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Analysis of Cornell Cooperative Extension under the Background of Big Data



Abstract: - In the era of knowledge economy, higher education has become the support and engine of socio-economic development, and the importance and urgency of its social service function have become more prominent. The content and form of services urgently need to be updated and innovated. Analyzing the history and current development status of typical university social services undoubtedly has important exemplary value. As one of the earliest universities born in the United States to serve society, Cornell University has a deeply rooted concept of social service, a complete social service system, and a unique social service promotion system. The development of information technology and big data has greatly improved the social service field of the university. In order to have a deeper understanding of the development track and operation logic of Cornell University's social service extension system, this paper adopts the method of literature research, historical research and case study to trace the source of Cornell University's social service concept and explore Cornell University's social service extension model -- agricultural extension project with advantages of traditional "land-grant college". Learn about natural resources, environment and sustainable energy development projects that keep pace with The Times, as well as youth development and family upbringing services for family education. This article believes that the social services provided by Cornell University under the social service promotion system have a strong academic and professional nature, and the direction, content, and social needs of serving society are highly matched and coupled, which helps the university form a complete social service system. Its mature social service promotion system and successful experience in social services have important implications for the construction and improvement of university social service functions.

Keywords: Cornell University, Social Service, Cornell Cooperative Extension, Big data

I. INTRODUCTION

Cornell University was founded in 1865 and has actively provided social services since its establishment. The formation of the Cornell Plan in 1868 marked the formal establishment of the university's social service function. With the rapid development of information technology, big data has become an important support CCE. Big data, with its personalized, efficient, extensive and other advantages, has brought great improvement to the field of social service of Cornell University. At present, academic research on this system is mostly under the background of social services, as one of the cases supporting the improvement of Cornell University's social service function.[1] There is relatively little research on analyzing Cornell Cooperative Extension(CCE) alone. Besides, the research background of CCE stayed for a long time, mostly in the forming stage of the system in the 20th century,[2] and the subsequent participants, types of expansion projects, and project data have not been updated. Third, the existing research only discusses the reasons for the formation of the system,[3] or simply lists the extension projects,[4] and does not conduct in-depth research and analysis on the complete operation process of the system, nor does it lack necessary evaluation and revelation. In short, a comprehensive study of CCE has yet to emerge.

This article takes the Cornell Cooperative Extension as the research object, and uses literature research, historical research, and case study methods to update the participants, promotion project types, and project data of CCE. It analyzes the causes, operational processes, and service models of the system, and summarizes the characteristics of CCE promoting Cornell to improve their social service system, strong academic nature, and high coupling with social needs. It reveals that the development of application-oriented universities should adhere to the adjustment of educational concepts, attach importance to the play and updating of social service functions; clarify one's own social service positioning and accurately seek the docking point for social services; improve the operational mechanism of social services, establish an effective service guarantee system, and so on.

II. TRACING THE CONCEPT OF CORNELL UNIVERSITY'S SOCIAL SERVICE EXTENSION SYSTEM

The origin of Cornell University's concept of social service has its specific historical basis, which is inextricably linked with the needs of the economic and social development of the United States in the first half of the 19th century. In the early years of the founding of America, the rapid development of industry and agriculture

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objectively provided a good social environment for the formation of Cornell University's social service function and the establishment of modern higher education system. The educational ideas of Cornell and White, the founders of the university, also provided the necessary ideological guidance for the generation of Cornell's social service function. The introduction of a series of laws such as the Morrill Act has provided policy guidance for the formation of Cornell University's social service concept. The gradual prevalence of pragmatism has had a great impact on the traditional colonial college education and laid the educational philosophy foundation for the formation of Cornell University's social service function.

The introduction of a series of laws such as the Morrill Land-Grant Act has provided policy guidance for the formation of Cornell University's social service function. The law does not specifically provide for "social services," but Article 4 stipulates: "Land grant colleges shall teach agricultural and mechanical related subjects in accordance with the methods determined by the state legislature, without excluding other classical scientific disciplines, including military strategy, to meet the cultural and practical education needs of all industrial classes in different jobs and professions".[5] These provisions conveyed far-reaching goals: institutionalization of practical research and education, integration of classical disciplines and practical scientific knowledge education, opening up universities to new social classes, especially industrial classes, and leaving it up to the states to explore ways to build land-grant colleges and achieve their goals. Once enacted, the Act had a huge impact on the structure and expansion of American higher education, and eventually promoted the rapid growth of social productivity in the United States. Historian James McPherson called the Morrill Land-Grant Act "one of the most productive works in American history." [6] As the product of the "Land Grant Act" and the representative of the land-grant college, Cornell University has integrated social service into its educational philosophy since its establishment, which is embodied in the famous Cornell plan in the history of American higher education formulated in the early days of the school's establishment. The main contents of the plan are as follows: "First, emphasize the combination of liberal education and practical education; The second is to emphasize the equal status of each course; The third is to emphasize the function of scientific research and serve the society; Fourth, standardize the management system of Cornell University; The fifth is to attach importance to the communication between the university and the government and society." [7] In addition, in the early days of Cornell University, the training of applied talents, the establishment of agricultural experiment stations, the promotion of agricultural technology and other measures have fully reflected the impact of the Morrill Act.

