GUIDLINES OF EDUCATION ADMINISTRATION BASED ON AGRICULTURAL TECHNOLOGY INNOVATION FOR GUANGXI HIGHER VOCATIONAL COLLEGES

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Thesis Title Guidelines of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges

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ABSTRACT

The objectives of this research were: 1) to investigate the current situation of agricultural technology innovation-based education administration in Guangxi higher vocational colleges; 2) to propose guidelines for such administration; 3) to evaluate the proposed guidelines' suitability and feasibility. The study involved 418 research administrators from six agricultural higher vocational colleges in Guangxi. Research tools consisted of a questionnaire, structured interviews, and an evaluation form. Data were analyzed using percentage, mean, standard deviation, and content analysis.

Results showed that the current situation of education administration based on agricultural technology innovation in Guangxi higher vocational colleges was at a medium level across six aspects. The highest mean was observed in demand for vocational and technical talents, followed by knowledge acquisition ability and income, while knowledge coupling and application abilities scored the lowest. A total of 48 guidelines were proposed. Evaluations indicated that both the suitability and feasibility of these guidelines were at the highest level.

Keywords: Guidelines, Education Administration, Agricultural Technology innovation, Higher Vocational Colleges

ชื่อเรื่อง	**แนวทางการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตรสำหรับวิทยาลัยอาชีวศึกษาระดับสูงในมณฑลกวางสี**
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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ 1) เพื่อศึกษาสภาพปัจจุบันของการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตรของวิทยาลัยอาชีวศึกษาระดับสูงในมณฑลกวางสี 2) เพื่อเสนอแนวทางการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตรของวิทยาลัยอาชีวศึกษาระดับสูงในมณฑลกวางสี และ 3) เพื่อประเมินความเหมาะสมและความเป็นไปได้ของแนวทางการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตรของวิทยาลัยอาชีวศึกษาระดับสูงในมณฑลกวางสี ประชากรในการวิจัย ได้แก่ ผู้บริหารวิทยาลัยอาชีวศึกษาระดับสูงด้านการเกษตร จำนวน 6 แห่ง รวมทั้งสิ้น 418 คน เครื่องมือที่ใช้ในการวิจัย ได้แก่ 1) แบบสอบถาม 2) แบบสัมภาษณ์แบบมีโครงสร้าง และ แบบประเมินผล สถิติที่ใช้ในการวิเคราะห์ข้อมูล ได้แก่ ค่าร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และการวิเคราะห์เนื้อหา

ผลการวิจัยพบว่า สภาพปัจจุบันของการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตรของวิทยาลัยอาชีวศึกษาระดับสูงในมณฑลกวางสี โดยภาพรวมอยู่ในระดับกลาง จากผลการวิจัย พบว่าด้านความต้องการบุคลากรด้านอาชีวศึกษาและเทคนิคมีค่าเฉลี่ยสูงสุด รองลงมาคือความสามารถในการแสวงหาความรู้และการมีรายได้ ส่วนความสามารถในการเชื่อมโยงและการประยุกต์ใช้ความรู้มีค่าเฉลี่ยต่ำสุด แนวทางการบริหารการศึกษาภายใต้บริบทนวัตกรรมเทคโนโลยีทางการเกษตร รวมทั้งสิ้น 48 แนวทาง ผลการประเมินความเหมาะสมและความเป็นไปได้ของแนวทาง อยู่ในระดับสูงสุด

คำสำคัญ: แนวทาง การบริหารการศึกษา นวัตกรรมเทคโนโลยีทางการเกษตร วิทยาลัยอาชีวศึกษาระดับสูง

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Xiao Shalang

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Chapter 1
Introduction

Rationale

Agriculture, as the fundamental industry of the national economy, directly relates to a country's food security, economic stability, and social harmony. In the context of globalization, informatization, and sustainable development, agricultural technological innovation has emerged as a crucial force driving agricultural modernization, enhancing agricultural production efficiency, safeguarding food safety, and promoting rural economic development. (Ahmed, J. & Almeida, E., 2020)

As population growth, resource scarcity, and environmental pressures intensify, traditional agricultural development models struggle to meet the diverse demands of modern society for quantity, quality, and safety of agricultural products. Agricultural modernization, as an effective approach to addressing these issues, hinges on technological innovation to transform agricultural production methods, achieving efficiency, intelligence, and sustainability. It necessitates the widespread application of modern technological tools in agricultural processes, enhancing resource utilization efficiency, mitigating environmental pollution, ensuring food safety, and elevating the added value of agricultural products.

Agricultural technological innovation serves as the core driver of agricultural modernization. By leveraging advanced technologies such as gene editing, smart agricultural equipment, and agricultural big data, this innovation significantly boosts agricultural production efficiency, reduces production costs, and enhances the quality and safety of agricultural products. Furthermore, it fosters the extension and upgrading of the agricultural industrial chain, propelling rural industrial upgrading and economic development. Consequently, strengthening agricultural technological innovation is of paramount importance for safeguarding national food security, promoting farmer income growth, and realizing rural revitalization. (Ahmed, J., & Almeida, E., 2020) Agricultural vocational education occupies a pivotal position in nurturing agricultural technical talent. Through systematic curricula, practical teaching, and industry-academia cooperation, it equips students with solid agricultural fundamentals, practical vocational skills, and forward-thinking innovative thinking. These highly skilled agricultural technicians constitute a vital force driving agricultural technological innovation, actively contributing to the transformation and application of new technologies and achievements in agricultural production frontlines. (Sephokgole, & Makgato, et.al., 2021)

As an important agricultural production area in southwest China, agriculture plays a fundamental role in Guangxi's national economy. However, in the face of the increasing pressure from population growth, resource constraints and environmental stress, the traditional agricultural model is no longer able to meet the diversified demands of modern society for the quantity, quality and safety of agricultural products. Currently, Guangxi's agriculture is accelerating its modernization transformation and urgently needs to enhance production efficiency and promote industrial upgrading through agricultural technological innovation. In this process, agricultural vocational education bears the important mission of cultivating high-quality technical and skilled talents and serves as a key bridge connecting technological research and development with production application. Therefore, establishing an agricultural vocational education management system that suits the regional reality and strengthening the integration and innovation of agricultural technologies have become urgent needs for promoting the high-quality development of Guangxi's agriculture and achieving rural revitalization.

Currently, China's agricultural vocational education and agricultural technological innovation confront novel issues and challenges. Firstly, the distribution of agricultural educational resources is uneven. This issue is particularly pronounced in China, where some economically developed regions and major agricultural provinces boast relatively complete agricultural vocational education systems and high-caliber faculty, while economically underdeveloped regions and minor agricultural provinces suffer from resource scarcity and inadequate faculty strength. This uneven distribution of educational resources restricts the development of agricultural vocational education and hinders the comprehensive promotion of agricultural technological innovation. (Ahmed, J. & Almeida, E., 2020)

Secondly, the content of agricultural education is disconnected from market demands. At present, some agricultural vocational education institutions still exhibit a lag in setting educational content, failing to promptly reflect the latest advancements and market demands in agricultural science and technology. Some curricula and teaching methods remain rooted in traditional agriculture, lacking new knowledge and skills compatible with modern agricultural science and technology and industrial development. This results in students struggling to adapt to market demands upon graduation, impacting their employability and entrepreneurial abilities. (Turulja, L. & Bajgorić, N., 2018)

Thirdly, the mechanism for transforming agricultural technological achievements is inadequate. Despite notable achievements in China's agricultural technological innovation, the mechanism for transforming these achievements into real-world productivity remains imperfect. Some outstanding agricultural technological achievements have yet to be promptly transformed, impacting the benefits and influence of agricultural technological innovation. This, to a certain extent, relates to the underutilization of agricultural vocational education's role in the transformation of technological achievements. Therefore, it is imperative to further refine the mechanism for transforming technological achievements, strengthening cooperation and exchanges between agricultural vocational education, research institutions, and enterprises, and facilitating the transformation and application of technological achievements. (Adekunle Osidipe, 2019)

In conclusion, agricultural vocational education constitutes an integral part of the agricultural technological innovation system. By strengthening industry-academia-research cooperation, establishing technological innovation platforms, and refining the mechanism for transforming technological achievements, it promotes the effective integration and sharing of technological innovation resources, fostering the in-depth development of agricultural technological innovation activities. Moreover, it offers talent and intellectual support for the sustainable development of the agricultural technological innovation system. Given this backdrop, investigating the impact mechanism of agricultural vocational education on agricultural technological innovation holds significant practical relevance.

Research Questions

1. What is the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges?

2. What are the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges?

3. How suitable and feasible are the guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges?

Objectives

1. To study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

2. To provide the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

3. To evaluate the suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Scope of the Research

Population

The population of this study comprised 418 research administrators from six agricultural higher vocational colleges in Guangxi. The six institutions selected for this study are closely related to agricultural vocational education, namely Guangxi Vocational University of Agriculture, Guangxi Agricultural Engineering Vocational Technical College, Guangxi Eco Engineering Vocational and Technical College, Guangxi Natural Resources Vocational and Technical College, Guangxi Manufacturing Engineering Vocational and Technical College, Fangchenggang Vocational and Technical College.

The Interviewee

This study selects 12 senior administrators in higher vocational colleges in Guangxi as the research objects. This study understands the current situation of agricultural technology innovation and education administration of higher vocational colleges in Guangxi through interviews. Respondents must meet the following criteria: 1) The administrator of vocational colleges in Guangxi have been engaged in education management for 8 years or more; 2) They have the qualifications of being a researcher with expertise in terms of science and technology management very well; 3) Respondents are willing to participate in recorded structured interviews; 4) Must be willing to view their interview transcripts for verification.

Evaluate

The experts for evaluating the suitability and feasibility of guidelines is 9 experts from higher vocational colleges in Guangxi. The qualifications of the experts are as follows: 1) Who have been engaged in education management in higher vocational colleges for more than 8 years; 2) Those who have corresponding technical qualifications or experience in scientific research in the field of agricultural vocational education; 3) Have a senior professional title or a doctorate degree.

Variable

According to the analyzed of related theories and research, characteristics of impact factors of agricultural vocational education on agricultural technology innovation are as follows:

1. Knowledge acquisition ability
2. Knowledge coupling ability
3. Knowledge application ability
4. Demand for vocational and technical talents
5. Policy
6. Income

Advantages

1. The research results provide a reference for higher vocational education is the key factors to promote agricultural technology innovation in Guangxi.

2. The research results provide a reference for the mechanism of agricultural vocational education impact agricultural technology innovation.

3. The research results provide ideas for the role and approach of Industry-University-Research (IUR) collaboration in the realm of agricultural vocational education significantly impacts the innovation of agricultural technology.

Definition of Terms

1. Education Administration refers to the field of educational administration is a multifaceted field with various theoretical perspectives, it encompasses a broad range of theories, practices, and challenges. These concepts provide a comprehensive framework for understanding the complexities of managing and leading educational institutions. Effective educational administrators use these principles to create conducive learning environments, foster positive relationships, and ensure the successful operation of their schools. Effective administration is critical for the successful operation of educational institutions and the achievement of educational goals. Ongoing research and innovation in this field continue to shape the ways in which educational leaders manage and lead their organizations.

2. Guangxi Higher Vocational Colleges refer to specialized institutions established with the approval of the State and the Government of Guangxi Zhuang Autonomous Region, which implement higher vocational education within the administrative region of Guangxi Zhuang Autonomous Region. Its core positioning is to cultivate high-quality technical and skilled talents who are oriented towards the

demands of regional economic and social development and master the theoretical knowledge, practical skills and comprehensive vocational qualities required in specific professional fields or job groups. Such institutions mainly offer junior college and undergraduate degree education, with a study period usually ranging from 3 to 4 years. Its establishment and operation comply with the "Vocational Education Law of the People's Republic of China" and relevant local regulations and policies of Guangxi.

3. Research Administrator refer to professional personnel in higher vocational colleges in Guangxi who are dedicated to coordinating scientific research activities. The core functions include: formulating scientific research plans for professional technological innovation; Integrate professional scientific research resources; Supervise technology research and development and technology transfer projects; Promote the application of industry-university-research technologies; Manage funds, intellectual property rights and performance. Its role connects teaching with industrial demands and supports the innovative capabilities of educational institutions in serving the modernization of the industry.

4. Agricultural Technology Innovation refers to the dynamic process that encompasses agricultural scientific research, inventions, creations, as well as the promotion, application, enhancement of production capacity, and maximization of benefits of scientific and technological achievements. It includes the conception, research and development, promotion and diffusion, production, and sales activities and processes aimed at obtaining new agricultural varieties, products, technologies, and methods, all aimed at addressing agricultural challenges and improving food security.

5. Knowledge Acquisition Ability refers to the capacity of individuals or organizations to obtain new knowledge, technologies, and information. Agricultural vocational education constructs diversified learning platforms and resource systems, providing convenient avenues for farmers and agricultural practitioners to acquire knowledge. In the process of agricultural scientific and technological innovation, this ability is directly related to the efficiency and effectiveness of innovation activities.

6. Knowledge Coupling Ability refers to knowledge coupling ability refers to the capacity for knowledge from different fields to interconnect and influence each other, forming a comprehensive knowledge system. In agricultural vocational education, through a systematic teaching system, agricultural vocational education seamlessly integrates knowledge from agricultural production technology, agricultural economics and management, agricultural research and practice, agricultural

environment and sustainable development, among others, into a comprehensive and intricate agricultural knowledge system.

7. Knowledge Application Ability refers to the capacity to transform acquired knowledge, technologies, and information into practical productivity or innovative outcomes. Agricultural vocational education reinforces students' knowledge application ability through practical teaching, internships, and IUR collaborations. In agricultural scientific and technological innovation, knowledge application ability serves as a crucial criterion for evaluating educational effectiveness and innovation achievements.

8. Demand for Vocational & Technical Talents refers to the need for individuals who have specialized skills, knowledge, and training in specific trades, crafts, or technical fields. These talents are essential for industries and sectors that rely on practical and applied skills to operate efficiently and innovate. This demand is driven by several factors, including: economic development, technological advancements, industry-specific needs, labor market dynamics etc.

9. Policy refers to the strategic plans, regulations, and initiatives implemented by governments, educational institutions, and other stakeholders to promote and enhance vocational education and training (VET). These policies aim to create a skilled workforce that meets the needs of the economy and supports individual career development. Key aspects including: curriculum development, funding and resources, quality assurance, teacher training, access and equity, industry collaboration, etc.

10. Income refers to the earnings or wages received by individuals who have completed VET programs and possess skills in specific trades, crafts, or technical fields. This income can vary based on several factors, including the level of skill, industry, geographic location, and work experience. The importance of fair compensation for agricultural technicians to ensure the sustainability and growth of the agricultural sector, particularly in the context of technological advancements and modernization efforts.

Research Framework

The six variables selected in this study are based on a systematic review and summary of existing literature and empirical research (see Table 2.1 in Chapter 2). These variables have a high frequency of appearance and strong consensus in related domestic and international studies. They comprehensively cover the key paths through which agricultural technological innovation affects the management of higher vocational education from four dimensions: educational process, market demand, policy environment, and economic benefits. They not only reflect the core functions of vocational education in knowledge transmission, integration, and application, but also demonstrate the regulatory role of external policies and market mechanisms on educational outcomes. Therefore, using these six variables as a framework can systematically and multi-dimensionally assess the current status of education management in agricultural higher vocational colleges in Guangxi, and provide theoretical basis and empirical support for formulating scientific and feasible management guidelines. The research framework of this paper is show in Figure 1.1:

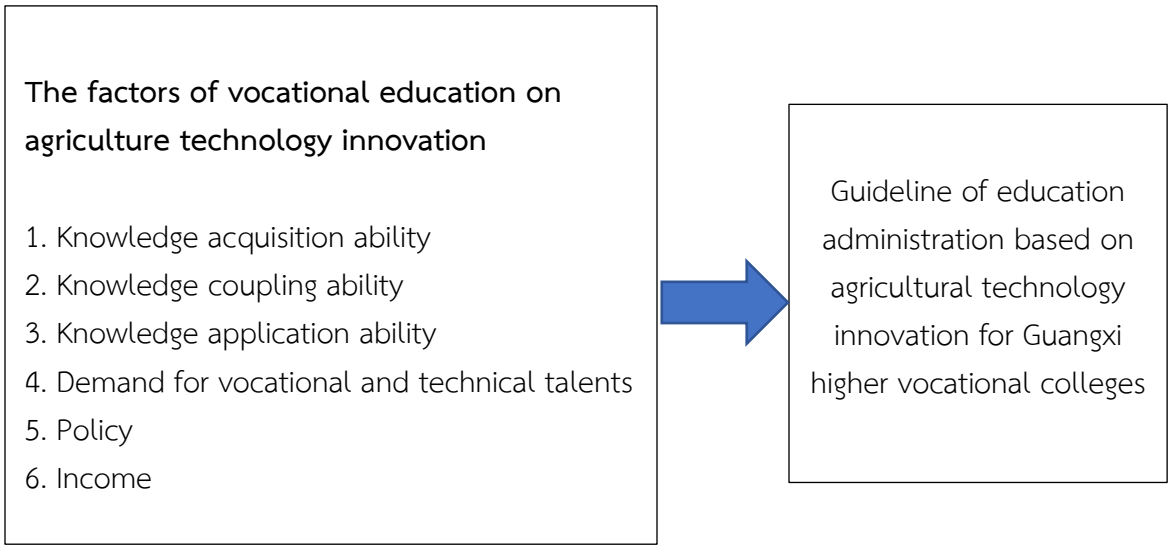

Figure 1.1 Research Framework

Chapter 2
Literature Review

This chapter will focus on the research questions raised in Chapter 1 and summarize the main theoretical basis and related researchers involved in this research, so as to clarify the theoretical inheritance, improvement and expansion relationship between this research and existing achievements. In order to explore the theoretical basis of the mechanism of agricultural vocational education affecting agricultural technology innovation in Guangxi, this chapter sets out the theories as follow:

1. Concept of Educational Administration
2. Concept of Agricultural Vocational Education
3. Concept of Agricultural Technology Innovation
4. Context of of Higher Vocational College in Guangxi
5. Related Research

The details are as follows.

