in Texas alone, hundreds of tons of Mexican free-tailed bat guano have been harvested for fertilizer, with current retail prices per kilogram me ranging from $2.86 to $12.10. Guano collection is practiced in certain locations sustainably, particularly in caverns where bats often spend a portion of each year migrating to other

locations. Some businesses have also employed the microorganisms collected from bat guano to enhance detergents and other goods with high human value [9], [10].

CONCLUSION

Numerous zoonotic and possibly zoonotic diseases are hosts to bats. Due of their distinctive and varied lives, which include their capacity for flight, frequently very gregarious social structures, lengthy life spans, and low fertility rates, they vary from other disease reservoirs. They constitute a possible epidemiologic risk factor for a number of illnesses that may be lethal to people, such as leptospirosis, histoplasmosis, rabies, Ebola, and pseudotuberculosis. Multiple diseases that are reservoirs in bats may spread due to physiological stress brought on by habitat loss or modification. White nose syndrome in bats has been associated with recent die-offs, which may be related to increasing environmental stress that makes bats more vulnerable to fungus and viral diseases such lentiviruses, European bat lyssaviruses, rabies, and Ebola virus. Activities by humans that enhance bat exposure will probably increase the possibility of illnesses. The fungus Histoplasma capsulatum, which causes the lung ailment known as histoplasmosis, may be found in bat guano, just as it can in bird droppings.

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CHAPTER 12

HIGHER VOCATIONAL EDUCATION AND ECONOMIC DEVELOPMENT IN THE YANGTZE RIVER ECONOMIC BELT FROM 2008 TO 2020

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ABSTRACT:

By building a comprehensive evaluation indicator system and utilizing a coupling and coordination degree model, empirical research is done on the relationship between higher vocational education and regional economic development in the Yangtze River economic belt using panel data from 2008 to 2020. The study's findings indicate that during the last 13 years, both the regional economic development system and the higher vocational education system have seen their development levels grow in the Yangtze River economic belt. The two systems engaged in a sound coupling relationship. Their degree of connection and coordination, however, was not great. 73% of the provinces were in a state of imbalance and transition by the end of 2020, and the degree of coupling coordination shown a gradient phenomenon of "high in the East and low in the west. The Yangtze River Economic Belt shall deepen supply-side reform of higher vocational talent training in accordance with needs of industrial development, optimize the layout of higher vocational specialties to boost the adaptability of education to economy, and strengthen regional overall coordination to accelerate cluster development of regional higher vocational education in order to improve the coupling and coordination level between the two systems.

KEYWORDS:
Accelerate Cluster, Economic Development, Indicator, Vocational Education.

INTRODUCTION

Higher vocational education is a crucial component of the national education system and the development of human resources. It is also the type of education that is most closely linked to the advancement of the economy and of society, and it is a key factor in fostering the efficient interaction between the talent, industrial, and innovation chains. On the one hand, the higher professions are intimately related to the reorganization, modernization, and upgrading of the industrial structure, which may provide crucial intellectual and labor resources for economic growth. The volume, quality, and rate of growth of regional higher vocational education are, to some part, determined by regional economic development, which also serves as a baton for optimizing specialty setup and developing talent training methods in the higher vocational education. Higher vocational education and local economic development work together to support and entrench one another. One of the vitally needed considerations in this context is how to fully use the benefits of higher vocational education to support the high-quality growth of the regional economy. China's promotion of the building of the Yangtze River economic belt started an expedited phase in 2016 with the formal release of the Yangtze River economic belt development plan's framework [1], [2]. The importance of fostering the growth of the

Yangtze River economic belt is obvious given that it is the area with the greatest potential for China's economic and social development. The Yangtze River economic belt, which includes 11 provinces and cities including Shanghai, Jiangsu, and Zhejiang, accounts for around 21% of the country's total area and has a population and GDP that are more than 40% of the national average. It is one of the areas in China with the greatest overall strength and the greatest level of strategic assistance.

In order to provide theoretical support and empirical evidence for promoting the high-level coordinated development of higher vocational education and society, this study investigates the level of development and the coupling and coordination relationship between the regional economic development system of the Yangtze River economic belt and the higher vocational education system of the 11 provinces in that region. Education and economics have always been two intertwined terms that are complimentary to one another and have attracted long-term interest from academic circles both domestically and internationally. Based on his human capital theory, Theodore W. Schultz paved the way for fresh study on the connection between education and economic development as early as the 1960s. According to this hypothesis, systematic human resource enhancement is substantially more successful than the economic contribution of physical capital, and education is the primary mechanism for building up human capital.