The educational ideas of Cornell and White, the founders of the university, also provided the necessary ideological guidance for the generation of Cornell Cooperative Extension. Ezra Cornell had a strong sense of public service, and he had a vision of the United States as a place where public prosperity and universal justice benefit all people. Cornell wanted to build a comprehensive and practical institution of higher education dedicated to a variety of intellectual activities. This institution of higher learning should organically combine practical education and humanistic education to meet the needs of young people for knowledge in farms, mines, factories, scientific research and other professions, and be well able to solve all practical problems in life. [8] Cornell indignantly rejected the idea of an "aristocratic" institution, as Cornell put it in the university's founding inscription; "I would found an institution where any person can find instruction in any study." [7] This sentence has also become the guiding principle for the development of Cornell University and has influenced the growth of several generations of Cornell people. The other founder of the school, also the first president of the university, White, provided a source of ideas for the establishment of Cornell and drew a blueprint for its development. Years of experience in studying, visiting, and serving in universities have enriched White's university philosophy and forged the philosophy of White University, all of which are ultimately reflected in Cornell University. At Cornell University, White sounded the horn of democratization in American higher education, offering pragmatic courses that organically integrate university education, scientific research, and social services, becoming a model of the combination of humanities education and practical education in modern American universities. [9] Cornell University made White's university ideals a reality.

The rise of pragmatism in the United States has greatly influenced the development of the whole society, promoted the higher education from college to university, promoted a number of real colleges and universities to emerge, and made American higher education enter the era of "university". [10] Among the numerous land grant colleges, Cornell University's educational philosophy is quite typical, fully reflecting the pragmatic philosophy, especially in the practical and technological traces of American higher education in terms of majors and curriculum settings. Since its establishment, it has vigorously developed agricultural and mechanical colleges, carried out agricultural education, established agricultural extension experimental stations, and trained professional and technical talents. Cornell College of Engineering expects students who have taken STEM courses to grow into

highly sensitive, responsible, and capable leaders in solving complex real-world problems, promoting human development; [11] Cornell Hotel management is guided by the needs of the industry and takes "shape the global knowledge base of hospitality management" as its mission. The training goal is clearly defined as "training Hospitality Leadership Through Learning in the 21st century", and cultivating "skills-management-operation" composite talents with high management ability and decision-making level. In the face of the change of domestic industrial structure and the increase in demand for complex senior talents, Cornell has also made its own timely response. The updated undergraduate programs in the Cornell College of Agriculture and Life Sciences over the past decade are almost all interdisciplinary, focusing on the breadth of knowledge, emphasizing the integration of expertise in various fields and the unique ability to solve problems from multiple perspectives. The Nutrition Science program is jointly developed by the College of Human Ecology and the College of Agricultural Life and Sciences. The Earth and Atmospheric Sciences program involves many branches of mathematics, physics, and a unique combination of earth science knowledge. Highlighting students' personal freedom, combining classical knowledge with practical knowledge, serving society and transforming society through scientific research, etc., all reflect the profound influence of pragmatic philosophy on Cornell University's founding and social service concept. As President White put it, "Her (Cornell) graduates will fill legislatures, grow into newspaper employees, and serve on committees in cities and counties across America. Once graduates become the backbone of society, the decay of America will stop, and pure American ideals will triumph." [9]

Following the historical clues and examining the reasons for the establishment of Cornell University's social service function, we find that Cornell University's high-level service philosophy and exemplary social service function connotation are not accidental, but historical inevitability. This inevitability is closely related to factors such as the needs of economic development, the promotion of national legislation and policies, the educational ideas of the founders, and the philosophy of pragmatism. The development of the American social economy has become a leading factor in the emergence of Cornell University's social service concept. A series of bills such as the Land Grant Act have laid a solid legal foundation for the development of Cornell University's social service. Cornell and White provided a source of thought and blueprint for the development of Cornell University's social service, and Cornell University's social service concept has also been deeply influenced by pragmatism. The integration of the three major concepts of talent cultivation, scientific research, and serving society into the entire educational process of Cornell University fully reflects its mission as a land grant college.

III. MAIN SOCIAL SERVICE EXTENSION INSTITUTIONS AND CONTENT OF CORNELL UNIVERSITY

As a university created by land grants, serving the development of New York State is the inherent responsibility of Cornell University, and promoting the development of local agricultural and industrial education was the most important mission of the university when it was founded. Cornell University's Agricultural Sciences was established in the 1860s and has developed over 150 years to become an international first-class teaching, research, and promotion organization based on agriculture, relying on the environment and natural resources, and focusing on life sciences. The College of Agriculture and Life Sciences positions its mission as: to utilize education and research to benefit the general public. For many years, the college has been based on outstanding scientific research level, focusing on national agricultural extension services, working closely with producers to promote the organic integration of teaching, scientific research, and social services, and contributing to the development of productivity in New York State.

A Agricultural Promotion Activities Highlight the Characteristics of the Land Grant College

The College of Agriculture and Life Sciences (CALS) at Cornell University has multiple agricultural extension service institutions, The most influential among them are the Agricultural Experiment Station on the main campus of Cornell University, which focuses on critical agricultural issues, and the New York State Agricultural Experiment Station, located in Geneva, New York, which focuses on promoting the application of advanced agricultural technologies. The aim is to help agricultural stakeholders develop productivity through university faculty, extension personnel, agricultural experts, and others.