Concept of Educational Administration

In general educational administration refers to the process of managing and leading educational institutions, such as schools, colleges, and universities. It involves coordinating various activities and resources to achieve the educational goals and objectives of these institutions. The concept encompasses a wide range of functions, including planning, organizing, directing, and controlling educational activities.

At the beginning of the 20th century, with the progress of industrialization, management science flourished. Taylor's scientific management movement and its use in educational administration promoted the development of the discipline of educational management. 1908 Squidden and Allen co-authored School Reports and School Effectiveness, which summarized the experience of schools in drawing on the ideas and methods of business management. 1901 Bergeret's Classroom Management, which analyzed the cost of running schools and studied the relationship between educational inputs and outputs.

The American Newlon's 1937 article on authoritarianism in school management was an attempt to transfer the methods of business management, to educational management. in 1949, the American Yoche emphasized in his book "School Management and the Improvement of Human Relations" that schools are a

complex social group and that the responsibility of managers lies in the management process to promote the interaction of all employees. It is also an attempt to apply the ideas of business management in educational management.

While not exclusively focused on education, Drucker (1993)'s principles of management have been applied to educational administration. He defines administration as the practice of managing an organization's resources to achieve its mission and goals. Tony Bush (1998) summarizes the disputes in western education management circles as the opposition between the two viewpoints of "universality" and "particularity". Scholars who hold the "universal viewpoint" often assume that management "It is based on common factors regardless of its institutional background" and believes that the universal principles of management can be applied to all organizations. There is no fundamental difference between educational management and other management.

Fullan (2001) focuses on educational change and leadership. He argues that successful educational administration requires effective change management, strong leadership, and a focus on continuous improvement. He emphasizes the role of the principal as a change agent and the importance of building collaborative cultures within schools. Hallinger (2003) is known for his work on instructional leadership. He stresses the principal's role in shaping the school's instructional climate and promoting effective teaching and learning practices. He also highlights the importance of leadership behaviors that directly impact student learning outcomes.

Leithwood (2004) focuses on transformational leadership in education. He argues that educational leaders should inspire and motivate their staff, fostering an environment conducive to change and innovation. His research shows that leadership practices significantly impact school effectiveness and student achievement. Spillane (2006) is known for his work on distributed leadership, which suggests that leadership in schools should be a shared responsibility among various stakeholders, including teachers and administrative staff. He argues that this approach can lead to more sustainable and effective school improvement efforts.

Sergiovanni (2007) defines educational administration as a moral and ethical activity that focuses on the development and growth of students. It involves creating a supportive environment that fosters educational excellence. Hoy and Miskel (2008) emphasize a systems approach to educational administration. They view schools as complex organizations where various subsystems interact to achieve educational goals. They highlight the importance of organizational theory, leadership, decision-

making processes, and the socio-cultural context in which educational institutions operate.

Lunenburg, F.C. & Ornstein, A.C. (2011) educational administration is the application of management principles and techniques to the educational setting, ensuring that resources are efficiently utilized to meet the educational needs of students. Hoy, W.K. & Miskel, C.G. (2013) believed Effective educational administration involves making informed decisions that consider various stakeholders' perspectives. Decision-making models, such as rational, participative, and intuitive models, guide administrators in making strategic choices.

Yukl (2013) emphasizes leadership within administration, defining it as the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives. Robbins,S.P. & Coulter,M. (2016) pointed out educational administration is the process of achieving organizational goals by engaging in the four major functions of planning, organizing, leading, and controlling educational activities.

To sum up, the field of educational administration is a multifaceted field with various theoretical perspectives, it encompasses a broad range of theories, practices, and challenges. These concepts provide a comprehensive framework for understanding the complexities of managing and leading educational institutions. Effective educational administrators use these principles to create conducive learning environments, foster positive relationships, and ensure the successful operation of their schools. Effective administration is critical for the successful operation of educational institutions and the achievement of educational goals. Ongoing research and innovation in this field continue to shape the ways in which educational leaders manage and lead their organizations.

Concept of Agricultural Vocational Education

1. Definition of Agricultural Vocational Education

Food and Agriculture Organization (FAO, 2000) proposed agricultural vocational education is designed to develop the skills and knowledge necessary for working in the agricultural sector. It focuses on practical training and technical education to prepare individuals for various agricultural occupations. World Bank (2007) proposed agricultural vocational education encompasses training programs that provide individuals with the technical skills and practical knowledge required to

pursue careers in agriculture. This education is aimed at enhancing productivity and sustainability in farming practices.

International Labour Organization (ILO, 2010) proposed agricultural vocational education refers to the specialized training programs that equip learners with the competencies necessary for employment in the agricultural sector. It includes hands-on training and theoretical education in areas such as crop production, animal husbandry, and agricultural machinery. UNESCO (2012) believed agricultural vocational education is a subset of VET that focuses specifically on agriculture-related fields. It aims to provide students with the practical skills and theoretical knowledge needed to perform effectively in agricultural jobs. CEDEFOP (2015) proposed agricultural vocational education is part of the broader technical and vocational education and training (TVET) framework that aims to prepare individuals for specific trades, crafts, and careers at various levels in the agricultural industry. It involves both theoretical and practical components, ensuring that students are ready for the labor market upon completion of their training.

Ghimire and Martin (2013) defined agricultural vocational education as a program of study that is designed to prepare students for employment in the agriculture industry. This includes areas such as crop production, animal husbandry, agricultural mechanics, and agribusiness. The education is structured to provide both theoretical knowledge and hands-on experience. Alston and Freer (2015) proposed agricultural vocational education is described as an educational pathway focused on the development of technical, managerial, and entrepreneurial skills required in the agricultural sector. This education prepares individuals for various roles within the agricultural industry, from farming and livestock management to agribusiness and agricultural research. McKenney and Lee (2009) emphasized that agricultural vocational education is crucial for equipping students with the necessary skills to engage in sustainable agricultural practices and contribute to rural development. The curriculum often includes a combination of classroom instruction and fieldwork.

To sum up, agricultural vocational education refers to pre-service and in-service education aimed at cultivating students from basic education, scientific and technological personnel in the agricultural field, and already employed farmers, with educational content focusing on knowledge, skills, and attitudes necessary for the agricultural and forestry industries and urban construction, and with the goal of enabling the educated to acquire certain qualifications related to agricultural production. These programs emphasize hands-on training and aim to enhance productivity, sustainability, and employability in the agricultural sector.

2. Theories of Agricultural Vocational Education

Scholars reveal the relationship between the relevant elements of agricultural vocational education through different theories. Constructivist Theory (Piaget J., 1972; Vygotsky L.S., 1978) suggests that learners construct their own understanding and knowledge of the world through experiences and reflecting on those experiences. In agricultural vocational education, constructivist approaches might involve problem-based learning where students are given real-world agricultural problems to solve, encouraging them to draw on their prior knowledge and experiences to find solutions.

Social Learning Theory (Bandura A., 1977) emphasizes the role of observation, imitation, and modeling in learning. In the context of agricultural vocational education, this theory suggests that students can learn agricultural practices effectively by observing experienced farmers and peers, and then imitating those practices in a supportive environment. Experiential learning theory emphasizes the importance of hands-on experiences in the learning process. According to Kolb (1984), learning is a process whereby knowledge is created through the transformation of experience. In the context of agricultural vocational education, this theory supports the idea that students learn best by engaging directly in farming activities, such as planting, harvesting, and using agricultural machinery.

Situated Learning Theory (Lave J., & Wenger E., 1991) posits that learning occurs best when it is embedded within the context of real-life activities. For agricultural vocational education, this means that students should learn within actual farming environments, participating in the community of practice alongside experienced farmers. This approach helps students acquire not only technical skills but also cultural and social knowledge relevant to agriculture. Human Capital Theory (Becker G.S., 1993) views education and training as investments that enhance the productivity and earnings of individuals. Applied to agricultural vocational education, this theory supports the idea that equipping individuals with specific agricultural skills increases their value in the labor market, thereby improving agricultural productivity and economic development. Fu Z., Satchapappichit, S., & Zeng, Y. (2024) pointed out the intertwined nature of knowledge acquisition and integration emphasizing their collective importance in innovation, competitive advantage, and effective knowledge management practices.

These theories provide a robust framework for understanding how agricultural vocational education can be effectively delivered. They highlight the importance of experiential learning, contextual learning, active participation,

investment in human capital, and social interactions in the educational process. By incorporating these theoretical perspectives, agricultural vocational education programs can be designed to maximize student engagement and learning outcomes.

Jacob Mincer (2014) noticed the importance of human capital in studying income distribution, and analyzed the relationship between residents' income distribution and the amount of training received. He found that income distribution was mainly related to intellectual ability or luck. Based on Smith's Compensation Theory framework, Mincer (2014) studied the differences in training as elements of individual choice and concluded that income distribution was closely related to human capital. Afterwards, he empirically analyzed the costs and benefits of labor human capital investment and found that the return on investment in on-the-job training in human capital was high, not lower than formal education, and the investment was also significant. In the framework of traditional economic theory, Schultz (1961) found that the growth rate of national income was higher than that of material capital investment. Through logical reasoning and analysis, he believed that human capital was an important factor in promoting economic growth. Human capital is an element that solidifies in the skills, knowledge, and individual labor abilities of workers. It is an important factor in the rapid growth of modern economies and an efficient factor in economic development. Gary S.Becker (1964) combined human capital investment theory with income distribution. When the present value of expected returns is greater than or equal to the total present value of expenditures, i.e., costs, workers will be willing to invest in human capital. This expenditure becomes a human capital investment aimed at obtaining higher future wage income.

The Mincer equation- -arguably the most widely used in empirical work- can be used to explain a host of economic, and even non-economic, phenomena. One such application involves explaining (and estimating) employment earnings as a function of schooling and labor market experience. The Mincer equation provides estimates of the average monetary returns of one 2 additional year of education Patrinos, H. A. (2016).

Levkoe, C. Z. & Offeh-Gyimah, A. (2020) argued while providing valuable knowledge and skills, the dominant model of ecological farm internships privileges white, middle-class young people and creates barriers to entry for racialized people, thereby limiting access to the subsequent education, training and other privileges awarded as part of the experience in North America. In addition, this model hinders opportunities for building a more diverse ecological farming sector by reproducing a particular kind of farmer, limiting the impact of food movements.

Entering the 21st century, particularly in recent years, the theoretical research on agricultural vocational education has entered an innovative development stage, showcasing a more macroscopic and holistic awareness alongside continually improved research quality. The research perspectives have significantly diversified, with the introduction of emerging perspectives such as "targeted poverty alleviation," "rural revitalization," and "modern apprenticeship system," injecting new momentum into theoretical studies. The scope of research content has also deepened, encompassing not only macro-level system construction and policy formulation but also delving into micro-level aspects like teaching methodologies, curriculum design, and student evaluation. Additionally, there is an active exploration of cross-domain integration with information technology, agricultural industries, and other fields. Concurrently, research methodologies have become increasingly scientific, emphasizing rigor and empiricism. Tools like SPSS are widely employed for data analysis, coupled with field investigations and case studies, laying a solid foundation for theoretical research.

Concept of Agricultural Technology Innovation

1. Definition of Agricultural Technology Innovation

Different organizations give different definitions or concepts to agricultural technology innovation. World Bank (2007) pointed out agricultural technology innovation refers to the development and implementation of new technologies and practices that enhance agricultural productivity, sustainability, and resilience. This includes advancements in machinery, biotechnology, information technology, and precision farming techniques. FAO (2011) proposed agricultural technology innovation involves the creation and adoption of new tools, processes, and technologies that improve the efficiency, productivity, and sustainability of agricultural production systems. It encompasses innovations in crop and livestock production, irrigation, pest control, and post-harvest processing.

International Food Policy Research Institute (IFPRI, 2016) indicated agricultural technology innovation is the process through which new technologies, such as improved crop varieties, agricultural machinery, and digital tools, are developed and applied to solve agricultural challenges. It aims to increase agricultural productivity, reduce environmental impacts, and enhance food security. United Nations Conference on Trade and Development (UNCTAD, 2017) proposed agricultural technology innovation encompasses the introduction of new methods, practices, and technologies in agriculture to improve production efficiency, crop yields, and the

overall sustainability of farming practices. This includes innovations in biotechnology, agroecology, and climate-smart agriculture.

Roseboom, J. & Rutten, H. (1998) proposed innovation in agricultural technology involves the creation and application of new agricultural techniques, including advancements in biotechnology, machinery, and information systems, aimed at increasing agricultural productivity and addressing environmental concerns. Huang, J., Hu, R. & Rozelle, S. (2004) proposed agricultural technological innovation is the process of developing and integrating new agricultural technologies, such as genetically modified crops, precision farming, and advanced irrigation systems, to enhance crop yields and resource use efficiency.

To sum up, Agricultural Technology Innovation refers to the dynamic process that encompasses agricultural scientific research, inventions, creations, as well as the promotion, application, enhancement of production capacity, and maximization of benefits of scientific and technological achievements. It includes the conception, research and development, promotion and diffusion, production, and sales activities and processes aimed at obtaining new agricultural varieties, products, technologies, and methods, all aimed at addressing agricultural challenges and improving food security. By exploring these definitions and references, one can gain a comprehensive understanding of the scope and impact of agricultural technology innovation in modern farming practices.

2. Theories of Agricultural Technology Innovation

The theoretical framework of agricultural science and technology innovation comprehensively encompasses pivotal domains such as agricultural biotechnology, agricultural information technology, agricultural equipment technology, and agricultural ecological technology, which intertwine and mutually reinforce to propel significant advancements in agricultural science. Recent breakthroughs in agricultural biotechnology, including the application of gene editing technologies like CRISPR-Cas9, have successfully cultivated crop varieties with enhanced disease resistance, higher yields, and superior quality. Agricultural information technology leverages big data, cloud computing, artificial intelligence, and the Internet of Things to precisely analyze data and intelligently support decision-making, thereby notably enhancing agricultural production efficiency and management. Meanwhile, the latest achievements in agricultural equipment technology, exemplified by smart and autonomous agricultural machinery, have revolutionized agricultural production by promoting high levels of mechanization and automation, reducing costs, and boosting efficiency. Looking ahead, agricultural

science and technology innovation will continue to evolve towards greater intelligence, precision, and informatization, providing robust technological support for the sustainable development of modern agriculture.

Adam Smith (1776) believed that the improvement of workers' abilities and machinery was related to technological progress, and that division of labor promoted the improvement of workers' abilities and machinery, which was conducive to improving labor productivity. Marx, K. (1867) viewed invention and innovation as a social process and took a dialectical approach to it. J.A. Schumpeter (1942) believed that technological innovation was a shift in the production function or a new combination of production factors and production conditions, with the purpose of obtaining potential profits. Solow R.M. (1956) conducted a more comprehensive study of technological innovation theory and proposed a two-step theory, which stated that the two conditions for achieving technological innovation were the source of new ideas and their subsequent implementation and development. Richard L.Enos (1962) clearly defined technological innovation from the perspective of behavioral sets, believing that it was the result of a combination of several behaviors, including capital investment guarantees, organizational establishment, planning, recruitment of workers, and market development. Lynn, G.S. (1982) defined technological innovation from the perspective of the timing process of innovation, believing that it was the entire behavioral process that began with the recognition of the commercial potential of technology and ended with its full commercialization into a product. Utterback, J. M. (1994) believed that, unlike inventions or technical prototypes, technological innovation was the actual adoption or first application of technology. Freeman,C.(1995) believed that technological innovation referred to the first commercial transformation of new products, processes, systems, and services. The National Science Foundation of the United States defined technological innovation as the introduction of new or improved products, processes, or services into the market.