Later researchers Paul Romer and Robert Lucas emphasized that education accelerates technical advancement while boosting economic development, arguing that knowledge and skilled human capital are the primary origins and driving factors of economic expansion. The human resources with systematic and formal education are the most major element contributing to the economic development, according to Herbertsson's empirical study on the causes for the economic progress of the Nordic nations. By assessing the effect of human resources at various levels of education on the level of economic development, Pereira demonstrated the differences in the contributions of various educational inputs to economic growth. It is clear that relevant international research has mostly concentrated on the one-way influence and contribution of education to economic growth, and the majority of findings indicate that education positively accelerates economic development [3], [4].

Domestic research emphasizes the relationship between education and economy more than studies conducted outside. The present research mostly focuses on theoretical analysis and actual study. Theoretical debates often center on how education and economic growth are connected internally and coordinated. For instance, He et al. used the logical structure diagram to analyses the dialectical link of the two-way drive between education and economy and then presented policy suggestions based on actual practices. In order to ensure the coordinated development of vocational education and the economy, Wang analyzed the typical experiences of Germany, the United Kingdom, Australia, and other developed nations. Wang then proposed some initiatives from the perspectives of institutional level, organization, and specific strategy. From the standpoint of integrating production and education, Xia and Shi examined the mutual acceleration between higher vocational education and regional economic development and proposed 5 paths for coordinated development, such as expanding the concept of operating schools and implementing coordination management. Wang and colleagues used configuration thinking and the fiscal technique to investigate the complex causal mechanisms that impact the high-quality development of regional economies by integrating the internal and external

circumstances of higher education, using 31 provinces and cities in China as instances .Numerous studies on the coordinated development link between education and economy have used the econometric model, statistical analysis, and other techniques for the empirical investigation.

For instance, Fu and Zhao obtained the spatial-temporal differentiation of higher education and economic development in 31 provinces of China against the backdrop of "Double First-class Initiative," and Zhou and Zhu examined the relationship between the higher vocational education and the economic development level in Chongqing based on time series data using the Granger causality test method. Higher education and the regional economy are interdependent and complementary, according to Hao's empirical analysis of the spatial-temporal stability of the coordination between them in China from 2009 to 2018 using the spatial statistics method. By using a PVAR model and utilizing panel data from 31 Chinese provinces from 2009 to 2018, Xie and colleagues examined the dynamic association between higher vocational education investment and industry structure upgrading. They came to the conclusion that investing in higher vocational education has a positive short-term impact on industrial structure upgrading, and that this promotion effect exhibits a phased characteristic of positive and negative alternation" on higher vocational education investment.

Researchers tend to place greater emphasis on the connection between undergraduate education or all of higher education and the economic system and less emphasis on higher vocational education. The Yangtze River economic belt in particular, experts tend to place more emphasis on the national or single province level than on the coupling and coordination between higher vocational education and the economic system at the mesa level. Scholars emphasize the causality test technique, spatial statistics method, and other econometrics or statistics method more from the standpoint of research methodologies. Subjective considerations will always conflict with such procedures. Subjective randomness may be avoided using a coupling and coordination model based on the objective entropy technique of assignment. In order to measure the comprehensive development level and degree of coupling and coordination of the higher vocational education and economic development system, this research used panel data from the 11 provinces in the Yangtze River economic belt, including Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Guizhou, and Yunnan from 2008 to 2020 [5], [6].

DISCUSSION

A comprehensive evaluation indicator system for the higher vocational education system and the regional economic development system is built on the basis of classifying relevant research literature according to connotation and characteristics of the higher vocational education and the regional economic development, in combination with scientific, systematic Ness, hierarchy, feasibility, and other principles for building the indicator system. The characteristics of higher education as well as a specific profession focus are both features of vocational education, which is a form of education separate from general education. The higher vocational education system chose education scale, education quality, and education success as criterion-level consideration factors based on the concept of "input-process-output" educational performance assessment. The education scale describes the fundamental state of education and indicates the level of educational growth. It includes three assessment indicators: enrollments, enrolment rates, and the number of college students. The quality of education is influenced by both financial and

human resources. The investment and distribution of education money and professors in vocational institutions mostly reflect the quality of instruction provided. In this study, the three indicators national fiscal education fund, educational revenue, and teacher-student ratio reflect the quality of education the most. The effectiveness of education investment is reflected in the outcome assessment measure known as education accomplishment. The number of higher vocational colleges' granted patents, the number of awards in the National Competition for Skills of Vocational Education, the number of national models, and "high-level higher vocational college with Chinese characteristics and specialty cons" are three indicators that, when combined with college-running orientation and objective of the higher vocational colleges, reflect education achievement in this research.