The effective implementation of agricultural extension services cannot be separated from the Cornell Cooperative Extension (CCE) constructed by the Agriculture and Life Sciences at Cornell University. The main operational process of this system is as follows: firstly, establish agricultural extension stations in various districts and counties of New York State; Secondly, Cornell University faculty and cooperative promoters from various districts and counties in New York State jointly serve as technical promoters; Thirdly, targeting small farmers, fruit and vegetable producers, dairy industry practitioners, and other agricultural producers in rural areas, the system

aims to introduce the latest agricultural research achievements of the university, popularize new agricultural technologies, and accelerate the application of theoretical research to practice. This will help farmers solve difficult problems and help them thrive in a rapidly changing world. This system has promoted the establishment of extension stations in 57 counties of New York State and 26 field experimental stations.[12] These institutions regard the development of agriculture in New York State as a key research goal, combining local experience and cutting-edge science, and using empirical analysis as a powerful tool to solve agricultural problems in New York State. Ultimately, they converge into an efficient agricultural science system and agricultural technology knowledge network, which are promoted and applied throughout the United States. The CCE directly benefits 1.9 million people nationwide every year, and indirectly benefits 15 million people nationwide through online means.[13] Overall, under the leadership of the US Department of Agriculture, a federal state local linkage agricultural service promotion model with Cornell University characteristics has been formed to promote socialized services (Figure 1).

The two major experimental stations of the university are important research bases and think tanks for Cornell University in the field of agriculture and food systems. The Agricultural Experimental Station has a history of over 140 years, connecting Cornell University's world-class research farms and crop cultivation facilities with the state wide cooperative extension, and addressing urgent issues such as species invasion and climate change that pose a threat to social health and well-being through technological promotion cooperation in the agricultural areas of New York State. The experimental station has over 14000 acres of research farms and over a dozen crop cultivation greenhouses, with a 127000 square foot greenhouse space that can accommodate hundreds of research projects.[13] The annual funding of \$6 million from the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture (USDA) also provides the possibility for scientists to conduct research services. The New York State Agricultural Experimental Station (NYSAES), located in Geneva, New York, was established in 1882 and operated by the School of Agriculture and Life Sciences at Cornell University. The development concept of this experimental station is to engage in research in various fields such as agriculture, life sciences, and food sciences, integrating the latest technological achievements of Cornell University with the production of specialty crops and food, and establishing a sustainable food system.[3] With the development of the times, the agricultural structure of New York State has undergone changes, and the promotion scope of the New York State Agricultural Experimental Station has been continuously adjusted. From the early focus of a few scientists on dairy products, horticulture, and evaluation of vegetable and field crop varieties, it has expanded to over 300 researchers providing services to the state's wine industry, beer producers, bioenergy crop production, food practitioners, and farmers whose crops have been affected by pests and diseases. In the 21st century, the experimental station maintained its position as the economic engine of New York State with an annual output value of over 36.7 billion US dollars.[3]

In addition to the two major experimental stations, regional agricultural projects are also the backbone of Cornell University's service to agriculture. Regional agricultural projects offer a wide range of services and a wide range of types, covering multiple counties and districts in New York State. They provide scientific information and technical assistance to producers of dairy products, livestock, field crops, vegetables, grapes, and fruits. The regional agricultural experts promoted by Cornell are using the latest farm modernization and labor development tools, as well as pest and disease management technologies, to accelerate the entry of agricultural products into emerging markets and help farmers overcome increasingly severe environmental and economic challenges. Representative cases of this project include the Harvest New York, Cornell Small Farms, Regional Agriculture Programs, the Commercial Horticultural Program in Eastern New York State, the Cornell Vegetable Program, the Lake Erie Grape Project, and the Lake Ontario Fruit Project.