British scholar Vincent Moore pointed out that technological innovation was the origin, evolution, and development process of technological products; British economist P. Stoneman (1995) believed that technological innovation was the first time scientific inventions were input into the production system and through research and development, efforts were made to form a complete process of commercial transactions; Australian scholar Donald Watt believed that technological innovation was the process of enterprises developing inventions or research results and finally creating profits through sales; the Modern Economic Research Association of Japan described technological innovation as the combination of means of production; the

Research Department of the Library of Congress of the United States defined technological innovation as a complete process from the generation of new products or processes to their market application, including a series of activities such as new idea generation, research, development, commercial production, and diffusion. The Organization for Economic Cooperation and Development (OECD) believed that technological innovation referred to the emergence of new products and their commercialization in the market, as well as the emergence of new processes and their application in the production process.

In the mid-1980s, Myers, S. (1984) sorted out and analyzed the arguments and expressions related to the definition of technological innovation over the decades. He believed that technological innovation was a meaningful discontinuous event characterized by its novelty of conception and successful implementation. Some studies focus on how technology is likely to fundamentally change many aspects of teaching and learning in higher education. For example, Christensen, Horn, Caldera, & Soares (2011) link the processes of technological change in education to their theory of disruptive innovation. Mohamed Samir Hussein, R. (2014) attempted to enhance current understanding of the adoption of innovations in an important industry like the higher education industry. Empirical results shed light on influential factors when adopting technological innovations by faculty and administrators in the higher education industry. In addition to the attributes of the innovation, all university-based factors as well as one service provider factor, namely, need for interaction, were identified to have a significant influence on the adoption of technological innovations in the higher education industry. Turulja, L., & Bajgorić, N. (2018) confirms that knowledge management processes individually contribute to the innovation and indirectly on business performance. Besides, it confirms mediating effect of innovation between both knowledge acquisition and knowledge application and organizational business performance. Amanullah, M. D., Ullah, S., Hussain, F., & Iqbal, M. (2021) discussed in the paper "Measurement of Technological Innovation Capabilities in Agriculture Knowledge and Innovation Systems": the development of a framework to measure technological innovation capabilities within agricultural knowledge and innovation systems. The focus is on how various factors contribute to innovation in the agricultural sector and how these can be quantitatively assessed.

3. The Cross-Development of Human Capital and Technology Innovation Theory

The mechanism of human capital on technological innovation is complex. Innovation can be broadly seen as the integration of various types of knowledge accumulation. As technological innovation is a complex and dynamic process, its ultimate goal is to generate new business outcomes, and knowledge can help enterprises achieve this goal (Subramaniam & Youndt, 2005). Since knowledge is internalized in the thoughts and actions of individuals with human capital characteristics (Meyer, 2011), the critical role of human capital in enterprise innovation is primarily manifested in two aspects: facilitating the utilization of internal knowledge and the absorption of external knowledge. Enterprise human capital represents the sum of knowledge, experience, and skills possessed by all individuals within the enterprise in economic activities (Subramaniam & Youndt, 2005; Gallié, 2012). For enterprises, innovation necessitates not only better comprehension, judgment, and execution in the innovation decision-making process but also the contribution of various specialized skills at different levels to the final innovation outcomes. Therefore, it is the ultimate comprehensive manifestation of various enterprise human capital. For instance, enterprise managers with high human capital are more receptive to new ideas and make better decisions; employees with high human capital attributes accelerate and creatively apply new knowledge in production; and high-quality and well-trained R&D personnel accelerate and facilitate the realization of innovation outcomes (Ballot et al., 2001; Winne & Sels, 2010). Thus, the traditional approach of relying solely on R & D institutions for innovation is no longer applicable (Chesbrough, 2003), as any employee within the enterprise can become an active promoter of innovation. This requires enterprises to fully tap the innovative potential of different individuals within the organization, enabling the full utilization of human capital attached to individuals, thereby maximizing the potential for knowledge to be transformed into business outcomes. Related research indicates that even employees with similar individual characteristics often exhibit varying levels of productivity depending on their positions (Liu Zhiqiang et al., 2015).

Furthermore, as the complexity of technological innovation increases and the market environment becomes more volatile, it has become increasingly challenging for enterprises to achieve innovation solely through internal resources and capabilities (Caloghirou et al., 2004). As a result, more and more enterprises are beginning to acquire new knowledge through external knowledge search. However, whether external knowledge can be effectively utilized by enterprises and become a

source of innovation depends on two aspects: firstly, whether the external knowledge aligns with the enterprise's desired knowledge objectives, which is determined by the enterprise's ability to effectively collect and acquire knowledge (Escribano et al., 2009). Secondly, and more crucially, it depends on the enterprise's absorptive capacity (Cohen & Levinthal, 1990). An enterprise's absorptive capacity stems from two factors: the enterprise's existing knowledge base and its efforts towards technological development (Kim, 1999). The former is largely reflected in the sum of knowledge possessed by internal employees, while the latter's degree of effort is manifested in investments such as R & D, patents, and training, which need to be transformed into employee experience and knowledge, becoming part of the enterprise's human capital, and subsequently influencing the enterprise's absorptive capacity. This process repeats itself. Therefore, the accumulation of internal human capital within an enterprise plays a crucial role in the acquisition of external knowledge.

Table 2.1 The results of the synthesis of the impact factors of vocational education on agricultural technology innovation

Researcher / Impact Factors	Yayavaram, S., & Chen, W. R.(2015)	Turulja, L., & Bajgorić, N.(2018)	Stephen Marshall (2018)	Bloodgood, J. M.(2019)	Marcela. H.de.M.(2020)	Li, Y., & Wei, Z.(2020)	Kaczorowski T.; Howorth S.(2021)	Wang, L., & Sun, W.(2021)	Amanullah, M. D.et.al (2021)	Zhao, R., & Liu, H.(2023)	Fu, Z., S. & Zeng, Y.(2024)	**Total**
Knowledge acquisition ability	√			√	√	√	√		√	√	√	**8**
Knowledge coupling ability	√	√	√	√		√	√			√		**7**
Knowledge application ability	√	√	√					√	√	√	√	**7**
Innovation incentive			√	√				√		√		**4**
Demand for vocational and technical talents				√		√		√	√	√	√	**6**
Policy	√	√		√	√	√	√				√	**7**
Income	√		√	√				√	√	√		**6**
Innovation team		√	√	√				√				**4**

According to Table 2.1, the researchers analyzed and synthesized documents, concepts, theories, and researches related to the impact of vocational education on agricultural technology innovation, which consisted of Yayavaram, S., & Chen, W. R. (2015), Turulja, L., & Bajgorić, N. (2018), Stephen Marshall (2018), Bloodgood, J. M. (2019), Marcela. H.de.M. (2020), Li, Y., & Wei, Z. (2020), Kaczorowski T.; Howorth S. (2021), Wang, L., & Sun, W. (2021), Amanullah, M. D.et.al (2021), Zhao, R., & Liu, H. (2023), Fu, Z., S. & Zeng, Y. (2024). The researcher used the criteria to consider the corresponding characteristics. To use as a framework for research in this study. By selecting characteristics with a frequency of six or more. Which can be

synthesized in six characteristics as follows: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income.

Knowledge Acquisition Ability

Li, & Wang (2014) proposed the role of knowledge acquisition in the innovation process of agricultural enterprises. The author argue that the ability to acquire external knowledge, such as from research institutions and market feedback, is crucial for developing new agricultural technologies and improving productivity. Gao, & Li (2018) discussed the impact of knowledge acquisition on the adoption of precision agriculture technologies. The authors emphasize that farmers' ability to acquire knowledge about new technologies significantly affects their willingness and ability to adopt these innovations; the ability to effectively acquire and utilize knowledge from various sources is essential for maintaining competitiveness and achieving sustainability in agriculture.

Everwijn, Bomers, & Knubben (1993) proposed that, traditionally education has been expected to address the problem that the acquisition of knowledge does not guarantee the successful application of that knowledge. However, according to Whitehead, the ultimate goal of education should be to teach students how to apply knowledge. In fact, the problem people face is that the knowledge and skills specific to a discipline are not sufficient to adequately address the problems that go beyond the discipline, are new and unknown. In addition to the specific knowledge and skills of a discipline, more general knowledge and skills are needed, such as communication, problem-solving, using information, analysis, and decision-making. However, general knowledge and skills do not guarantee that a person also has sufficient specialized knowledge to use.

Turulja, L., & Bajgorić, N. (2018) analyzed and empirically tested the relationships between knowledge acquisition and application, product and process innovation, and firm performance. The study found that product and process innovation had a direct impact on firm performance. At the same time, knowledge acquisition and knowledge application had an indirect impact on firm performance through product innovation and process innovation. Although knowledge management represents a complex concept of knowledge management in organizations and can include more processes, the study confirmed the contribution of knowledge management processes to innovation and indirectly affected firm performance. It validated the mediating role of innovation in the relationships between knowledge acquisition, knowledge application, and organizational

performance, providing important empirical evidence to support the role of individual knowledge management processes and independent types of innovation within organizations.

Hyland, Hoff & Rounds (2022) used a large and representative dataset in the study, using a person-centered approach to integrate interests and competencies, examining the relationship between different profiles of interests and abilities and strengths and weaknesses in personal knowledge. The study yielded two main findings. First, eight interest capability features were generated using latent feature analysis (Latent Profile Analysis, LPA), replicating and extending the interrelationship between interest and capability found in previous studies using variable-centric methods. Second, the strongest knowledge score for each profile corresponds to their strongest ability and interest, highlighting the importance of the interest-ability profile for guiding knowledge development. Importantly, in some areas, people with lower abilities are actually more knowledgeable than those with higher abilities. Overall, these findings suggest that people learn the best when they have the opportunity to acquire knowledge related to their interests and abilities.

Rusly, Sun & Corner (2015) developed a theoretical model showing how change readiness factors at the individual and organizational levels affect knowledge acquisition. They point out that knowledge acquisition understanding, knowledge acquisition background and individual differences are the main dimensions that define the degree of change readiness of knowledge acquisition process. Different business archetypes, inter-occupational differences, and the demographics of professionals influence the way change readiness factors shape the knowledge acquisition process in the firm.

Bloodgood, J. M. (2019) explored the impact of acquiring relevant knowledge, irrelevant knowledge, and erroneous knowledge on competitiveness. According to the uniqueness of relevant knowledge, irrelevant knowledge and wrong knowledge, the source of knowledge and the complementarity of enterprises, the positive and negative effects of relevant knowledge, irrelevant knowledge and false knowledge acquisition on the competitiveness of enterprises are proposed. He noted that managers should plan knowledge acquisition for the interaction of new knowledge and complementarity, and that various combinations of enterprise complementarity, knowledge types and key qualities can lead to significant competitive effects, such as parity, relative harm and opportunity capture.

To sum up, knowledge acquisition ability refers to the capacity of individuals or organizations to obtain new knowledge, technologies, and information. Agricultural vocational education constructs diversified learning platforms and resource systems, providing convenient avenues for farmers and agricultural practitioners to acquire knowledge.In the process of agricultural scientific and technological innovation, this ability is directly related to the efficiency and effectiveness of innovation activities.

Knowledge Coupling Ability

Xu, & Zhang (2013) explored the role of knowledge coupling in agricultural innovation, emphasizing how integrating diverse knowledge sources (e.g., traditional practices and modern technology) enhances innovation capacity. The authors argue that knowledge coupling is essential for creating sustainable agricultural practices. Li, & Feng, (2016) examined the impact of knowledge coupling on the innovation performance of agricultural firms in China. It highlights that firms with a higher capability to couple different knowledge types (scientific, technical, and local) tend to have better innovation outcomes and more competitive advantages. Wang, & Liu (2020) focuses on the role of knowledge coupling in smart agriculture, particularly how the integration of information technology and agricultural practices can lead to innovative solutions. The authors suggest that knowledge coupling is a critical factor in the successful implementation of smart farming technologies.

Yayavaram, & Chen (2015) pointed out that the coupling change between existing knowledge domains will affect the innovation outcomes, but will not affect the innovation outcomes when the domain complexity is high, while the coupling between new knowledge domains and existing knowledge domains will improve the innovation outcomes when the domain complexity is high, but not when the domain complexity is high. In their research, they present arguments to explain how coupling changes between existing knowledge domains and coupling changes between new and existing knowledge domains affect the production of valuable inventions.

Jin, Yang, Fawad Sharif, & Li (2022) divides knowledge coupling changes into four types and two dimensions; the coupling of external existing and new knowledge and external knowledge with existing knowledge and the coupling of internal existing and new knowledge with existing knowledge. The results show that the coupling of external existing knowledge and new knowledge has an inverted u-shaped effect on enterprise innovation performance. The coupling change of existing knowledge or existing knowledge and new knowledge within an enterprise has a direct positive impact on enterprise innovation performance. The regulatory effect of network cohesion flattened the inverted u-shaped effect of external new knowledge and

existing knowledge, while the regulatory effect of external existing knowledge is not significant.

Chen, Yao, & Zhou (2021) empirically tested the survey data of 229 Chinese technology enterprises by using regression and bootstraying methods. The results show that the complementary coupling of knowledge has a positive effect on both exploratory innovation and exploitative innovation. Alternative knowledge coupling has a positive effect on exploratory innovation, but has no positive effect on exploratory innovation. Furthermore, the relationship between knowledge coupling and exploratory and exploitative innovation is continuously mediated by organizational memory and knowledge creation. The results show that the innovation performance of firms significantly depends on the consistency between the different characteristics of knowledge coupling and innovation strategy. By exploring the mediating role of organizational memory and knowledge creation, the influence mechanism of knowledge coupling on exploratory innovation and exploitative innovation is revealed.

To sum up, knowledge coupling ability refers to knowledge coupling ability refers to the capacity for knowledge from different fields to interconnect and influence each other, forming a comprehensive knowledge system. In agricultural vocational education, through a systematic teaching system, agricultural vocational education seamlessly integrates knowledge from agricultural production technology, agricultural economics and management, agricultural research and practice, agricultural environment and sustainable development, among others, into a comprehensive and intricate agricultural knowledge system. The complementary coupling of knowledge has a positive effect on both exploratory innovation and exploitative innovation.

Knowledge Application Ability

Yang, & Li (2018) examined the role of knowledge application in the success of agricultural innovation systems. It argues that the ability to apply scientific knowledge to practical agricultural problems is essential for driving innovation and ensuring the relevance of research outcomes. Chen, & Xu (2019) explored the relationship between knowledge application and the adoption of sustainable agricultural practices. It finds that the practical application of knowledge related to environmental conservation and resource management is key to achieving long-term sustainability in agriculture. Chou, & He (2014) argued that firms that effectively apply knowledge are better positioned to adapt to technological changes and market demands, which enhances their innovation capabilities.

Cukurova, Bennett & Abrahams (2018) explored the effectiveness of two different learning environments:(i) guided self-directed learning and (ii) independently researched unguided self-directed learning. Students were asked to complete pre - and post-intervention tests containing 10 diagnostic questions, four of which measured students' knowledge acquisition in one setting and six of which measured their ability to successfully apply knowledge in another setting. The study found that supervised self-directed learning environments improved students' knowledge and ability to apply knowledge in new situations, but unsupervised self-directed learning had no statistically significant effect. The study also found that unsupervised independent learning led to a statistically significant increase in the number of student misunderstandings on a diagnostic question. The results of this study suggest that instruction in self-directed learning activities is a key necessity.

Ackerman, Beier & Bowen (2002) reviewed previous studies and empirically examined 228 adults aged between 21 and 62 years, comparing self-reported assessments of ability and knowledge with objective measures. The correlation between self-rated and objective assigned pairs has both significant convergent and discriminative validity, indicating that individuals have both roughly accurate and different views on their relative relationship in ability and knowledge.

Botti & Reeve (2003) examined the hypothetical ability of 60 second and third year student nurses with high academic performance for hypothetical cases, the need to identify uncertain information and obtain additional information, and diagnostic accuracy. The results suggest that general academic ability and knowledge have a partially independent role in the acquisition of nursing expertise. Academic competence influences decision-making in low-complexity tasks, but as case complexity increases, domain-specific knowledge and experience determine decision-making skills. Novice with different levels of knowledge and abilities have important differences in clinical decision-making and can be studied by systematically increasing the complexity of the decision-making task. These results have implications for the structure and assessment of clinical education.

To sum up, knowledge application ability refers to the capacity to transform acquired knowledge, technologies, and information into practical productivity or innovative outcomes. Agricultural vocational education reinforces students' knowledge application ability through practical teaching, internships, and IUR collaborations. In agricultural scientific and technological innovation, knowledge application ability serves as a crucial criterion for evaluating educational effectiveness and innovation achievements.