The regional economic development system chose economic size, economic structure, economic benefit, and inventive development as criterion-level consideration factors based on the features of regional economic development. The following two indicators per capita gross regional output and employment across all societal sectors reflect the economic size, which is a description of the integrated capacity and development status of the regional economy. The distribution of social productivity and production elements is mirrored in the economic structure, which is shown in this study by the following two indicators: the share of secondary industry in GDP and the share of tertiary industry in GDP. The three metrics used in this study to measure economic benefit the per capita income disparity between urban and rural regions, GDP growth rate, and Engel coefficient reflect the link between social and economic input and output. The following three indicators the internal expenditure of research & development fund, the full-time equivalent of research & development personnel, and the number of granted patents reflect the potential and development trend of local economic growth and depend on the investment in labor forces and funds for scientific and technological innovation.

Data Source Descriptions:

The local statistical yearbooks of the provinces in the Yangtze River economic belt, the Ministry of Education's official website, and the Educational Statistics Yearbook of China 2008-2020 are the data sources for this study's higher vocational education system. National model and high-level higher vocational college with Chinese characteristics and specialty construction plan" higher vocational college construction units from 2006, national backbone higher vocational college construction units from 2010, and high-level higher vocational colleges with Chinese characteristics and specialty construction plan units from 2019 make up the total number of higher vocational colleges. The China Statistical Yearbook 2009–2021, the China Statistical Yearbook on Science and Technology 2009–2021, and local statistical yearbooks serve as the system's data sources [7], [8]. The weights of the indicator data in this study are determined using the entropy approach. Table 1 displays the indicator system and the outcomes of the weight computation. Entropy is a unit of measurement for irregularity and unpredictability in a closed system in thermodynamics. The degree of dispersion of an indication, as expressed by the information entropy, may be used to estimate an indicator's significance based on its properties. The influence of the indication on the overall assessment increases with increasing dispersion degree, and vice versa. The entropy evaluation method, in contrast to the subjective weighting evaluation method, uses the information entropy principle to determine the weight in an objective manner. This method can better avoid the subjective randomness of weighting in the calculation programmed and conduct the object evaluation in

a more accurate and objective manner, which is suitable for the thorough evaluation of multiple indicators in this study. shows that higher vocational education in the Yangtze River economic belt is typically growing and making significant progress, which is consistent with the context of the recent years, during which China has placed a strong priority on the development of vocational education.

China has passed a number of laws since 2005, including the State Council's Decision on Vigorously Developing Vocational Education, the State Council's Decision on Accelerating the Development of Modern Vocational Education, and the State Council's Decision on Implementing National Vocational Education Reform. The connotative development of higher vocational education was significantly accelerated by these measures, which gave vocational education a more prominent role in educational reform, innovation, economic growth, and social development. However, the complete assessment indicator has hit its historical apex in 2019, signaling the beginning of a clear turning point. The sharp declines in internship training and employment scale of the students closely connected with enterprises at the end of 2019 as a result of COVID-19 on the economic industry have directly impacted the number of hired teachers, which is reflected in changes in the teacher-student ratio and other indicators. Additionally, the National Competition for Skills of Vocational Education in 2020 had a sharp reduction in competition items, competition teams, and winner numbers compared to those in 2019, which also contributed to the indicator's collapse.