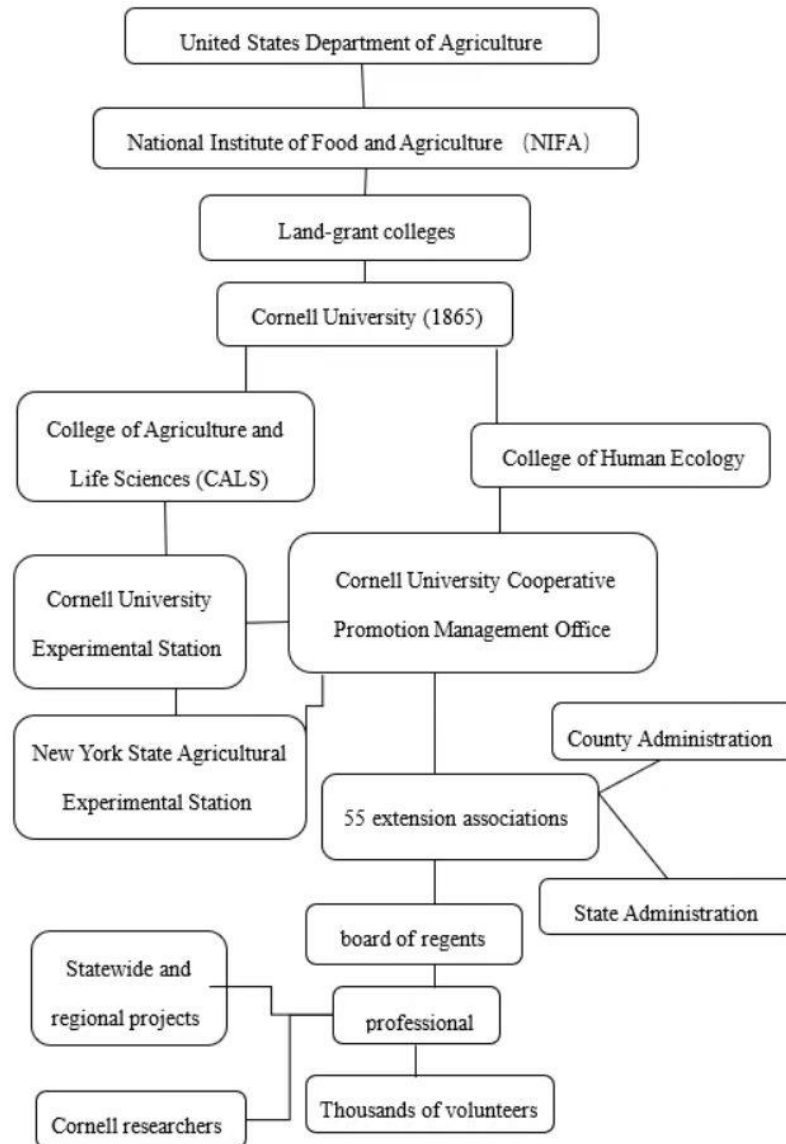


Figure 1: Overall Architecture of Cornell Cooperative Extension[14]

Cornell University's unparalleled research capabilities and professional knowledge have led New York State to become a global leader in the food and agriculture sectors. Agriculture in New York State is very important, with over 36600 farms in the state and an annual sales of \$4.4 billion in unprocessed agricultural products. New York State has 4300 food and beverage companies, employing 57000 employees, and annual sales approaching \$19 billion.[15] The Cornell College of Agriculture and Life Sciences has been active in fulfilling Cornell's mission to "serve New York State agriculture." Provides guidance services and technical assistance for dairy, livestock, field crops, vegetables, grapes, pesticide safety, food distribution, and farm strategic planning in New York State and related areas through the Agricultural Experiment Station on the main campus and the New York State Agricultural Experiment Station in Geneva, New York, as well as regional farm programs. In 2021, the New York State Agricultural Experiment Station provided more than 700 training events for producers and processors in New York State and beyond, extending 58,824 hours. In the past five years (2016-2021), the experimental station has developed 16 new agricultural varieties.[16] The area of the experimental station has also continued to expand with the development of the times, from 125 acres in the initial establishment to 900 acres, used for the construction of experimental fields, orchards, and vineyards. Cornell University has developed a new computer model that accurately predicts the temperature at which grape vines will experience frost damage, minimizing the damage caused to farmers by extreme weather. Although this station is an experimental station that places great emphasis on applied research, it also maintains a balance of basic research. In 2021, it published 99 publications related to promotion, laying the foundation for the development of agriculture in New York State.[16]

B. Ecological Sustainability Cooperative Extension Opens Up New Areas of Service

With the development of the times, the School of Agriculture and Life Sciences is no longer the sole provider of social promotion activities at Cornell University, and the School of Human Ecology has also joined in. Personalized recommendation is becoming the basic form of information network services in the era of "Internet plus" and "big data".[17] Cornell University's social service promotion activities are no longer limited to the agricultural field, but have shifted to multiple aspects such as agriculture and food, disaster prevention, environment and natural resources, food nutrition, and youth growth. There are also various ways to expand, including online courses, short-term courses, field study days, public school activities, etc. Rooted in every district of New York State, Cornell University combines local conditions with research-based solutions to help families and communities in New York State thrive in a rapidly changing world. Currently, the Cornell University Social Promotion System has over 1500 vocational teachers and educators, over 13000 volunteers across the state, and over 250000 children and adolescents participating in 4-H courses.[18]

1) Community and economic vitality

The New York Extension Disaster Education Network (NYEDEN), led by Cornell University's Social Services Promotion System, is a collaborative education network dedicated to helping New York residents in disaster prevention, response, and post disaster recovery. The New York State Disaster Education Network helps New York residents and communities prepare for disaster prevention and reduce the impact of natural and man-made disasters by providing early warning of adverse weather and emergency situations, developing personalized disaster response and recovery guidelines, and providing emergency response training for disasters and emergencies. Due to its affiliation with the National Disaster Education Network (EDEN) in the United States, it can share data with land grant universities in the United States, receive rich research resource support, and build efficient and feasible state plans for the local area while assisting other states and federal governments in disaster prevention. At the time of the outbreak of novel coronavirus, the social focus was more on human health. The New York State Disaster Education Network focused on the challenges of residents' mental and emotional health, established a crisis consultation plan, provided free and confidential emotional support hotline for New York residents, and helped New York residents overcome difficulties.

2) Environment & natural resources

The Environment and Natural Resources subsystem focuses on maintaining the natural resources and environmental property of New York State, providing technical support for areas such as ecosystem conservation, monitoring climate change, preventing harmful species invasion, focusing on wildlife, water quality, fisheries and forestry resources, and developing renewable resources. Among them, pesticide safety, "climate intelligent" agriculture, and comprehensive pest management are representative social service projects.