Demand for Vocational and Technical Talents

Wang & Zhang (2016) discussed the critical role of vocational education in bridging the skills gap in the agricultural sector. The demand for technically proficient workers who can handle modern agricultural innovations is emphasized as key to maintaining competitiveness and improving productivity. McGrath & Powell (2016) discussed the increasing demand for vocational and technical talents in the context of global economic changes. It emphasizes that as economies transition towards knowledge-based industries, the need for workers with specialized technical skills has grown significantly.

Hanushek & Woessmann (2020) argued that the demand for vocational education and training graduates is rising due to the expanding role of technology in the workplace. They highlight that VET programs need to adapt to the changing labor market demands to ensure that students acquire relevant skills. Huaping & Binhua (2022) explored the impact of digital economy development on labor structure based on modeling analysis and empirical analysis. The research shows that the digital economy can promote the progress of skilled talents, and the proportion of high-skilled talents will gradually increase; Regional economic coordination policies can promote the diffusion of digital technologies and the upgrading of skilled personnel. Zhang & Sun (2022) argued that the demand for vocational and technical talents in china is closely linked to the global trend of digitalization in agriculture. The need for workers who are proficient in the use of digital tools and platforms for farm management and innovation is increasingly critical.

Zhang, Abidin & Tu (2023) believe that regional differences and the low matching degree of positions and majors are the main reasons for the low employment happiness of Chinese vocational college students. Based on the actual needs of the society, this study examines the correlation between the subject setting, education methods and employment of fresh graduates of Guangdong Vocational College of Communications and several nearby cities, so as to design a feedback mechanism to optimize the dependent variables through the reverse adjustment of independent variables, so as to solve the above employment happiness problem. The results show that regional economic differences have little influence on graduate employment happiness, and education patterns and curriculum have a great impact on graduate employment happiness.

To sum up, demand for vocational and technical talents refers to the need for individuals who have specialized skills, knowledge, and training in specific trades, crafts, or technical fields. These talents are essential for industries and sectors that

rely on practical and applied skills to operate efficiently and innovate. This demand is driven by several factors, including: economic development, technological advancements, industry-specific needs, labor market dynamics etc. These studies reflect the evolving demands in the agricultural sector, particularly the need for vocational and technical talents who are equipped to handle modern agricultural innovations. The emphasis is on the development of specific skills that align with the latest technological advancements and sustainable practices in agriculture.

Policy

Wang & Li (2017) proposed how government policies, particularly subsidies and grants, have significantly stimulated agricultural technological innovation in China. The research points out that targeted financial incentives lead to increased research and development activities in agricultural technology, thereby enhancing innovation capacity. Klerkx, & Rose (2020) discussed how innovation policies in the agricultural sector need to focus on creating conducive environments for technology adoption. They argue that beyond financial support, policies should also address infrastructural and institutional barriers to ensure that innovations are effectively adopted by farmers.

Liu & Qiu (2019) explores the role of policy frameworks in fostering public-private partnerships (PPP) in agricultural innovation. The authors find that policies promoting PPPs have been effective in driving collaborative research, which is crucial for the development and diffusion of new agricultural technologies. Jiang, & Ren (2021) investigated the impact of regulatory policies on the adoption of precision agriculture technologies. It concludes that supportive regulations, combined with awareness programs, play a significant role in accelerating the uptake of innovative technologies in the agricultural sector.

According to Lamprinopoulou, & Roep et.al (2014), innovation is increasingly being valued by policy makers as a means to meet the challenges of sustainable economic development. However, factors such as inadequate physical and knowledge infrastructure, uncoordinated institutional frameworks, and lack of specific capacities can negatively impact the operation of agricultural innovation systems. By assessing and comparing the performance of agricultural innovation systems in Scotland and the Netherlands, the study found that in both countries, systemic failures in actor interaction and capabilities, as well as market and incentive structures, were revealed. However, some differences have emerged between the two countries that seem to have more to do with social and cultural (soft institutions) differences than formal legal and regulatory frameworks (hard institutions).

The results of Akkaya & Lee (2021) suggest that the use of taxes alone will encourage experimentation with new production methods, but will reduce social welfare. Policies that use only subsidies are better at raising social welfare than policies that include both taxes and subsidies, but the opposite is true for increasing trial rates. The study found that zero spending policies lead to a decline in social welfare unless producers face financial barriers in transitioning to the new approach.

To sum up, policy refers to the strategic plans, regulations, and initiatives implemented by governments, educational institutions, and other stakeholders to promote and enhance vocational education and training. These policies aim to create a skilled workforce that meets the needs of the economy and supports individual career development. Key aspects including: curriculum development, funding and resources, quality assurance, teacher training, access and equity, industry collaboration, etc. These studies collectively underscore the importance of well-designed policies in fostering agricultural technological innovation, highlighting the role of financial incentives, regulatory frameworks, and public-private partnerships in driving advancements in the sector.

Income

Li & Wang (2015) proposed that vocational talents in agriculture with specialized skills in innovative technologies tend to earn higher incomes compared to their counterparts in traditional roles. The increasing demand for precision agriculture and biotech expertise has led to a rise in wages for skilled professionals in these areas. Chen, & Zhang, (2017) discussed the income disparity between agricultural vocational talents with different levels of technological proficiency. Those who have adapted to modern farming techniques and innovations generally experience better income prospects than those reliant on conventional methods.

Wang, L., & Sun, W. (2021) studied highlights that the integration of digital technology in agriculture has created new high-income opportunities for vocational talents. Those involved in digital agriculture, data analytics, and smart farming are among the highest earners in the agricultural sector. Zhao, & Liu (2023) argued that continuous education and skill development are key factors in improving the income of vocational talents in agriculture. With the rise of sustainable farming practices, vocational talents who invest in ongoing learning and adapt to new technologies tend to achieve higher income levels.

Zhang & Luo (2015) examined the income levels of agricultural technicians in China, noting that despite their critical role in advancing agricultural practices, their income remains relatively low compared to other technical professions. The authors

argue that income disparities need to be addressed to attract and retain talent in the agricultural sector. Rahman, & Salim (2018) analyzed income trends among agricultural technicians in Bangladesh, emphasizing that while there has been some improvement due to policy interventions, the income levels are still not commensurate with the expertise required for the job. The study suggests that better compensation could enhance the performance and motivation of agricultural technicians.

Guan & Wu (2020) focuses on the factors affecting agricultural technician income in rural China. It finds that income is significantly influenced by factors such as education level, years of experience, and the type of agricultural enterprise. The study recommends targeted policies to improve income levels for agricultural technicians, particularly in underdeveloped regions. Kim, J., & Park, S.(2021) discusses the role of agricultural technicians in South Korea's smart farming initiatives and highlights how increased demand for skilled technicians in high-tech agriculture has led to a gradual rise in their income. However, it points out that this income growth is uneven across different regions and types of farming.

To sum up, income refers to the earnings or wages received by individuals who have completed VET programs and possess skills in specific trades, crafts, or technical fields. This income can vary based on several factors, including the level of skill, industry, geographic location, and work experience. These studies emphasize the importance of fair compensation for agricultural technicians to ensure the sustainability and growth of the agricultural sector, particularly in the context of technological advancements and modernization efforts.

Context of Higher Vocational College in Guangxi

In the early 1980s, China began to attach importance to vocational education. In 1985, the Central Committee of the Communist Party of China issued the "Decision of the Central Committee of the Communist Party of China on the Reform of the Education System", which clearly stated the importance of vocational education. In the late 1980s, some colleges and universities began to set up vocational and technical education classes, which marked the bud of China's higher vocational education. After 2000, China's higher vocational education expanded rapidly, and the number of vocational colleges increased significantly. Many higher vocational colleges have expanded their scale and level by merging and upgrading. In 2002, the Ministry of Education issued the Decision on Vigorously Promoting the Reform and Development of Vocational Education, which put forward the goal of

"actively developing higher vocational education". The state has gradually introduced policies to promote the quality of higher vocational education, such as the implementation of the "Double Certificate" system, emphasizing both vocational qualification certificates and academic certificates. In 2014, The State Council issued the Plan for the Construction of the Modern Vocational Education System (2014-2020), which clarified the reform direction and tasks of vocational education. In 2019, the Ministry of Education and the Ministry of Finance jointly launched the "Double High Plan", the "High-level Higher Vocational Schools and Professional Construction Plan", aiming to build a number of world-class higher vocational colleges and professional groups. In the past decade, Chinese higher vocational colleges have actively carried out international cooperation, introduced foreign high-quality educational resources and advanced teaching models, and improved the level of international education.

Guangxi Zhuang Autonomous Region is located in the southwestern part of China and borders Vietnam, with the largest population of ethnic minorities in China. In recent years, Guangxi has carried out modernization reforms in vocational education, achieving significant results. In 2020, Guangxi enrolled 324.000 students in medium vocational schools, accounting for 43% of high school students; enrolled 272.000 students in higher vocational schools, accounting for 53% of college students. More than 350,000 students graduate from vocational education institutions every year, with the initial employment rate of high vocational graduates reaching 92% (China Daily). Guangxi hosts a variety of higher vocational institutions, including specialized vocational colleges and technical universities. By 2024, there are 89 institutions of higher education in Guangxi, including 53 vocational colleges (including 4 vocational universities) and 36 general undergraduate colleges. Among them, four vocational colleges mainly serve the agricultural industry, while several other colleges offer majors related to the agricultural industry. These institutions offer a wide range of programs in fields such as agriculture, engineering, information technology, healthcare, business, tourism, and more. Notable institutions include Guangxi Vocational University of Agriculture, Nanning Vocational and Technical University, Guangxi Technological College of Machinery and Electricity, and Guangxi Modern Vocational Technology College etc.. Higher vocational education in Guangxi attracts a diverse student population, including those from rural and ethnic minority backgrounds.

The development of higher vocational education in Guangxi has roughly experienced three stages, which are basically consistent with the development of higher vocational education in China. Early exploration stage: From the late 1980s to the early 1990s, Guangxi began to explore the development of vocational education and established some secondary vocational schools to train primary technical talents. In the 1990s, the state issued a series of policies to support vocational education, and the vocational education in Guangxi has gradually developed to the higher level. Rapid expansion stage: In 2000, the Ministry of Education issued the "Several Opinions on Deepening the Reform of Vocational Education and Teaching and Comprehensively Improving the Quality of Education", which clearly proposed to vigorously develop higher vocational education. Guangxi followed suit and issued a series of local policies to promote the development of higher vocational education. During this period, Guangxi set up a number of higher vocational colleges, such as Guangxi Vocational and Technical College, Guangxi Industrial Vocational and Technical College, Guangxi Agricultural Vocational and Technical College. Quality improvement stage: In 2019, the Ministry of Education issued the "National Vocational Education Reform Implementation Plan", which proposed specific measures and objectives for vocational education reform, including the implementation of the "Double high Plan". In the same year, the Guangxi Department of Education issued the Implementation Plan for the Reform and Development of Vocational Education in Guangxi Zhuang Autonomous Region, which is a local implementation plan formulated according to the national implementation plan for the reform and development of vocational education, and specifies the development goals and measures of vocational education in Guangxi in detail. In 2019, Guangxi launched the "Double High Plan", and in 2020, the first batch of 30 professional groups of 11 higher vocational colleges were selected, and the Department of Education gave corresponding construction funds. In the past ten years, Guangxi higher vocational colleges have also accelerated the pace of international cooperation, introduced advanced educational resources and teaching models, and improved the level of international education, especially the cooperation with Southeast Asian countries is quite distinctive and effective.

The curriculum in higher vocational institutions is designed to be practical and industry-oriented, with a strong focus on hands-on training and real-world applications. Programs often include internships, apprenticeships, and partnerships with local businesses and industries to ensure students gain relevant experience and skills. The Guangxi government actively supports the development of higher vocational education through funding, policy initiatives, and infrastructure

development. key policies aim to improve the quality of vocational education, enhance teacher training, and promote collaboration between educational institutions and industries. During the 13th Five-Year Plan period (2016-2020), Guangxi's vocational education budget reached 50 billion yuan (about $7.5 billion) to improve school conditions and build demonstration training bases (Asian Development Bank).

Higher vocational education in Guangxi is an essential part of the region's educational and economic landscape. It provides practical skills and training to a diverse student population, supports local industries, and contributes to social and economic development. It also contributes to social mobility by providing educational opportunities to students who may not have access to traditional higher education pathways. Continued investment and development in this sector are crucial for meeting future workforce needs and sustaining regional growth.

Guangxi has promoted the development of vocational education through a series of policies and incentives, such as including major vocational education projects and enrollment figures in the performance evaluation system(China Daily). Guangxi has fully utilized its geographical advantages to deepen vocational education exchanges and cooperation with ASEAN countries. Several China-ASEAN joint vocational education exhibitions and forums have been held, promoting the internationalization of vocational education. Guangxi has established the China-ASEAN Vocational Education Research Think Tank and the China-ASEAN Border Vocational Education Alliance, among other institutions, to promote regional cooperation and development in education.

According to the statistics of Guangxi Education Department in 2023: In the past three years, Guangxi vocational colleges have won a total of 260 national awards, ranking 10th in the country and 2nd in the West. In the second National Vocational Education Teaching Achievement Award evaluation, a total of 15 awards ranked 8th in the country, and the second in the West China was selected in the first National Teaching Material Construction Award. It has won 10 vocational education textbook awards, 1 advanced individual award, and 1 advanced group Award. The total number of awards ranked 13th in the country. 5 vocational schools have entered the top 50 national vocational school special management. It can be seen that although the overall level of Guangxi's economic development is in the middle and lower reaches of China, the level of higher vocational colleges can be ranked in the middle and upper reaches of the country. Limited by geography, resources, industry, economy and other factors, Guangxi vocational education development

support capacity is insufficient: The overall basic conditions of some vocational schools are weak, coupled with the rapid growth of the school scale, the funding investment does not keep pace with the growth of the school scale, and one or more indicators such as the average campus area per student, the construction area of the school building per student, and the number of books per student in some vocational schools do not meet the national standards. In terms of teacher construction, the ratio of students to teachers in some vocational schools is high, the proportion of “Double-Professionally-Titled” teachers is low, it is difficult to introduce high-level, high professional titles, high education, and high skill talents, and the problem of insufficient quantity and poor quality of teachers has not been completely solved.

To sum up , the challenges of Guangxi higher vocational include the need for continuous curriculum updates to keep pace with technological advancements, ensuring adequate funding, and improving facilities and resources. Future development goals focus on enhancing the quality of education, expanding industry partnerships, and promoting innovation and entrepreneurship among students.

Related Research

1. Research Progress on Agricultural Vocational Education

The focus on vocational education originated in the 18th century, when Adam Smith, in the 18th century, recognized the role and effectiveness of vocational education, stating that "a particular skill or trade, which requires much time and labour to acquire, is equal to a machine of great expense, which must be worn out before it can be made good by another of the same kind." High-priced machines offer greater productivity, and mastering specialized skills and trades enhances production efficiency. Christoph H. Loch (2002) went further, arguing that education and training primarily serve to cultivate laborers' vocational skills and their ability to solve complex problems, both of which are crucial factors in enhancing industrial competitiveness. Therefore, vocational education plays an invaluable role in improving laborers' education and has significant potential for development. Education and training possess two functions: nurturing laborers' skills and fostering their capacity to tackle intricate issues, thereby elevating industrial competitiveness. Different forms of education and training vary in their contributions to economic development. Tam Bang Vu (2006) conducted a study on the educational backgrounds of employees in several major industries in the United States and concluded that community colleges play a more significant role in local economic

development, with a higher contribution rate than general higher education, serving as a vital channel for talent supply.

The rapid development of the European Industrial Revolution in the 19th century created a massive demand for skilled workers, fostering the emergence of Western vocational education, and thus, the seeds of modern vocational education systems began to sprout. To meet the escalating demand for workers amidst the rapid industrialization, countries worldwide formulated vocational education development strategies to promote the swift advancement of their domestic vocational education systems. Among them, Germany, Japan, and the United States stand out as exemplary cases in vocational education, setting global benchmarks. Practical developments have driven theoretical innovations. In the 1960s, Theodore W. Schultz (1961) pioneered the theory of human capital, further theorizing the nation's emphasis on vocational education development. He believed that education can foster human capital, which serves as the primary source and driving force behind economic growth and social development. The establishment and development of vocational education theories have gained momentum over the past half-century, particularly with the successful implementation of Germany's "Dual System" vocational education, attracting increasing attention from scholars.