In addition, a rather clear phenomena of regional hierarchy are shown by the complete assessment indicator of higher vocational education. Jiangsu, Zhejiang, and Hunan are placed in the first hierarchy, followed by Anhui, Sichuan, Hubei, Jiangxi, Shanghai, and Chongqing, and Yunnan and Guizhou in the second hierarchy. shows that from 2008 to 2020, there will be a strong correlation between the regional economic development system and the higher vocational education system in the Yangtze River economic belt. The average measure of regional economic development increased by 149% between 2008 and 2020, from 0.1488 to 0.3717. The average indicator of the complete assessment of higher vocational education increased by 270% from 0.0847 in 2008 to 0.3141 in 2020. It seems that higher vocational education is developing at a rate much faster than the local economy. Regional economies, on the other hand, generally outperformed higher vocational education in terms of development level during the same period, and they also displayed a relatively clear-cut phenomenon known as provincial hierarchy, which is as follows: first hierarchy, second hierarchy, and third hierarchy.

A comparison between the annual average values of the comprehensive evaluation indicators of the higher vocational education system and the regional economic development system in the Yangtze River economic belt from 2008 to 2020 was made to further measure the synchronicity of the two systems. The type of the coordinated development was calculated in accordance with the results of the comparison. Anhui, Jiangxi, Hubei, Hunan, Chongqing, and Sichuan are among the six provinces that have advanced higher vocational education, making up 54.5% of all the cities in the Yangtze River industrial belt. Shanghai, Jiangsu, Zhejiang, Yunnan, and Guizhou are among the five provinces with the lowest levels of higher vocational education, making up 45.5% of all the cities in the Yangtze River industrial belt. On the one hand, the regional economic development system and the higher vocational education system have developed in quite different ways throughout the provinces. On the other hand, it also

suggests that the two systems have a significant link. According to coupling degree results, the two main systems in Guizhou Province had moderate coupling levels in 2008 and 2009, with coupling degrees of 0.5691 and 0.6575, respectively. Other provinces over the years had coupling degrees higher than 0.8, indicating a high coupling degree. Jiang has the greatest average coupling degree, followed by Hubei, while Guizhou has the lowest average coupling degree, according to the particular rankings. Most of the provinces have a relatively modest coupling and coordination degree when seen from the viewpoint of the yearly average. Only Jiangsu and Zhejiang, which are in the main coordination stage of the coordination type, have yearly average values of the coupling and coordination degree greater than 0.6 out of the 11 provinces.

Hunan is in the transition type's limited coordination stage. In the near imbalance stage of the transition type, Sichuan, Hubei, Anhui, Shanghai, and Jiangxi are all now positioned. With yearly average values of the coupling and coordination degree less than 0.4, Chongqing and Yunnan are in the moderate imbalance stage of the imbalance type. The last place finisher, Guizhou, is in the mild imbalance stage of the imbalance type. The empirical findings demonstrate that, since 2008, there has been a strong coupling relationship between regional economic growth and higher vocational education in the Yangtze River economic belt. It demonstrates how the two systems rely on and complement one another. An essential motor for promoting the growth of the local economy is the advancement of higher vocational education. A long-term running-in is required to achieve the high-quality coupling between higher vocational education and economic and social development, which is related to the adaptation of vocational education to the economy. The development of the regional economy creates the conditions and market demands for the continuous development of higher vocational education.

The overall conditions of the coordinated development of the two are not perfect, nevertheless, as shown by the coupling coordination degree value. The higher vocational colleges are still comparatively behind in terms of talent training specifications, types, and other aspects, which prevents them from meeting the demands for high-end industries and industrial high-end development. As a result, they are unable to keep up with the high-quality development of the industrial economy and high-end development of talent demand specifications. The establishment and adaptation of some specialty groups also lag behind the rate of industrial development due to the rapid development of emerging technologies, and the strength of talent training is insufficient to meet the demands of regional industrial transformation and upgrading, particularly for strategic emerging industries. In certain provinces, it has caused varying degrees of imbalance between higher vocational education and regional economic growth, and the degree values of coupling and coordination between the two systems are poor [9], [10].

CONCLUSION

Based on panel data of 10 years, this study builds an extensive evaluation indicator system for the higher vocational education system and the regional economic development system. It then calculates and analyses the coupling and coordination degrees of the higher vocational education and regional economic development of the 11 provinces in the Yangtze River economic belt. The following are the primary conclusions: The Yangtze River economic belt's higher vocational education system and regional economic development system have both seen fluctuations in their general growth levels during the 13 years from 2008. The average value

of the system for regional economic development's comprehensive assessment indicators is somewhat greater than that of the system for higher vocational education. However, thanks to supportive policies, the higher vocational education system has made quick progress, and its rate of development growth is substantially greater than that of the regional economic development system.

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