The Cornell Cooperative Extension's Pesticide Safety Education Program (CCE-PSEP) actively carries out the Cornell Cooperative Extension's Pesticide Safety Education Program to provide scientific and objective pesticide education, promote the safe use of pesticides, and reduce the risks faced by pesticide applicators, consumers, and the environment. This project collaborates with agencies such as the New York State Environmental Protection Agency, the New York State Pesticide Administration, and the New York State Department of Agriculture and Marketing to provide pesticide certification and training for the entire state of New York, and to provide fair sources of pesticide information for applicators, researchers, and the public. Its main responsibilities include: writing a training manual for pesticide applicator certification, preparing candidates for the New York State Department of Environmental Protection (NYSDEC) pesticide certification exam; Review and release the Cornell Crop and Pest Management Guidelines; Through the distance learning center, we provide online seminars and distance learning courses for over 25000 pesticide users in New York. This project has been recognized as a nationally recognized leader in pesticide safety education for over 40 years.

In the northeastern United States, climate related risks such as extreme rainfall, drought, heat stress, and pests pose a serious threat to farmers' livelihoods. The Climate Smart Farming program at Cornell University provides research-based scientific information, online tools, and training for agricultural practitioners in the Northeast, and provides farmers with opportunities to engage with top agricultural experts to help them cope with the hazards of extreme weather and climate change. This agricultural promotion project focuses on six basic areas, namely: soil health, effective management of water resources, comprehensive pest and disease management, diversification of farm crop varieties, impact of extreme weather on livestock, and farm planning and management. Comprehensive governance in six major sectors helps farmers resist climate risks and improve farm sustainability. Powerful data model online tools provide many conveniences for agriculture, such as Adapt-N, an online tool developed by

Cornell University that can input high-resolution weather data and soil and crop management information into well calibrated computer models, making it easy for users to accurately manage their nitrogen application rates in corn, grain, and silage production.

Table1: Summary of NEWA user statistics for all resources across all locations and years from 2017 to 2020[19]

Years	Users	Returning users	Contact hours
2020	11659	1627	2741:33:56
2019	11667	2058	2502:25:33
2018	11229	1983	2741:12:05
2017	9869	1647	2632:51:38

In 1985, when the New York State Integrated Pest Management was established, the focus was on helping New York State farmers find ways to reduce pesticide use. After nearly 40 years of development, the New York State Integrated Pest Management Project has formed a comprehensive strategic system, covering not only the agricultural field but also protecting various crops and agricultural products from pest threats; Applying ecology within farms and communities; Imparting effective, research-based pest management techniques to producers of dairy products, fruits, vegetables, and ornamental plants; Establish a statewide detection network to provide real-time pest prediction for farmers, and widely engage in nonagricultural fields. Establish a sound pest management system within communities such as schools, parks, workplaces, and municipal buildings. The New York State Integrated Pest Management Project Subsystem NEWA (Environmental and Weather Application Network) is an online pest management tool that provides over 40 pest prediction models to 28 states in the United States, providing short-term crop risk assessments for growers. According to statistics, the number of users using this tool reached 11659 in 2020, achieving 2741 hours of online expansion (Table1). Research has shown that the NEWA pest prediction model can save farmers an average of \$19500 in pesticide costs per year and avoid \$264000 in crop losses.[20]

3) *The expanded food & nutrition education program (EFNEP)*

In 1969, the State of New York implemented the Food and Nutrition Education Program funded by the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture. The program was led by the Department of Nutrition Science at Cornell University, and was the first nutrition education program in the United States targeting low-income populations. For more than 50 years, the program has been at the forefront of nutrition education work. The Food and Nutrition Education Program currently provides free seminars in 29 counties and cities in New York State to conduct personalized analysis of nutritional intake for participants. Cornell University frontline educators also impart knowledge on food safety and scientific diet to families below the poverty line, and strive to cultivate participants in balancing dietary structure, food safety knowledge, food science nutrition, changing dietary habits, and avoiding malnutrition and obesity. The research report shows that graduates who participate in food and nutrition education projects will have a more reasonable diet in the future, with meat, milk, vegetables, fruits, and grains consumption closer to the recommended dietary pyramid indicators, a cumulative increase of 1.4 percentage points (Figure 2).

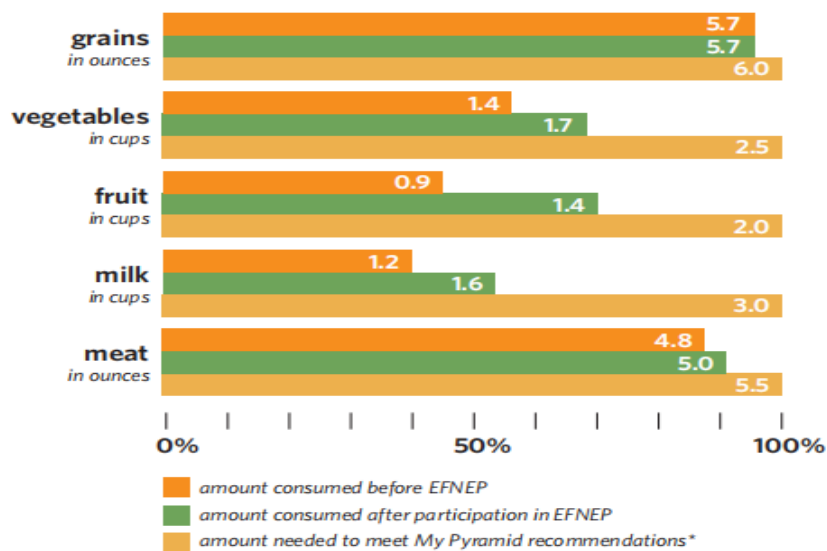


Figure 2: Comparison of Effects Before and after Participation in Food and Nutrition Education Projects[21]

C. Promoting Social Welfare through Youth and Family Education

President Rhodes emphasized that Cornell University's collaborative promotion project should prioritize improving the quality of life for the people of New York State.[22] Under the leadership of President Roosevelt, Cornell University leveraged its research advantages in education, psychology, and sociology to organically integrate social service promotion projects such as basic education and family education, promoting the overall well-being of individuals, families, and communities.