Research on vocational education theories, on the one hand, provides a theoretical basis for agricultural vocational education practices, and on the other hand, promotes the development of agricultural vocational education theories that rely on its unique characteristics. Early research on agricultural vocational education primarily focused on its characteristics, functions, funding sources, organizational structures, as well as constraining factors and future trends. Karen Levesque, in her book "Vocational Education in the United States: Toward the Year 2000," conducted extensive data analysis and theoretical argumentation on vocational education and agricultural vocational education models in the United States, highlighting their characteristics and successful experiences as the most developed capitalist country in contemporary agriculture, while also analyzing inherent constraints and future directions. Leclercq, Jean Michel (1989), and Iwamoto, Muneharu (1994) analyzed agricultural vocational education in Japan, arguing that the social reform movement of the 1960s propelled rural vocational and technical education in Japan. Japan's rural education development process is characterized by a strong emphasis on legal guarantees, a focus on industry-academia cooperation and individual practical training, and an intensified cultivation of students' professional awareness, which have played a positive role in Japan's socio-economic transformation, narrowing the urban-

rural gap, and promoting urban-rural integration. Dr. Gisela Dybowski (2005) analyzed the status, functions, organizational structure, funding sources, and stakeholder roles of the "Dual System" within the German vocational education system, and further examined the benefits it brings to the nation, individuals, and enterprises.

In modern times, agricultural vocational education has been incorporated into the research framework of rural and farmer issues. For instance, Schumacher's (1973) research argues that the primary reason for the backwardness of developing countries lies in rural and farmer issues, and that agricultural vocational education and training are crucial to addressing these issues. Firstly, in terms of agricultural vocational education, farmers' income, and agricultural production, Vildan Serin(2009) conducted a survey of 676 farmers in 23 cities across seven regions in Turkey, emphasizing the contribution of formal vocational training and seeking expert technical assistance to farmers' income and productivity levels. The study found that formal vocational training positively impacts farmers' income levels. Paviris analysis of the US agricultural economy from 1929 to 1972 revealed that 81% of agricultural output growth and 71% of productivity improvement were attributed to education and scientific research. Secondly, regarding agricultural vocational education and farmers' personal development, Sue Kilpatrick (2000) used large-scale information data from Australia and a small sample of farmers participating in agricultural training to analyze the effects of education and training from both macro and micro perspectives. The study found that vocational education and training enhance farmers' ability and willingness to succeed in management practices. Thirdly, concerning farmers' demand for agricultural vocational and technical education, G. Phelan (2002) et al. examined how agricultural vocational education and training services affect the rising level of non-agricultural employment among the farming population, exploring various factors related to non-agricultural work and whether farmers' concurrent occupations have negative impacts on agricultural production. The study found that farmers' concurrent occupations are typically associated with declining agricultural income under unfavorable economic conditions, and that different types of farmers have varying demands for agricultural vocational education and training.

Achim Spiller and Julian Voss (2007) used empirical analysis to evaluate the demand for vocational education and training among German farmers, indicating that the agricultural vocational education market is fully transparent with diverse supply sources. However, farmers generally perceive limited time for participating in vocational education and training, and 53% of them are dissatisfied with the effectiveness and quality of training. Factor analysis revealed three primary factors influencing the demand for agricultural vocational education and training: the fundamental advantages of vocational education, farmers' costs and opportunity costs associated with agricultural vocational education and training, and evaluations of supply. Jim Pratley (2008) analyzed the lack of professional human resources in the agricultural sector and the declining number of graduates from agricultural vocational schools, arguing that the unattractive public image of agriculture contributes to the lack of appeal in agricultural careers. Wang, S., Tian, X., Wang, H., Liu, C., Wang, Z., & Song, Q. (2023) indicated the results of existing studies on agricultural talent show that China’s talent supply and demand coupling coordination is low, with significant regional differences and uneven clustering.

2. Research Progress in Agricultural Technological Innovation

Since the American economist Joseph Schumpeter introduced the theory of innovation in his book "Theory of Economic Development" in 1912, scholars both domestically and internationally have applied the theory of technological innovation to the agricultural sector, leading to the proposal of numerous significant theories. These range from William Petty's "Theory of Agricultural Technology Diffusion and Application" in 1942, Cochrane's renowned Agricultural Technology Treadmill Theory in 1958, to Theodore W. Schultz's Modern Factor Introduction Theory in 1964, and Roling Neils' research on agricultural extension theory in 2003.

In recent years, the research structure of agricultural technological innovation has further enriched and improved. Ponniah (2011) proposed the participating entities within the agricultural technological innovation system, taking agricultural development in sub-Saharan Africa as an example. Shi Zhongwen et al. (2014), from the perspective of innovation system theory, pointed out that agricultural technological innovation is a systematic project that can achieve collaborative innovation among all links in the production chain, various related departments, and stakeholders through agricultural innovation. Haki et al. (2014) utilized experimental data collected from eight African countries to indicate that not all innovation platforms can promote crop management innovation. Athman et al. (2015) studied the development and utilization processes of 87 agricultural technologies and found

that 60% of these technologies required intermediary intervention, emphasizing the intermediary role of governments in promoting agricultural technological innovation. Resource endowments, cultural conditions, technology, and institutional factors jointly contribute to agricultural technological progress, among which agricultural production resource endowments play a central role in determining the path and choice of agricultural technological change (Hayami & Ruttan, 1973). The conditions of agricultural production resource endowments and the prices of agricultural production factors induce and influence technological innovations in corn production (Otrnstead & Rhode, 1984). Among agricultural resource endowments, population is a crucial factor driving agricultural technology research and development. Regions with higher agricultural population density tend to have a higher level of agricultural technological innovation (Robinson & Sehutjer, 1984). When agricultural labor is abundant and land is relatively scarce, agricultural technological innovation tends to focus more on biotechnology research and development (He Ai & Xu Zongling, 2010). Through a survey of 265 residents on the Greek island of Crete, Koundouri et al. (2006) found that the level of farmers' human capital determines the degree of advancement in the adoption of new technologies by farmers.

In terms of the process, agricultural technological innovation encompasses research and development, experimental promotion, production application, and diffusion, with a particular focus on the latter two stages. The diffusion of agricultural technological innovation is directional. Evidence from 600 years of research in Chinese agriculture has revealed that new technologies are predominantly disseminated from advanced regions to less developed ones, with regional characteristics determining the direction of agricultural technology diffusion (Perkins, 2013). Farmers decide whether to adopt these technologies based on the performance of newly introduced and tested technologies by themselves and their neighbors, achieving the transfer of new technologies from scientists' laboratories to farmers' fields through learning by doing (Leathe & Smale, 1991). According to agricultural technology extension theory, the transformation of agricultural technology is an active process for farmers to acquire technology, and farmer-oriented agricultural technology transformation is influenced by diffusion efficiency, acceptance efficiency, communication efficiency, and external environmental factors (Roger, 2010). In the process of agricultural technological innovation diffusion, the speed of agricultural technology information dissemination is a crucial factor (Mansfield, 1961). The influence of time on the diffusion of agricultural technological innovation exhibits staged characteristics, with fewer recipients in the initial stage, a surge in the middle

stage, and a gradual decrease in the later stage, forming a normal distribution curve (Hagerstrand, 1968). Factors such as agricultural technology itself, technology information dissemination, natural environment, regional characteristics, farming scale, spatial distance, investment capital, farmers' quality, agricultural technology extension institutions, and government policies all contribute to varying degrees to the diffusion process of agricultural technological innovation achievements (Huang Yuxiang, 2008; Kuang Haoyuan, 2014).

The adoption of agricultural technology affects the diffusion effect of agricultural technological innovation achievements. Farmer organizations and non-governmental organizations help increase the probability of farmers adopting agricultural technologies (Filho et al., 1998). Factors such as the educational level of technology adopters (including computer literacy, reading ability, etc.), full-time farming, and farm size positively impact the application rate of agricultural technologies (Daberkow & McBride, 2003). Technological age, reversible investments, variable inputs and outputs, and stochastic prices influence the effectiveness of agricultural technology applications (Baerenklau & Knapp, 2007). The diversity of technology application models among different farmer classes affects the differences in innovation application effects under varying socio-economic environments (Feder et al., 1985). The characteristics of farmers' technology application affect the potential application capabilities of agroforestry innovation (Mercer, 2004). The gender of farmers influences the different efficiencies of agricultural technology application and absorption (Morris & Doss, 1999). In terms of the pathways for agricultural technology adoption, uncertainty stems from incomplete information, which affects farmers' decisions regarding crop seed adoption (L.Dean Hiebert, 1974). Mobile phone services can help overcome difficulties in technology application by accessing information and experience, financial services, and market input and output information (Baumuller, 2012).

Furthermore, an increasing number of scholars are now paying attention to the driving forces behind agricultural technological innovation. V. W. Ruttan (1970) used data from the United States and Japan from 1880 to 1960 to study factor prices and agricultural technology changes, confirming the existence of induced technological change in agriculture in both countries. The micro-perspective of induced technological innovation theory posits that if capital-saving research results are more easily obtained than labor-saving ones, technological change will be capital-saving; an increase in the price of capital-saving research activities will lead to a shift in technological change towards labor-saving technologies; an increase in output

scale will lead to an increase in research efforts; and any change that alters the present value of factor costs will alter the optimal mix of research activities. There are national differences in the path of induced technological innovation. Alan L. Olmstead and Paul Rhode (1993) conducted an empirical study using data from the United States from 1880 to 1980, but the results using state and regional-level data did not support the hypothesis of induced technological change.

3. Research Progress on the Impact of Agricultural Vocational Education on Agricultural Technology Innovation

Knowledge comprises two forms: explicit and implicit. Explicit knowledge is more systematic and formal, while implicit knowledge is more deeply rooted in society. Explicit knowledge, such as patents, corporate R & D, academic papers, and certifications, is relatively easy to measure. In contrast, a vast amount of implicit knowledge, though challenging to discern and comprehend, holds the greatest research value. Implicit knowledge, including networks, local practices, cultural context constructions, and elements deeply embedded in society, lacks specific excavation and definition, thus cannot be simply replicated or transferred (Lundvall & Johnson, 1998). The acquisition and explicitation of implicit knowledge facilitate the transfer and practice of most innovations(Orgy & Lundvall,1996). Active learning organizations continuously collaborate with external entities, fostering learning among all members, rapidly adapting to environmental changes, undergoing organizational and institutional reforms, building interactive innovation mechanisms with other organizations, and embracing innovation (Pedler, 1991; Asheim, 1999). The knowledge structure influences the transfer and practice of innovative outcomes, with the acquisition and explicitation of implicit knowledge driving the transfer and practice of innovation. However, a limitation of this conclusion lies in its failure to explore the logical relationship between explicit knowledge and innovation, as well as how to acquire and explicitate implicit knowledge.

Jacob Mincer (1958) argues that human capital's primary roles in economic growth manifest in two aspects. Firstly, it coordinates with physical capital and initial raw labor in the process of total output production, serving as a stock of skills derived from education and training, an essential production factor. Secondly, human capital acts as a knowledge stock and a source of innovation, constituting one of the fundamental drivers of economic growth. This viewpoint, on the one hand, initially reveals the fundamental relationship between human capital as a knowledge stock and innovation, affirming the role of explicit human capital knowledge in innovation. On the other hand, it also recognizes the foundational role of education and training

in the innovation process. In contrast, Galunic C.D. (1998) holds a different perspective. He maintains that technological innovation relies on abundant human capital, which comprises employees' skills and capabilities shaped by a combination of factors such as education level, experience, professional knowledge, and training experiences. This view affirms the role of human capital in technological innovation but does not support Mincer's notion that human capital is a knowledge stock. Instead, Galunic C.D.believes that human capital comprises employees' skills and capabilities, synthesized by education level, experience, professional knowledge, and training experiences, thus preliminarily establishing the basic theoretical logic of human capital-technological innovation.

Papageorgiou (1999) contends that human capital plays a decisive role in technological innovation. Snell S.A. (1992), by analyzing the explicit characteristics of human capital, confirms its foundational and source role in technological innovation. He argues that human capital manifests as highly knowledgeable, creative, and skilled employees who possess the specialized techniques required for their roles and functions, serving as the most influential representatives of new knowledge and ideas within enterprises, thereby forming the foundation and source of technological innovation. Empirical evidence also supports this viewpoint. Llakhli & de Clercq (2004) maintain that the most prominent force in discovering new technologies within enterprises is human capital, which not only enables a flexible grasp of new technologies but also allows for the learning and excavation of relevant knowledge based on the needs and nature of enterprise innovation. March J.G. (1991) believes that the stronger an enterprise's human capital, the more likely individuals and their associated human capital are to accurately and keenly perceive innovative opportunities. Nevertheless, these studies have not traced the origins of human capital, making it difficult to gain a deeper understanding of the logical relationship between human capital and technological innovation.

Human capital comes from education. Uzawa H. (1965) constructed an optimal growth model incorporating human capital, arguing that technological change stems from the education sector specializing in the production of ideas, and that the rate of technological innovation depends on the existing technological level and the labor productivity of the education sector; Nelson & Phelps (1966) argued that the growth rate of actual technology is an increasing function of the availability of education. There is a time lag between the theoretical technological level and the actual technological level in reality. Eliminating this time lag will generate technological innovation. The availability of education and the gap between the two

are important factors affecting the elimination of the time lag. Jamison & Moock (1984) conducted an empirical test of this conclusion and found that school education has a significant positive impact on agricultural technology diffusion using Nepalese agricultural data. Koellinger (2007) found that entrepreneurs with higher education tend to innovate rather than imitate. German vocational education is an effective means to enhance professional status. The "Dual System" model separates theory and practical learning, with schools focusing on theory and factories on practice, emphasizing practicality. Its production skills grow in a step-by-step manner, and its status also grows accordingly (Mayer, 2001; Kantonidou, 2005). David J. Spielman (2008) examined the status and role of agricultural vocational education in sub-Saharan Africa from the perspective of the regional agricultural innovation system, arguing that agricultural vocational education is not only important for building human and scientific capital, but also plays an important role in the process of organizations and individuals transmitting and accepting new technologies, new products, new organizational cultures, and behaviors.

4. Conclusion

The above research on agricultural vocational education mainly focuses on influencing factors and their impacts on production efficiency, industrial competitiveness, and the development of rural areas and farmers. Research on agricultural technological innovation mainly deals with the subjects, structures, processes, and dynamics of innovation. The relevant research on the two mainly adopts a theoretical approach, combined with specific cases to analyze the impact of vocational education on technological innovation. The above literature provides a basic theoretical foundation for studying the impact of agricultural vocational education on agricultural technological innovation. However, there are also deficiencies in the following aspects: First, less attention is paid to agricultural technological innovation. With the development of science and technology, technological innovation in non-agricultural industries has characteristics such as indoorization, processization, intensification, and coupling. Agricultural technological innovation will face the influence of variable natural conditions such as temperature and humidity, and the influencing factors of innovation are intertwined and complex. Second, the above research focuses more on general vocational and technical education and less on agricultural vocational education. The importance of industry in the national economy promotes the development of general vocational education, which in turn enhances the important status and role of general vocational education in the field of education. At present, food security crises, green development, and

low-carbon theoretical innovations have greatly enhanced the fundamental role of agricultural development in the economy and society, which will inevitably accelerate the development of agricultural vocational education theory and practice. Third, less attention is paid to the mediating effect of industry-university-research cooperation between agricultural vocational education and agricultural technological innovation.

Chapter 3
Research Methodology

This research focuses on the impact mechanism of agricultural vocational education on agricultural technological innovation in Guangxi higher vocational colleges. Study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges, formulate and evaluate the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The research has the following procedures.

1. The Population
2. Research Instruments
3. Data Collection
4. Data Analysis

Phase 1: The objective of this phase is to study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The Population

The population of this study comprised 418 research administrators from six agricultural higher vocational colleges in Guangxi.

The six institutions selected for this study are closely related to agricultural vocational education, namely 1) Guangxi Vocational University of Agriculture, 2) Guangxi Agricultural Engineering Vocational Technical College, 3) Guangxi Eco Engineering Vocational and Technical College, 4) Guangxi Natural Resources Vocational and Technical College, 5) Guangxi Manufacturing Engineering Vocational and Technical College, 6) Fangchenggang Vocational and Technical College.

Table 3.1 Lists of agricultural vocational colleges and population size

No.	Higher Vocational College in Guangxi	Population
1	Guangxi Vocational University of Agriculture	88
2	Guangxi Agricultural Engineering Vocational Technical College	65
3	Guangxi Eco Engineering Vocational and Technical College	77
4	Guangxi Natural Resources Vocational and Technical College	74
5	Guangxi Manufacturing Engineering Vocational and Technical College	58
6	Fangchenggang Vocational and Technical College	56
	Total	**418**

According to Table 3.1, it showed that population 418, the size is scientific and reasonable.

Research Instruments

Questionnaire

The instrument to collect the data for objective one, to study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges was a questionnaire. The questionnaire was designed based on impact agricultural technological innovation six aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income.

The questionnaire was divided into two parts:

Part 1: Survey about personal information of respondents, classified by gender and educational background.

Part 2: Survey the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The criteria for data interpretation based on a five-point Likert's scale, as follows:

5 refers to the level of agricultural technology innovation for Guangxi higher vocational colleges at the highest level

4 refers to the level of agricultural technology innovation for Guangxi higher vocational colleges at a high level

3 refers to the level of agricultural technology innovation for Guangxi higher vocational colleges at a medium level

2 refers to the level of agricultural technology innovation for Guangxi higher vocational colleges at a low level

1 refers to the level of agricultural technology innovation for Guangxi higher vocational colleges at the lowest level

The data interpretation for average value is based on Rensis Likert (1932). The data interpretation is as follows:

4.50 – 5.00 refers to the highest level

3.50 – 4.49 refers to high level

2.50 – 3.49 refers to medium level

1.50 – 2.49 refers to low level

1.00 – 1.49 refers to the lowest level

Constructing a Questionnaire Process

The construction process of the questionnaire is as follows:

Step 1: Reviewing and analyzing documents, concepts, theories, and research related to impact agricultural technological innovation.

Step 2: Construct the questionnaire about the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. Then the researcher sent the questionnaire outline of questionnaire to the thesis advisors to review and revise the contents according to the suggestions.

Step 3: The index of objective congruence (IOC) of the questionnaire was examined by five experts, the index of IOC was 0.8–1.

Step 4: Revise the questionnaire based on the experts' suggestions.

Step 5: The questionnaires were distributed to 30 research administrators in Guangxi higher vocational colleges for try-out. The reliability of the questionnaire was 0.967, which was obtained by Cronbach’s Alpha Coefficient.

Step 6: The questionnaire was applied to 418 research administrators of Guangxi higher vocational colleges.

Data Collection

The data collection for objective one: to study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges, as following procedured:

Step 1: The researcher requested requirement letter form the graduate school, Bansomdejchaopraya Rajabhat University for requiring to collect the data from 418 research administrators in Guangxi higher vocational colleges.

Step 2: The researcher distributed the questionnaire to 418 research administrators. A total of 418 questionnaires.

Data Analysis

The data analysis in this research, the researcher analyze the data by package program, as follows:

Step 1: The personal information of the respondents was analyzed by frequency and percentage, classified by workplace, gender, age, highest degree, professional title and work experience.

Step 2: The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six following aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income, which is analyzed by mean and standard deviation.

Phase 2: To formulate guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Key Informants

The Interviewees

The interviewees in this research is 12 senior administrators of higher vocational colleges in Guangxi. The qualifications of the interviewees are as follows: 1) The administrator of vocational colleges in Guangxi have been engaged in education management for 8 years or more; 2) They have the qualifications of being a researcher with expertise in terms of science and technology management very well; 3) Respondents are willing to participate in recorded structured interviews; 4) Must be willing to view their interview transcripts for verification.

Research Instruments

Structured Interview

The instrument to collect the data for objective two is to formulate the guidelines of education administration based on agricultural technology innovation

for Guangxi higher vocational colleges. The structured interview was designed based on the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six following aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income.

The structured interview is divided into two parts:

Part 1: The personal information of interviewees, classified by interviewee, interviewer, education background, work experience, interview time, and interview date.

Part 2: The questions about suggestions for formulate the current situation of agricultural technology innovation based on six aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income, for research administrators of higher vocational colleges in Guangxi.

Constructing a structured interview process

The construction process of the structured interview is as follows:

Step 1: Reviewing and analyzing documents, concepts, theories, and research related to agricultural technology innovation.

Step 2: Construct the structured interview about suggestions for developing the current situation of agricultural technology innovation based on six aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income. Then send the outline of the semi-structured interview to the thesis advisors to review and revise the contents according to the suggestions.

Data Collection

The data collection for objective two: to formulate the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges, as following procedured:

Step 1: The researcher requested a requirement letter from the graduate school, Bansomdejchaopraya Rajabhat University requiring to interview the administrators from 6 higher vocational colleges in Guangxi.

Step 2: The researcher interviews the administrator one by one through an online platform or face-to-face depending on the interviewee's convenience.

Data Analysis

The structured interview about guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges was analyzed by content analysis.

Phase 3: To evaluate the suitability and feasibility of guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Key Informants

Expert Group

The experts for evaluate the suitability and feasibility of guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges was 9 administrators in Guangxi. The qualifications of the experts are as follows:1) Who have been engaged in education administration in higher vocational colleges for more than 8 years; 2) Those who have corresponding technical qualifications or experience in scientific research in the field of agricultural vocational education; 3) Have a senior professional title or a doctorate degree.

Research Instruments

Evaluation form

The instrument to collect the data for objective three, to evaluate the suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The evaluation form designed based on the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six following aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income.

The evaluation form provide into two parts:

Part 1: The personal information of interviewees, classified by work position, work experience, educational background, and academic title.

Part 2: The evaluation form about the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The criteria for data interpretation based on a five-point Likert's scale, as follows:

5 refers to the suitability and feasibility of the guideline at the highest level

4 refers to the suitability and feasibility of the guideline at a high level

3 refers to the suitability and feasibility of the guideline at a medium level

2 refers to the suitability and feasibility of the guideline at a low level

1 refers to the suitability and feasibility of the guideline at the lowest level

The data interpretation for average value is based on Rensis Likert (1932). The data interpretation is as follows:

4.50 – 5.00 refers to the highest level

3.50 – 4.49 refers to high level

2.50 – 3.49 refers to medium level

1.50 – 2.49 refers to low level

1.00 – 1.49 refers to the lowest level

Constructing an evaluation form process

The construction process of the evaluation form is as follows:

Step 1: Construct the evaluation form about guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Step 2: The evaluation form was applied to 9 administrators in higher vocational colleges in Guangxi.

Data Collection

The data collection for objective three: to evaluate the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges as following procedure:

Step 1: The researcher requested a requirement letter from the graduate school, Bansomdejchaopraya Rajabhat University for requiring to invite the expert to evaluate the guidelines.

Step 2: The researcher distributed the evaluation form to administrators. A total of 9 evaluation form.

Data Analysis

The data analysis in this research, the researcher analyzes the data by SPSS software as follows: The evaluation of the adaptability and feasibility of the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges is analyzed by mean and standard deviation.

Table 3.2 Summary of research methods

Research Methodology	**Objective 1: To study the current situation**	**Objective 2: To develop the guideline**	**Objective 3: To evaluate the suitability and feasibility**
Key Informants	The population were 418 research administrators from 6 agricultural higher vocational colleges in Guangxi	The interviewees were 12 senior administrators in higher vocational colleges of Guangxi	The evaluation experts were 9 administrators in higher vocational colleges of Guangxi
Research Instruments	Questionnaire	Structured interview	Evaluation form
Data Collection	Online filling	One-by-one through online platform or face-to-face depending on the interviewee convenience	A total of 9 evaluation form distributed to administrators
Data Analysis	By mean and standard deviation	Content analysis	By mean and standard deviation

Chapter 4
Data Analysis Results

The research in the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The objectives of this research were: 1) To study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. 2) To provide the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. 3) To evaluate the suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The data analysis result can be presented as follows:

1. Symbol and Abbreviations
2. Presentation of Data Analysis
3. Results of Data Analysis

The details are as follows.

Symbol and Abbreviations

N refers to population

μ refers to population mean

σ refers to population standard deviation

$\bar{X}$ refers to sample group mean

$S.D.$ refers to sample group standard deviation

Presentation of Data Analysis

Part 1: The analysis result about personal information of respondents, classified by workplace, gender, age, highest degree, professional title and work experience. Presented the data in the form of frequency and percentage.

Part 2: The analysis result about the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. Presented the data in the form of mean and standard deviation.

Part 3: The analysis result about the interview contents about the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 4: The analysis result about the evaluation of the suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges. Presented the data in the form of mean and standard deviation.

Results of Data Analysis

The researcher analyzed the data in 3 parts as follows:

Part 1: The analysis result about personal information of respondents, classified by workplace, gender, age, highest degree, professional title and work experience. Presented the data in the form of frequency and percentage.

Table 4.1 Basic information statistics

(N = 369)

	Personal Information	Frequency	Percentage
Workplace	Guangxi Vocational University of Agriculture	78	21.14
	Guangxi Agricultural Engineering Vocational Technical College	57	15.45
	Guangxi Eco Engineering Vocational and Technical College	69	18.70
	Guangxi Natural Resources Vocational and Technical College	65	17.61
	Guangxi Manufacturing Engineering Vocational and Technical College	51	13.82
	Fangchenggang Vocational and Technical College	49	13.28
	Total	**369**	**100**
Gender	Male	166	44.99
	Female	203	55.01
	Total	**369**	**100**
Age	30 years old and under	55	14.91
	31-40 years old	128	34.69
	41-50 years old	110	29.81
	51 years old and older	76	20.60
	Total	**369**	**100**

Table 4.1 (Continue)

	Personal Information	Frequency	Percentage
Highest degree	Bachelor's degree	55	14.91
	Master's degree	240	65.04
	Doctor's degree	74	20.05
	Total	**369**	**100**
Professional title	Junior and other titles	36	9.76
	Intermediate title	148	40.11
	Associate senior title	147	39.84
	Full senior title	38	10.30
	Total	**369**	**100**
Work experience	0-5 years	18	4.88
	6-10 years	56	15.18
	11-15 years	147	39.84
	16-20 years	110	29.81
	20 + years	38	10.30
	Total	**369**	**100**

According to Table 4.1, showed that the majority respondents were 166 male administrators, accounting for 44.99%, and 203 female administrators, accounting for 55.01%. The age of respondents was mainly 31-40 years old for 128 administrators, accounting for 34.69%, followed by 41-50 years old for 110 administrators, accounting for 29.81%, and 30 years old and under was the lowest level for 55 administrators, accounting for 14.91%. The highest degree of respondents was mainly master's degree for 240 administrators, accounting for 65.04%, followed by doctor's degree was the lowest level for 74 administrators, accounting for 20.05%, and bachelor's degree for 55 administrators, accounting for 14.91%. The professional title of respondents was mainly intermediate title for 148 administrators, accounting for 40.11%, followed by associate senior title for 147 administrators, accounting for 39.84%, and Junior and other titles was the lowest level for 36 administrators, accounting for 9.76%. The work experience of respondents was mainly 11-15 years for 147 administrators, accounting for 39.84%, followed by 16-20 years for 110 administrators, accounting for 29.81%, and 0-5 years was the lowest level for 18 administrators, accounting for 4.88%.

Part 2: The analysis result about the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. Presented the data in the form of mean and standard deviation.

Table 4.2 The mean and standard deviation of the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects

(N = 369)

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	μ	σ	Level	Order
1	Knowledge acquisition ability	3.30	0.93	medium	2
2	Knowledge coupling ability	3.26	0.87	medium	4
3	Knowledge application ability	3.26	0.91	medium	4
4	Demand for vocational and technical talents	3.32	0.85	medium	1
5	Policy	3.29	0.90	medium	3
6	Income	3.30	0.91	medium	2
	Total	**3.29**	**0.71**	medium	

According to Table 4.2, found that the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects was at medium level (μ =3.29). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was demand for vocational and technical talents (μ = 3.32), followed by both knowledge acquisition ability and income (μ =3.30), both knowledge coupling ability and knowledge application ability were the lowest mean (μ = 3.26).

Table 4.3 The mean and standard deviation of the current situation of knowledge acquisition ability in Guangxi agricultural higher vocational colleges

(N= 369)

No.	Knowledge acquisition ability	μ	σ	Level	Order
1	Administrators establish digital learning platforms to enhance the efficiency of teachers and students in acquiring new knowledge, new technologies and new information.	3.34	1.35	medium	3
2	Administrators establish diversified learning platforms to improve the effectiveness of agricultural innovation training.	3.32	1.26	medium	4
3	Administrators integrate diverse resource systems to provide support for teachers and students in structuring knowledge acquisition.	3.20	1.27	medium	8
4	Administrators regularly organize agricultural new technology training to help teachers master international cutting-edge technologies.	3.37	1.20	medium	2
5	Administrators attach importance to the real-time update and dissemination of new knowledge and cooperate with agricultural research institutions to establish a technology information sharing mechanism.	3.31	1.32	medium	5
6	Administrators attach importance to the Transformation of new knowledge and incorporate agricultural innovation achievements into the teaching resource library.	3.27	1.32	medium	6
7	Administrators have constructed convenient knowledge acquisition channels for farmers and agricultural practitioners, designing online and offline combined courses (such as mobile micro-courses).	3.25	1.19	medium	7

Table 4.3 (Continue)

(N = 369)

No.	Knowledge acquisition ability	μ	σ	Level	Order
8	Administrators focus on the comprehensive application ability of new technologies and information, thereby promoting interdisciplinary knowledge integration.	3.27	1.25	medium	6
9	Administrators attach importance to Optimizing the content of the resource systems and utilize big data technology to analyze the knowledge needs of agricultural practitioners for dynamic adjustment.	3.38	1.19	medium	1
10	Administrators provide real-time technical Problem-solving services for teachers and agricultural practitioners and have established an expert consultation platform.	3.25	1.25	medium	7
	Total	**3.30**	**0.93**	**medium**	

According to Table 4.3, found that the current situation of knowledge acquisition ability in Guangxi agricultural higher vocational colleges was at medium level (μ =3.30). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators attach importance to optimizing the content of the resource systems and utilize big data technology to analyze the knowledge needs of agricultural practitioners for dynamic adjustment. (μ =3.38), followed by administrators regularly organize agricultural new technology training to help teachers master international cutting-edge technologies. (μ =3.37), and administrators integrate diverse resource systems to provide support for teachers and students in structuring knowledge acquisition was the lowest mean (μ =3.20).

Table 4.4 The mean and standard deviation of the current situation of knowledge coupling ability in Guangxi agricultural higher vocational colleges

(N = 369)

No.	Knowledge coupling ability	μ	σ	Level	Order
1	Administrators attach importance to knowledge in the fields of agricultural production technology, agricultural economic management, agricultural research and practice, and fully integrate it through interdisciplinary curriculum design.	3.28	1.24	medium	5
2	Administrators pay attention to promoting the deep coupling of agricultural environment and sustainable development knowledge, so as to build a systematic teaching system.	3.23	1.23	medium	7
3	Administrators attach importance to teachers' research on the cross-integration of knowledge in agriculture and different fields, and formulate relevant incentive mechanisms.	3.32	1.20	medium	2
4	Administrators managers pay attention to students' ability to master the comprehensive agricultural knowledge system, and strengthen and integrate it through project-based teaching.	3.24	1.33	medium	6
5	Administrators pay attention to the integration of agricultural research practice and theoretical teaching resources, and establish cross departmental collaboration mechanisms for this purpose.	3.15	1.31	medium	8
6	Administrators regularly organize agricultural production technology experts and agricultural economic management experts to carry out knowledge collaborative innovation seminars, so as to solve some practical problems in the industry.	3.23	1.25	medium	7

Table 4.4 (Continue)

(N = 369)

No.	Knowledge coupling ability	μ	σ	Level	Order
7	Administrators pay attention to the promotion of systematic teaching knowledge modules, and transform the front-line experience of agricultural production into innovative teaching content through school-enterprise cooperation.	3.29	1.14	medium	4
8	Administrators pay attention to the use of systematic teaching system, and realize the visual correlation and sharing of knowledge of different agricultural disciplines through digital platforms.	3.36	1.28	medium	1
9	Administrators pay attention to the effect of knowledge coupling ability in actual teaching, and set up special assessment indicators in the curriculum evaluation system.	3.31	1.29	medium	3
10	Administrators attaches importance to the development of comprehensive agricultural production technology innovation courses, and has set up a team of interdisciplinary teachers.	3.24	1.28	medium	6
11	Administrators attach importance to improving the existing knowledge coupling system and introducing cutting-edge agricultural knowledge through international exchanges.	3.24	1.24	medium	6
	Total	**3.26**	**0.87**	**medium**	

According to Table 4.4, found that the current situation of knowledge coupling ability in Guangxi agricultural higher vocational colleges was at medium level (μ = 3.26). Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest mean was administrators pay attention to the use of systematic teaching system, and realize the visual correlation and sharing of knowledge of different agricultural disciplines through digital platforms (μ =3.36), followed by administrators attach importance to teachers' research on the cross-integration of knowledge in agriculture and different fields, and formulate relevant incentive mechanisms (μ =3.32), and administrators pay attention to the integration of agricultural research practice and theoretical teaching resources, and establish cross departmental collaboration mechanisms for this purpose was the lowest mean (μ =3.15).