1) 4-H youth development program

The "4-H Youth Growth" is an important component of CCE. '4-H' is an abbreviation for the first letter of the English words 'head', 'heart', 'hands', and 'health', corresponding to 'intelligence', 'moral character', 'operational ability', and 'health level', respectively. It emphasizes the comprehensive development of young people's physical and mental health. The "4-H Youth Development" project is open to young people aged 5-19, bringing resources from Cornell University to young people in New York State, guiding them to fully realize their potential, strengthening their moral literacy and enhancing their hands-on abilities in practice. The "4-H Youth Growth" project organizes various activities in areas such as nutrition and health, science and technology, environmental education, civic responsibility, and community development. It encourages New York State youth to learn new skills and explore the world through situational experiences and hands-on practices, cultivate civic awareness, leadership, decision-making ability, develop good living habits, and help them grow into capable, caring, and contributing members of society.

2) Parent education program

In the 1960s, the US government began to pay attention to the phenomenon of parents participating in children's lives and education, and subsequently introduced the "Start Plan Act" and "Track Plan Act". Afterwards, various states in the United States successively carried out family education guidance activities. During this period, the entire American society reached a broad consensus that high-quality early childhood family education laid the foundation for children's future learning, emotional development, and the establishment of good interpersonal relationships in adulthood. Thereafter, a large number of high-quality family education guidance projects based on evidence-based practices emerged in the United States. In this context, Cornell University also regards family education guidance as an important social promotion project. In various regions of New York State, educational programs provide parents and guardians with a wealth of deep parenting ideas aimed at strengthening parent-child relationships and consolidating healthy family development. Flexible and diverse educational programs can meet the needs of parents, teenagers, and different audiences throughout the family. Its characteristic projects include "Parenting Education 2.0", "Parenting Experience Seminar", "Healthy Family Education", and "Magic Years" courses.

The latest research report from the School of Human Ecology at Cornell University, titled "Results of the Parent Education Project (2020-2021)" (Figure 3), analyzes the behavioral changes of participants before and after the project. After analyzing the data collected based on 104 participants, it was found that after receiving parental education, there was a statistically significant change of 1% in the following three questions: "My patience with children", "Friend support when feeling down", and "Frequency of not getting angry with children"; However, there was a 5% fluctuation in "attempting to explain the reasons for formulating a certain criterion"; The frequency of praising children to those around them within a week has the largest change, with a 10% increase compared to the data before receiving family education. The results indicate that the Cornell University Parent Education Program has had a positive impact across the state, with significant improvements in parenting attitudes, behaviors, and knowledge levels among participants.

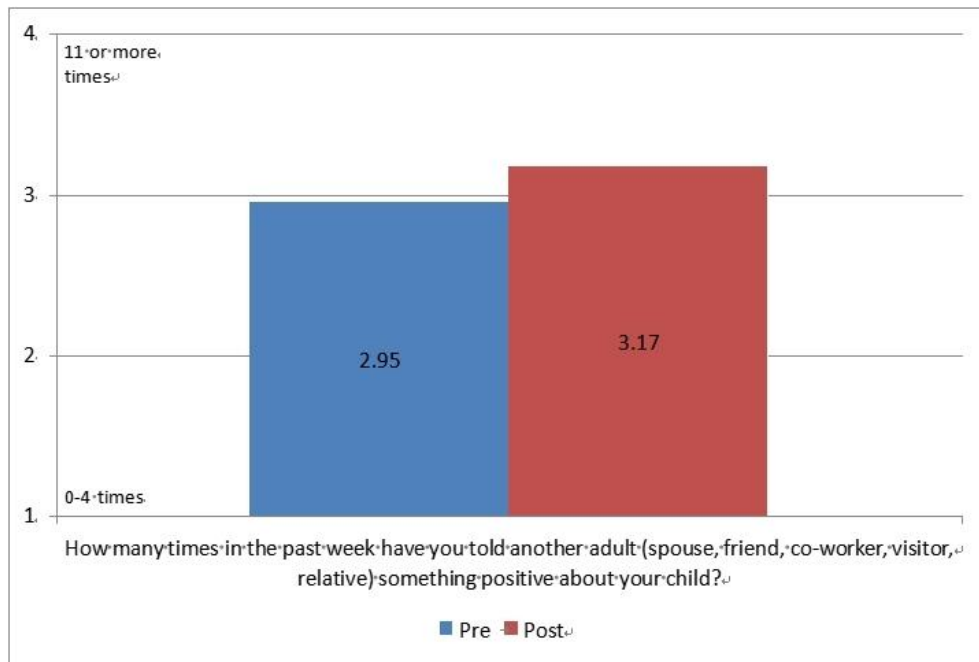


Figure 3: Achievements of Parent Education Projects from 2020 to 2021[23]

IV. ANALYSIS OF CORNELL UNIVERSITY'S SOCIAL SERVICE EXTENSION SYSTEM

The Cornell University Social Service Promotion System has successfully combined university intellectual resources with the well-being of local people through a series of collaborative promotion projects in New York State, promoting the participation of important research achievements and researchers in the local socio-economic development. It has made significant contributions in agriculture and food systems, environment and natural resources, food and nutrition education, and youth growth. Especially in the field of agriculture, it demonstrates the mission of the Land Grant College and fulfills the responsibilities of the Land Grant Institution.