Table 4.5 The mean and standard deviation of the current situation of knowledge application ability in Guangxi agricultural higher vocational colleges

(N = 369)

No.	Knowledge application ability	μ	σ	Level	Order
1	Administrators clearly listed knowledge application ability as the core training goal of agricultural higher vocational education to highlight its important position.	3.28	1.31	medium	4
2	Administrators establish the practical teaching system is conducive to systematically strengthening students' knowledge transformation ability.	3.30	1.28	medium	3
3	Administrators attach importance to promoting IUR collaborations in order to promote the practical productivity transformation of agricultural technological achievements.	3.31	1.21	medium	2
4	Administrators attach importance to the return of scientific research and innovation achievements to teaching practice, so as to develop policies to encourage teachers to participate in horizontal technology projects.	3.21	1.27	medium	8
5	Administrators cooperate with enterprises to design targeted positions in internships management to ensure that students solve real agricultural technology problems.	3.24	1.31	medium	6
6	Administrators take knowledge application ability as a key index to measure the educational effectiveness of agricultural higher vocational colleges to test the actual level of running schools.	3.26	1.32	medium	5
7	Administrators give priority to practical production benefits rather than pure academic value in evaluating educational effectiveness and innovation achievements.	3.24	1.28	medium	6

Table 4.5 (Continue)

(N = 369)

No.	Knowledge application ability	μ	σ	Level	Order
8	Administrators attach importance to practical teaching and technology incubation, and provide support by integrating university-enterprise resources.	3.20	1.31	medium	9
9	Administrators attach importance to improving students' knowledge application ability, so as to continuously optimize the structure of professional courses.	3.28	1.24	medium	4
10	Administrators attach importance to students' innovation achievements based on actual needs, and stimulate students through continuous innovation and entrepreneurship competitions.	3.33	1.27	medium	1
11	Administrators pay attention to the effectiveness of IUR collaborations, and incorporate it into departmental performance assessment.	3.23	1.28	medium	7
	Total	**3.26**	**0.91**	**medium**	

According to Table 4.5, found that the current situation of knowledge application ability in Guangxi agricultural higher vocational colleges was at medium level (μ =3.26). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators attach importance to students' innovation achievements based on actual needs, and stimulate students through continuous innovation and entrepreneurship competitions (μ =3.33), followed by administrators attach importance to promoting IUR collaborations in order to promote the practical productivity transformation of agricultural technological achievements (μ =3.31), and administrators attach importance to practical teaching and technology incubation, and provide support by integrating university-enterprise resources was the lowest mean (μ =3.20).

Table 4.6 The mean and standard deviation of the current situation of demand for vocational and technical talents in Guangxi agricultural higher vocational colleges

(N = 369)

No.	Demand for vocational and technical talents	μ	σ	Level	Order
1	Administrators regard the demand for vocational and technical talents as the core orientation of talent training in agricultural higher vocational colleges, so as to clarify the training orientation.	3.37	1.29	medium	2
2	Administrators regularly analyze the trends of economic development and technological advancement, and dynamically adjust the enrollment scale and direction of agricultural technology majors.	3.21	1.21	medium	8
3	Administrators pay attention to the industry--specific needs in order to optimize the curriculum system to train the appropriate technical personnel.	3.29	1.24	medium	6
4	Administrators attach importance to the research of labor market dynamics in order to adjust the content of practical teaching.	3.29	1.26	medium	6
5	Administrators attach importance to the crafts and technical field in the industry, and work closely with enterprises when formulating training programs to ensure that the course content is consistent with them.	3.32	1.21	medium	5
6	Administrators attach importance to the transformation of scientific research results into teaching resources to match the industry-specific needs, so they establish an incentive mechanism for teachers to participate in horizontal technology projects.	3.36	1.25	medium	3

Table 4.6 (Continue)

(N = 369)

No.	Demand for vocational and technical talents	μ	σ	Level	Order
7	Administrators pay close attention to the labor market dynamics, which helps schools to accurately grasp the changes in the demand for vocational and technical talents and further adjust education management strategies.	3.26	1.18	medium	7
8	Administrators attach importance to labor market feedback, so they have established a tracking mechanism for agricultural technology graduates to optimize the skill matching degree of talent training.	3.37	1.25	medium	2
9	Administrators include the service of regional economic development (such as rural revitalization, characteristic agriculture) into the talent training goals in order to better serve local economic development.	3.33	1.34	medium	4
10	Administrators pay attention to the technological advancement of local agricultural and develop policies to encourage teachers and students to participate in agricultural technology extension projects.	3.38	1.19	medium	1
	Total	**3.32**	**0.85**	**medium**	

According to Table 4.6, found that the current situation of demand for vocational and technical talents in Guangxi agricultural higher vocational colleges was at medium level (μ =3.32). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators pay attention to the technological advancement of local agricultural and develop policies to encourage teachers and students to participate in agricultural technology extension projects (μ =3.38), both followed by administrators regard the demand for vocational and technical talents as the core orientation of talent training in agricultural higher vocational colleges, so as to clarify the training orientation, and administrators established a tracking mechanism for agricultural technology graduates (μ =3.37). And administrators regularly analyze the trends of economic development and technological advancement, and dynamically adjust the enrollment scale and direction of agricultural technology majors was the lowest mean (μ =3.21).

Table 4.7 The mean and standard deviation of the current situation of policy in Guangxi agricultural higher vocational colleges

(N = 369)

No.	Policy	μ	σ	Level	Order
1	Administrators clearly include vocational education strategic plans into the long-term development goals of colleges and universities, so as to clarify the school-running positioning.	3.29	1.23	medium	6
2	Administrators attaches importance to the effectiveness of the implementation of the current policy and includes it in the annual assessment of the university management.	3.24	1.18	medium	9
3	Administrators have specific initiatives implemented to ensure that they systematically support curriculum development for agricultural technology majors.	3.30	1.27	medium	5
4	Administrators give priority to the use of government funding support to ensure practical training equipment and teaching resources related to agricultural technology innovation.	3.25	1.29	medium	8
5	Administrators attach importance to the full implementation of teacher training funding promised in documents at all levels, and establish a special fund audit system for this purpose.	3.31	1.22	medium	4
6	Administrators fully implement the dual-teacher training policy to promote the improvement of teachers' practical teaching ability.	3.27	1.24	medium	7

Table 4.7 (Continue)

(N = 369)

No.	Policy	μ	σ	Level	Order
7	Administrators will include the achievements of teachers' participation in the horizontal topics of agricultural technology into the bonus points of the professional title evaluation policy, so as to stimulate the scientific research potential of teachers.	3.25	1.21	medium	8
8	Administrators promote industry collaboration (such as the establishment of industrial colleges) to realize the two-way transformation of agricultural technology R&D and teaching resources.	3.38	1.20	medium	1
9	Administrators develop special policies (e.g. grants, skills training subsidies) to support rural students to participate in advanced agricultural technology courses.	3.34	1.21	medium	2
10	Administrators attach importance to the quality assurance of school education and teaching, and conduct a third-party quality assessment to conduct an annual audit of the teaching results of agricultural technology majors.	3.33	1.26	medium	3
11	Administrators attach importance to ensuring access and equity in education for students in remote areas, and have formulated special policies for ethnic minorities (such as the development of Zhuang language agricultural technology textbooks).	3.22	1.31	medium	10
	Total	**3.29**	**0.90**	**medium**	

According to Table 4.7, found that the current situation of policy in Guangxi agricultural higher vocational colleges was at medium level (μ =3.29). Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest mean was administrators promote industry collaboration (such as the establishment of industrial colleges) to realize the two-way transformation of agricultural technology R&D and teaching resources (μ =3.38), followed by administrators develop special policies (e.g. grants, skills training subsidies) to support rural students to participate in advanced agricultural technology courses (μ =3.34), and administrators attach importance to ensuring access and equity in education for students in remote areas, and have formulated special policies for ethnic minorities (such as the development of Zhuang language agricultural technology textbooks) was the lowest mean (μ =3.22).

Table 4.8 The mean and standard deviation of the current situation of income in Guangxi agricultural higher vocational colleges

(N = 369)

No.	Income	μ	σ	Level	Order
1	Administrators will incorporate graduates' the level of skill into the educational effectiveness evaluation system of higher vocational colleges to promote the improvement of the school's educational level.	3.23	1.23	medium	8
2	Administrators pay attention to the analysis of salary differences in the industry, so as to dynamically adjust the professional curriculum.	3.29	1.26	medium	5
3	Administrators attach importance to the fair compensation of agricultural technical personnel, and actively promote the policy of linking vocational skill level certification with salary.	3.33	1.26	medium	3
4	Administrators focus on enhancing the wages competitiveness of graduates in technology intensive positions and cooperate with enterprises to develop high value-added technology courses.	3.28	1.30	medium	6
5	Administrators pay attention to improving the work experience of graduates and establish a stepped internship system (such as "apprenticeship + on-site internship").	3.27	1.23	medium	7

Table 4.8 (Continue)

(N = 369)

No.	Income	μ	σ	Level	Order
6	Administrators recognize that the geographic location advantages of Guangxi vocational colleges adjacent to characteristic agricultural producing areas (such as sugarcane and mango planting belt) have significantly improved the income level of employees.	3.38	1.22	medium	1
7	Administrators promote schools and enterprises to sign minimum wages guarantee agreements to ensure that agricultural technology internship positions provide reasonable remuneration.	3.36	1.24	medium	2
8	Administrators will include gender equality wages into the assessment index of school-enterprise cooperation to safeguard the legitimate rights and interests of students.	3.33	1.27	medium	3
9	Administrators pay attention to the quantitative relationship between graduates' the level of skill, industry choice and income growth, so as to establish a database of graduates' income.	3.23	1.26	medium	8
10	Administrators encourage graduates to serve less developed agricultural counties in Guangxi to narrow the geographic location income gap by formulating special policies (such as regional employment subsidies).	3.36	1.29	medium	2
11	Administrators pay attention to enhancing the wages bargaining power of graduates and guide students to acquire composite skills through career planning courses.	3.30	1.26	medium	4
	Total	**3.30**	**0.91**	**medium**	

According to Table 4.8, found that the current situation of income in Guangxi agricultural higher vocational colleges was at medium level (μ =3.30). Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest mean was administrators recognize that the geographic location advantages of Guangxi vocational colleges adjacent to characteristic agricultural producing areas (μ =3.38). Both followed by administrators promote schools and enterprises to sign minimum wages guarantee agreements to ensure that agricultural technology internship positions provide reasonable remuneration, and administrators encourage graduates to serve less developed agricultural counties in Guangxi to narrow the geographic location income gap by formulating special policies (μ =3.36). Administrators will incorporate graduates' the level of skill into the educational effectiveness evaluation system of higher vocational colleges to promote the improvement of the school's educational level, and administrators pay attention to the quantitative relationship between graduates' the level of skill, industry choice and income growth, so as to establish a database of graduates' income were both the lowest mean (μ =3.23).

Part 3: The analysis result about the interview contents about the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

In this section, the lowest mean value of each variable is selected to design the interview questions based on the questionnaire survey results. The interview experts will answer the questions about why the mean value of the item is the lowest and provide guidance on solving the problem.

Table 4.9 Information of Interviewees

Interviewee	Age	Education background	Department	Work experience
Interviewees 1	44	Master's degree	Development planning	15 years
Interviewees 2	51	Doctor's degree	Academic affairs	22 years
Interviewees 3	47	Master's degree	Research	18 years
Interviewees 4	53	Doctor's degree	Academic affairs	24 years
Interviewees 5	48	Doctor's degree	Research	19 years
Interviewees6	42	Master's degree	Academic affairs	16 years
Interviewees 7	49	Master's degree	Development planning	20 years
Interviewees 8	55	Doctor's degree	Academic affairs	25 years
Interviewees9	50	Master's degree	Research	17 years
Interviewees10	40	Master's degree	Development planning	13 years

Table 4.9 (Continue)

Interviewee	Age	Education background	Department	Work experience
Interviewees11	45	Doctor's degree	Research	21 years
Interviewees12	42	Master's degree	Academic affairs	19 years

According to Table 4.9, the interviewees in this research was 12 senior administrators of higher vocational colleges in Guangxi . The interviewees all have more than 8 years of working experience in education management, being a researcher with expertise in terms of science and technology management very well, master's degree or above.

Interview Results

1. The guideline to knowledge acquisition ability consisted of 8 measures as follows:

1) Establish an online course resource library for agricultural technology to facilitate students' self-study.

2) Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly.

3) Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government.

4) Co-build courses with leading enterprises and introduce their technical standards and latest research achievements.

5) Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students.

6) Organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning.

7) Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content.

8) Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere.

2. The guideline to knowledge coupling ability consisted of 8 measures as follows:

1) Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses.

2) Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields.

3) Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems.

4) Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge.

5) Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice.

6) Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities.

7) Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling.

8) Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students.

3. The guideline to knowledge application ability consisted of 7 measures as follows:

1) Expand the modern agricultural technology training center to simulate a real production environment.

2) Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness.

3) Allow students to participate in enterprise technology improvement projects to accumulate practical experience.

4) Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements.

5) Regularly hold agricultural technology operation competitions to test students' application abilities.

6) Involve enterprise technicians in the design of training courses to meet industry demands.

7) Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.

4. The guideline to demand for vocational and technical talents consisted of 8 measures as follows:

1) Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added.

2) Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans.

3) "Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents.

4) Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions.

5) The employment situation of graduates will be tracked to optimize the talent cultivation model.

6) Agricultural career development courses will be offered to help students clarify the direction of technical positions.

7) Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students.

8) Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions.

5. The guideline to policy consisted of 9 measures as follows:

1) Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff.

2) Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization.

3) Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development.

4) Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects.

5) Promote the credit bank system to recognize students' learning achievements obtained through various channels.

6) Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies.

7) Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application".

8) Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers.

9) Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects.

6. The guideline to income consisted of 8 measures as follows:

1) Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally.

2) Carry out social training services, providing paid technical training to farmers and enterprises.

3) Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship.

4) Sign salary agreements with cooperative enterprises to safeguard students' rights and interests.

5) Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects.

6) Provide scholarships or training subsidies to students who obtain senior vocational skills certificates.

7) Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises.

8) Introduce the alumni donation mechanism and establish an agricultural technology education development fund.

Table 4.10 Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

Content		Guidelines
Knowledge acquisition ability	1	Establish an online course resource library for agricultural technology to facilitate students' self-study.
	2	Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly.
	3	Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government.
	4	Co-build courses with leading enterprises and introduce their technical standards and latest research achievements.
	5	Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students.
	6	Organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning.
	7	Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content.
	8	Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere.

Table 4.10 (Continue)

Content		Guidelines
Knowledge coupling ability	1	Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses.
	2	Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields.
	3	Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems.
	4	Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge.
	5	Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice.
	6	Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities.
	7	Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling.
	8	Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students.

Table 4.10 (Continue)

Content		Guidelines
Knowledge application ability	1	Expand the modern agricultural technology training center to simulate a real production environment.
	2	Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness.
	3	Allow students to participate in enterprise technology improvement projects to accumulate practical experience.
	4	Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements.
	5	Regularly hold agricultural technology operation competitions to test students' application abilities.
	6	Involve enterprise technicians in the design of training courses to meet industry demands.
	7	Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.

Table 4.10 (Continue)

Content		Guidelines
Demand for vocational and technical talents	1	Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added.
	2	Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the training plans.
	3	"Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents.
	4	Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions.
	5	The employment situation of graduates will be tracked to optimize the talent cultivation model.
	6	Agricultural career development courses will be offered to help students clarify the direction of technical positions.
	7	Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students.
	8	Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions.

Table 4.10 (Continue)

Content		Guidelines
Policy	1	Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff.
	2	Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization.
	3	Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development.
	4	Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects.
	5	Promote the credit bank system to recognize students' learning achievements obtained through various channels.
	6	Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies.
	7	Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application".
	8	Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers.
	9	Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects.

Table 4.10 (Continue)

Content		Guidelines
Income	1	Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally.
	2	Carry out social training services, providing paid technical training to farmers and enterprises.
	3	Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship.
	4	Sign salary agreements with cooperative enterprises to safeguard students' rights and interests.
	5	Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects.
	6	Provide scholarships or training subsidies to students who obtain senior vocational skills certificates.
	7	Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises.
	8	Introduce the alumni donation mechanism and establish an agricultural technology education development fund.

According to Table 4.10, the researcher put forward guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects, with a total of 48. There were 8 guidelines for knowledge acquisition ability, 8 guidelines for knowledge coupling ability, 7 guidelines for knowledge application ability, 8 guidelines for demand for vocational and technical talents, 9 guidelines for policy, and 8 guidelines for income.