A. Cornell Cooperative Extension Promotes the Improvement of Cornell University's Social Service System.

In the "Cornell Development Plan Outline 2010-2015", Cornell University proposed to improve the service system and conduct a rigorous and systematic evaluation of all social service activities. The specific actions are as follows: First, develop clear evaluation criteria for social service programs, with particular emphasis on the importance of quality for university and community impact; Second, include an external review component in the periodic evaluation of social services; Finally, institutional mechanisms should be developed to collect and evaluate data on the quality and impact of social service projects.[24] Afterwards, a series of specialized social service institutions emerged. The Cornell Cooperative System has built a feasible communication and service platform for the university to more efficiently fulfill its service functions, building a bridge between academic research and industry issues. It is an important platform for students, teachers, and practitioners to exchange and discuss with each other. The main focus is to conduct in-depth analysis and discussion on various key industry issues, strategic planning, development trends, etc., and update the theoretical system of teachers and students in a timely manner. At the same time, it benefits the industry from rigorous academic research, promotes social development, and provides a convenient channel for Cornell University to effectively serve society. In terms of teachers, in order to enhance their social participation abilities, Cornell University has launched the Community Learning and Service Partnership Program (CLASP) and established the Engaged Faculty Fellowship Program to promote the development of teachers' participatory academic abilities.[25] To enhance the enthusiasm of teachers in participating in social services, the school has set up the Levy Award to select two spots each year, with a bonus of \$5000 per person, to recognize teachers who have outstanding performance in community participation. Weir Medical College also regards social service as one of the criteria for evaluating teacher titles.

B. Cornell Cooperative Extension is highly academic

As a top research university in the world, Cornell University has never forgotten the mission principle that it should adhere to as a research university, that is, the principle of academic supremacy, while performing its social service function. The university maintains its academic nature in two aspects at the same time, that is, the social service theory itself and the scientific research. This not only keeps the social service theory updated, but also

provides scientific theoretical guidance and imitation model for other universities to carry out social services, and also keeps the social service content scientific and cutting-edge. Over the years of development, CCE has covered various districts and counties in New York State, forming a diversified service field pattern that involves agriculture, environment, community, youth development, etc., meeting the diverse needs of social development. Especially in agriculture, Cornell has created agricultural experimental stations and scientific experimental stations to provide technical services to New York State; Regularly holding agricultural knowledge lectures for the public, Cornell University Library provides first-class digital content and services, supports information access and academic exchange, and is equipped with dedicated online staff to provide personalized services, consultation, and online assistance for readers; Increase investment in agricultural technology research and development to support agricultural development; Support the construction of key agricultural disciplines; Emphasize the cultivation of professional talents, in order to serve, develop, lead and enhance the state of New York, and make significant contributions to the local economic and social development. Colleges and universities are often the "energy reservoir" and "engine" that drive economic and social development, and social service is an inescapable responsibility of colleges and universities. At any time, Cornell University is rooted in the land of New York State, using the advantages of its resources to serve the actual needs of New York State, which also has implications for the development of social service activities in colleges and universities.

C. High Coupling between Cornell Cooperative Extension and Social Needs

Cornell University was born at a time of national crisis after the war. Since its establishment, it has taken on the responsibility of assisting in national rejuvenation. Influenced by utilitarianism and pragmatism, Cornell has been different from traditional "ivory tower" universities since its inception. The government utilizes financial support and formulates relevant policies to control the development of universities, so as to meet the needs of national revitalization and form a unique social service model for universities. The concept of focusing on serving the country and closely combining with the development needs of the country, society, and local areas is an inevitable choice for the development of Cornell University, as well as its inherent mission and responsibility.

In the 140 years since its establishment in 1882 to 2022, Cornell University's New York State Agricultural Experiment Station has cultivated more than 280 varieties of fruits and vegetables, including 69 varieties released by the apple breeding program, adding \$400 million to the New York apple industry. The Geneva Agricultural Experiment Station produces 60 grape varieties, of which Cayuga White and Traminette have become the backbone of New York's wine industry, which is now worth \$6.65 billion.[26] In 2023, Cornell University received platinum, the highest rating from the American Association for the Advancement of Sustainability in Higher Education. In terms of social services, the association evaluated 15 criteria, including education and teaching, community partnerships, outreach materials and publications, outreach activities, patent licensing, continuing education, intercollegiate cooperation, community service, staff education programs, staff training, staff professional development, and public policy participation, with Cornell University ranking high at 4.68. In 2022, the total number of Cornell University students is 23,597, the number of students participating in social service is 20,194, accounting for 85.58%, and the annual contribution of students' social service is 544,966 hours. In terms of community relations, Cornell University is proud to get a perfect score.[27]

After years of development, the extension system of Cornell University has formed the characteristics of institutional perfection, strong academic, and high coupling, which highlights the mission of land grant institutions and highlights the unique charm of research universities. Its service model has deeply influenced other universities in the United States, and its service concept has been imitated by many universities in later generations. Because of the wide range of services, Cornell University has achieved fruitful results in many fields of social services.

V. CONCLUSIONS

Throughout history and reality, higher education has always been the most fundamental driving force for developed countries to become prosperous. It has become an effective link connecting technology, economy, and social development, and a gathering place for promoting social productivity innovation. The social service of Cornell University is closely combined with the needs of The Times and deeply integrated with big data. It establishes network thinking and data thinking in the field of social service, forms a social service information platform, and optimizes the allocation of social service resources. The system has promoted the development of New York State and American society, achieving a "win-win" situation of its own value and interests.

A. Adjust the Educational Philosophy and Strengthen the Emphasis on Social Service Functions.

Cornell has developed an outstanding educational philosophy over the years, with public service ideology as its prominent feature, emphasizing the application of knowledge, paying attention to the cultivation of skilled talents, and advocating for universities to actively serve their respective states. This has a distinct reference significance for the construction of higher education. Universities can emulate the successful experience of Cornell, internalize, absorb and explore unique social service methods and models that are suitable for themselves according to educational history and realistic advantages, regional needs, cultural traditions, etc. Firstly, actively adjust the concept of education, prioritize serving society, highly recognize the importance of it in ideological understanding, reshape the positioning of social service functions, guide educational behavior with educational concepts, and inject lasting vitality into the social service work of universities. Secondly, all kinds of universities and colleges coexist in the world, and there are obvious differences among them. In the process of establishing the school concept, it is necessary to closely combine the industrial structure and economic and social development needs of the universities. The orientation and development goals of the university should be determined from the top-level design, and activities such as personnel training, curriculum setting, and scientific research transformation should be guided to focus on the topic of "social service", so as to promote the good interaction between the university and the society, and play the role of the engine of social and economic development of higher education.

B. Define the Service Orientation and Identify the Focus of Social Services.

Higher education has become the "energy reservoir" and "engine" driving economic and social development, and social service is an unshirkable responsibility of universities. As a university founded by the New York State land grant, Cornell has obvious regional characteristics and has carried the mission of serving the social development of New York State since its establishment. From a historical perspective, Cornell University has always been rooted in the land of New York, utilizing its resource advantages and providing services based on the actual needs of the local community in New York. After more than a hundred years of development, Cornell University's social service scope covers various districts and counties in New York State, forming a diversified service field pattern, involving agriculture, environment, community, youth development, etc., meeting the diverse needs of social development and making significant contributions to the local economic and social development. This is also enlightening to the development of social service activities in Chinese universities. Firstly, universities should closely monitor the strategic layout and priorities of the country, strengthen policy and countermeasure research, accurately grasp the policy demand orientation of the region, and seek service contacts that can fully leverage their own unique advantages. Secondly, local universities should identify positions according to their own characteristics and advantages, make use of their advantages in talents, scientific research, platforms and information resources to broaden service fields, closely combine national and local strategic needs, enhance their own services to meet national strategic needs and regional development, and highlight the unique value of colleges and universities in the positive interaction with the society, and obtain the motivation for continuous progress.

C. Improve the Operational Mechanism of Social Services and Establish an Effective Service Guarantee System.

In long-term social service practice, Cornell University has explored and established a relatively sound social service promotion system and working mechanism, effectively ensuring the smooth progress of social service work. A perfect security system can not only enhance the planning and organization of social service work, but also achieve a transformation from sporadic and spontaneous workshops to a normalized and organized integrated. First of all, universities should establish a professional social service extension system, which can be modeled on the social service extension system of Cornell University, and set up special agencies and management departments. The establishment of professional transformation institutions will bring the social service management of universities into the standardized and professional track, remove the stumbling blocks that hinder social service work, and gradually improve the efficiency of serving society. Secondly, establish a specialized social service team that can recommend high level leaders to serve as supervisors of social service institutions, thereby enhancing the organization's status, better playing its role in overall planning and coordination, and enhancing the overall and forward-looking nature of social service work. Thirdly, universities should coordinate stable financial support and formulate a relatively perfect social service evaluation system.

Cornell University is actively building a social service information platform. Utilize computer data models to monitor global agriculture and food systems, human health, climate change, provide solutions for sustainable social development, and provide personalized intelligent services. Use big data technology to analyze market transaction

data, understand consumer demand trends, and improve farmers' sales ability. Apply research tools to analyze employment trends and challenges in New York State, and provide basis for formulating employment policies. Cornell University Library forecasts social service needs based on big data, uses artificial intelligence technology, and develops intelligent customer service systems to bring personalized service consultation and answers to readers. In short, universities can draw on the positive experience of Cornell University's social service promotion system, adhere to adjusting their educational philosophy, and strengthen their emphasis on social service functions; Clarify their own social service positioning and accurately seek contact points for social services; Improve the operational mechanism of social services and establish an effective service guarantee system.

This study takes Cornell University as an example to explore the laws of university social services, analyze the channels, content, models, characteristics, and other aspects of the university's social services, and probe the underlying reasons for the success of its social service activities. It will help to enrich the research achievements of Cornell University's social service and further enhance the relevant achievements of theoretical research on higher education, thereby broadening the ideas and perspectives of research on the development of higher education and social service, deepening the understanding of the social service function of universities, and providing a sound strategy for a series of problems existing in the interaction between universities and society today. However, limited in length, the paper only studies the CCE, and does not touch on the talent training and scientific research transformation closely related to social service. In addition, this paper focuses on the social services of the College of Agriculture and Life Sciences and the College of Human Ecology, while other colleges are less involved. Therefore, it is necessary to broaden the research horizon and update the research methods in the future.

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