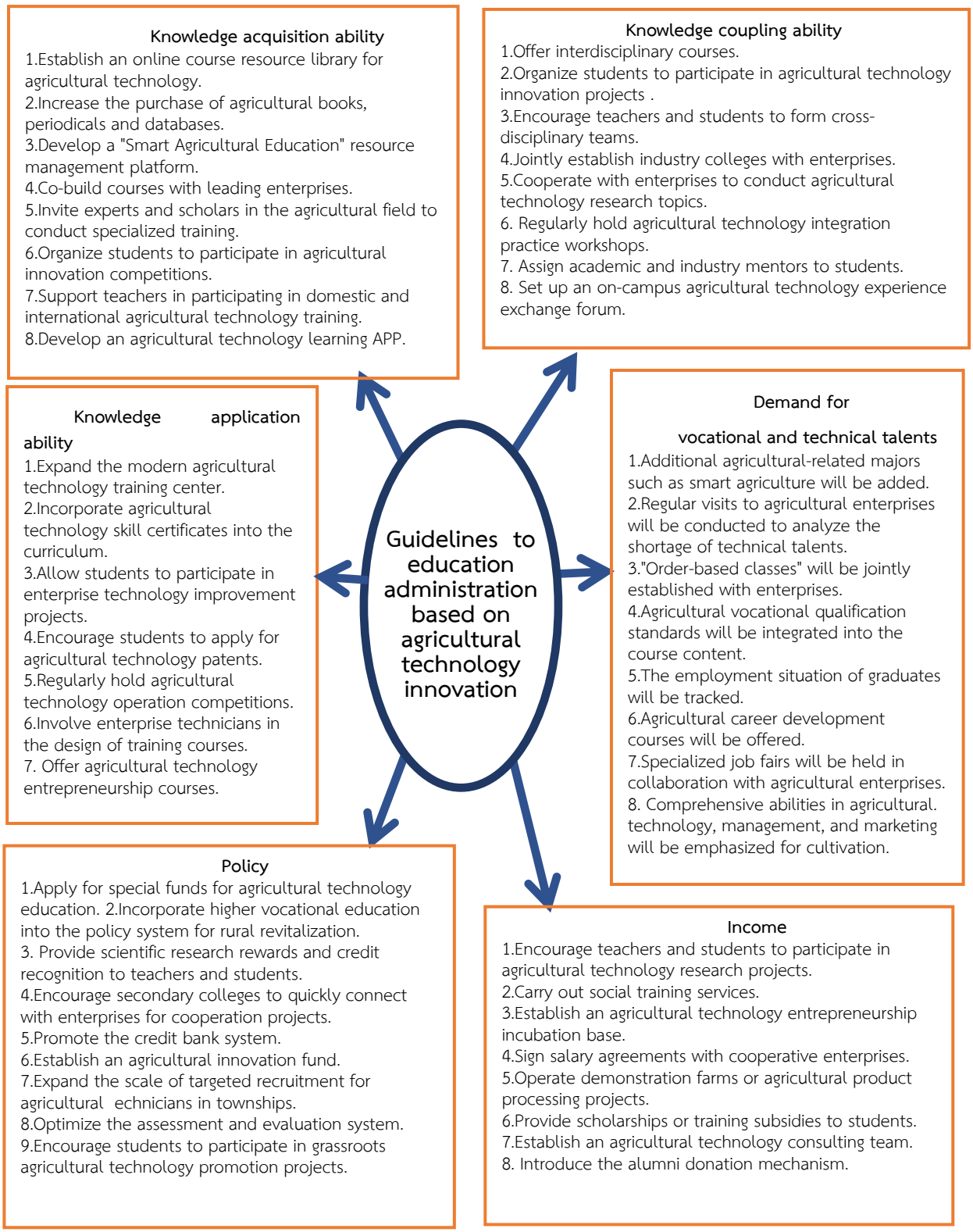

Figure 4.1 Guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational college

Part 4: The analysis result about the evaluation of the suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges. Presented the data in the form of mean and standard deviation.

Table 4.11 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects (N = 9)

	Guideline to education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability			Feasibility		
		$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1	Knowledge acquisition ability	4.61	0.22	highest	4.54	0.27	highest
2	Knowledge coupling ability	4.58	0.23	highest	4.58	0.43	highest
3	Knowledge application ability	4.60	0.29	highest	4.56	0.33	highest
4	Demand for vocational and technical talents	4.63	0.18	highest	4.61	0.39	highest
5	Policy	4.60	0.22	highest	4.57	0.29	highest
6	Income	4.63	0.31	highest	4.56	0.23	Highest
	Total	**4.61**	**0.17**	**highest**	**4.57**	**0.27**	**highest**

According to Table 4.11, the suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects were at highest level with the values between 4.00 and 5.00, which means the guidelines to education administration of Guangxi higher vocational colleges are suitability and feasibility. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: The highest mean of suitability were both demand for vocational and technical talents, income ($\bar{X}$= 4.63), followed by knowledge acquisition ability ($\bar{X}$= 4.61), and knowledge coupling ability was the lowest mean ($\bar{X}$= 4.58). The highest mean of feasibility was demand for vocational and technical talents ($\bar{X}$= 4.61), followed by knowledge coupling ability ($\bar{X}$= 4.58), and knowledge acquisition ability ($\bar{X}$= 4.54) was the lowest mean.

Table 4.12 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to knowledge acquisition ability

(N = 9)

Knowledge acquisition ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Establish an online course resource library for agricultural technology to facilitate students' self-study.	4.67	0.50	highest	4.67	0.50	highest
2. Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly.	4.67	0.50	highest	4.44	0.53	high
3. Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government.	4.56	0.73	highest	4.56	0.53	highest
4. Co-build courses with leading enterprises and introduce their technical standards and latest research achievements.	4.89	0.33	highest	4.22	0.44	high
5. Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students.	4.56	0.73	highest	4.89	0.33	highest
6. Organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning.	4.33	0.50	high	4.33	0.50	high

Table 4.12 (Continue)

(N = 9)

Knowledge acquisition ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content.	4.78	0.44	highest	4.78	0.44	highest
8. Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere.	4.44	0.53	high	4.44	0.73	high
Total	**4.61**	**0.22**	**highest**	**4.54**	**0.27**	**highest**

According to Table 4.12, found that the suitability of guidelines to knowledge acquisition ability was at highest level ($\bar{X}$=4.61), the feasibility of guidelines to knowledge acquisition ability was at highest level ($\bar{X}$=4.54). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean of suitability was co-build courses with leading enterprises and introduce their technical standards and latest research achievements ($\bar{X}$=4.89), followed by support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content ($\bar{X}$=4.78), and organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning was the lowest mean ($\bar{X}$=4.33). The highest mean of feasibility was Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students ($\bar{X}$= 4.89), followed by support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content. ($\bar{X}$=4.78), and co-build courses with leading enterprises and introduce their technical standards and latest research achievements are the lowest mean ($\bar{X}$=4.22).

Table 4.13 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to knowledge coupling ability

(N = 9)

Knowledge coupling ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses.	4.22	0.44	high	4.56	0.73	highest
2. Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields.	4.67	0.50	highest	4.89	0.33	highest
3. Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems.	4.44	0.53	high	4.44	0.53	high
4. Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge.	4.78	0.44	highest	4.44	0.73	high
5. Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice.	4.89	0.33	highest	4.78	0.44	highest
6. Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities.	4.44	0.73	high	4.67	0.50	highest

Table 4.13 (Continue)

(N = 9)

Knowledge coupling ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling.	4.56	0.53	highest	4.56	0.73	highest
8. Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students.	4.67	0.50	highest	4.33	0.87	high
Total	**4.58**	**0.23**	**highest**	**4.58**	**0.43**	**highest**

According to Table 4.13, it can be found that the suitability and feasibility of guidelines to knowledge coupling ability of higher vocational colleges in Guangxi are at the highest level with means between 4.50 and 5.00, which means guidelines to knowledge coupling ability are suitability and feasibility. Considering the results of this research, the suitability of aspects ranged from highest to lowest mean values as follows: Cooperate with enterprises to conduct agricultural technology research topics is the highest mean ($\overline{X}$ =4.89), followed by jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge ($\overline{X}$ =4.78). And offer interdisciplinary courses is the lowest mean ($\overline{X}$ =4.22). Considering the results of this research, the feasibility of aspects ranged from highest to lowest mean values as follows: Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields is the highest ($\overline{X}$ =4.89), followed by cooperate with enterprises to conduct agricultural technology research topics ($\overline{X}$ =4.78), and set up an on-campus agricultural technology experience exchange forum is the lowest mean($\overline{X}$ =4.33).

Table 4.14 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to knowledge application ability

(N = 9)

Knowledge application ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Expand the modern agricultural technology training center to simulate a real production environment.	4.67	0.50	highest	4.89	0.33	highest
2. Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness.	4.56	0.73	highest	4.56	0.53	highest
3. Allow students to participate in enterprise technology improvement projects to accumulate practical experience.	4.78	0.44	highest	4.48	0.44	high
4. Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements.	4.33	0.71	high	4.22	0.83	high
5. Regularly hold agricultural technology operation competitions to test students' application abilities.	4.44	0.53	high	4.67	0.71	highest
6. Involve enterprise technicians in the design of training courses to meet industry demands.	4.89	0.33	highest	4.33	0.87	high

Table 4.14 (Continue)

(N = 9)

Knowledge application ability	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.	4.56	0.53	highest	4.44	0.73	highest
Total	**4.60**	**0.29**	**highest**	**4.56**	**0.33**	**highest**

According to Table 4.14, found that the suitability of guidelines to knowledge application ability was at high level ($\bar{X}$=4.60), the feasibility of guidelines to knowledge application ability was at highest level ($\bar{X}$=4.56). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: The highest mean of suitability was Improve the involve enterprise technicians in the design of training courses to meet industry demands ($\bar{X}$=4.89), followed by allow students to participate in enterprise technology improvement projects to accumulate practical experience ($\bar{X}$=4.78), and encourage students to apply for agricultural technology patents and support the promotion and application of their achievements was the lowest level ($\bar{X}$=4.33). The highest level of feasibility was expand the modern agricultural technology training center to simulate a real production environment ($\bar{X}$=4.89), followed by regularly hold agricultural technology operation competitions to test students' application abilities ($\bar{X}$=4.67), and encourage students to apply for agricultural technology patents and support the promotion and application of their achievements was the lowest mean ($\bar{X}$=4.22).

Table 4.15 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to demand for vocational and technical talents

(N = 9)

Demand for vocational and technical talents	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added.	4.67	0.50	highest	4.56	0.73	highest
2. Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans.	4.89	0.33	highest	4.78	0.44	highest
3. "Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents.	4.56	0.53	highest	4.44	0.53	high
4. Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions.	4.78	0.44	highest	4.56	0.53	highest
5. The employment situation of graduates will be tracked to optimize the talent cultivation model.	4.67	0.71	highest	4.67	0.50	highest
6. Agricultural career development courses will be offered to help students clarify the direction of technical positions.	4.67	0.50	highest	4.67	0.50	highest

Table 4.15 (Continue)

(N = 9)

Demand for vocational and technical talents	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students.	4.44	0.73	high	4.89	0.33	highest
8. Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions.	4.33	0.71	high	4.33	0.71	high
Total	**4.63**	**0.18**	**highest**	**4.61**	**0.39**	**highest**

According to Table 4.15, it can be found that the suitability of guidelines to demand for vocational and technical talents at the highest level ($\overline{X}$=4.63), the feasibility of guidelines to demand for vocational and technical talents at the highest level ($\overline{X}$=4.61). Considering the results of this research aspects ranged form the highest to the lowest mean of suitability as follows: regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans was the highest mean ($\overline{X}$=4.89), followed by agricultural vocational qualification standards will be integrated into the course content ($\bar{X}$= 4.78), and comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions was the lowest mean ($\overline{X}$=4.33). The highest to the lowest mean of feasibility as follows: specialized job fairs will be held in collaboration with agricultural enterprises was the highest mean ($\overline{X}$=4.89), followed by regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans ($\overline{X}$=4.78), comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions was the lowest mean ($\overline{X}$=4.33).

Table 4.16 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to policy

(N = 9)

Policy	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff.	4.46	0.50	high	4.67	0.50	highest
2. Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization.	4.89	0.33	highest	4.78	0.67	highest
3. Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development.	4.56	0.53	highest	4.56	0.53	highest
4. Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects.	4.78	0.44	highest	4.67	0.50	highest
5. Promote the credit bank system to recognize students' learning achievements obtained through various channels	4.44	0.53	high	4.56	0.53	highest
6. Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies.	4.22	0.67	high	4.89	0.33	highest

Table 4.16 (Continue)

(N = 9)

Policy	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application".	4.67	0.50	highest	4.33	0.50	high
8. Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers.	4.67	0.50	highest	4.22	0.83	high
9. Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects.	4.56	0.53	highest	4.44	0.53	high
Total	**4.60**	**0.22**	**highest**	**4.57**	**0.29**	**highest**

According to Table 4.16, found that the suitability of guidelines to policy was at high level ($\bar{X}$=4.60), the feasibility of income was at highest level ($\bar{X}$=4.57). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean of suitability was cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization ($\bar{X}$=4.89), followed by introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects ($\bar{X}$= 4.78), and establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies was the lowest mean ($\bar{X}$= 4.22). The highest level of feasibility was establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies ($\bar{X}$=4.89), followed by cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization ($\bar{X}$=4.78), and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers was the lowest mean ($\bar{X}$=4.22).

Table 4.17 The mean and standard deviation of the evaluation of the suitability and feasibility of guidelines to income

(N = 9)

Income	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1. Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally.	4.89	0.33	highest	4.56	0.53	highest
2. Carry out social training services, providing paid technical training to farmers and enterprises.	4.67	0.50	highest	4.22	0.67	high
3. Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship.	4.78	0.67	highest	4.89	0.33	highest
4. Sign salary agreements with cooperative enterprises to safeguard students' rights and interests.	4.56	0.53	highest	4.67	0.50	highest
5. Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects.	4.22	0.67	high	4.78	0.44	highest
6. Provide scholarships or training subsidies to students who obtain senior vocational skills certificates.	4.67	0.50	highest	4.44	0.73	high

Table 4.17 (Continue)

(N = 9)

Income	Suitability			Feasibility		
	$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
7. Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises.	4.56	0.73	highest	4.56	0.53	highest
8. Introduce the alumni donation mechanism and establish an agricultural technology education development fund.	4.67	0.50	highest	4.33	0.71	high
Total	**4.63**	**0.31**	**highest**	**4.56**	**0.23**	**highest**

According to Table 4.17, found that the suitability of guidelines to income was at high level ($\bar{X}$=4.63), the feasibility of income was at highest level ($\bar{X}$=4.56). Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean of suitability was encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally ($\bar{X}$=4.89), followed by establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship ($\bar{X}$=4.78). And relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects was the lowest mean ($\bar{X}$=4.22). The highest level of feasibility was establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship ($\bar{X}$=4.89), followed by relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects ($\bar{X}$=4.78). And carry out social training services, providing paid technical training to farmers and enterprises are the lowest mean ($\bar{X}$=4.22).

Chapter 5
Conclusion Discussion and Recommendations

The research in the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The objectives of this research were: 1) To study the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. 2) To provide the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. 3) To evaluate the suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The research were including 6 following aspects: 1) Knowledge acquisition ability, 2) Knowledge coupling ability, 3) Knowledge application ability, 4) Demand for vocational and technical talents, 5) Policy, 6) Income. The population in this study was research administrators in higher vocational colleges in Guangxi. The Interview group was 12 high-level administrators. The research instruments were literature analysis, questionnaire, and structured interview. The statistic to analyze the data were percentage, mean, and standard deviation. The conclusion, discussion and recommendations of this research are as follows:

Conclusion

The research in the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The researcher summarizes the conclusion into three parts, details as follows:

Part 1: he current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 2: The guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 3: The suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 1: The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges In six aspects was at medium level. Considering the results of this research aspects ranged from the

highest to lowest mean were as follow: the highest level was demand for vocational and technical talents, followed by both knowledge acquisition ability and income, both knowledge coupling ability and knowledge application ability were the lowest mean.

1. Knowledge Acquisition Ability

The current situation of knowledge acquisition ability in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators attach importance to optimizing the content of the resource systems and utilize big data technology to analyze the knowledge needs of agricultural practitioners for dynamic adjustment, followed by administrators regularly organize agricultural new technology training to help teachers master international cutting-edge technologies, and administrators integrate diverse resource systems to provide support for teachers and students in structuring knowledge acquisition was the lowest mean.

2. Knowledge Coupling Ability

The current situation of knowledge coupling ability in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators pay attention to the use of systematic teaching system, and realize the visual correlation and sharing of knowledge of different agricultural disciplines through digital platforms, followed by administrators attach importance to teachers' research on the cross-integration of knowledge in agriculture and different fields, and formulate relevant incentive mechanisms, and administrators pay attention to the integration of agricultural research practice and theoretical teaching resources, and establish cross departmental collaboration mechanisms for this purpose was the lowest mean.

3. Knowledge Application Ability

The current situation of knowledge application ability in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators attach importance to students' innovation achievements based on actual needs, and stimulate students through continuous innovation and entrepreneurship competitions, followed by administrators attach importance to promoting IUR collaborations in order to promote the practical productivity transformation of agricultural technological achievements, and administrators

attach importance to practical teaching and technology incubation, and provide support by integrating university-enterprise resources was the lowest mean.

4. Demand for Vocational and Technical Talents

The current situation of demand for vocational and technical talents in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: the highest mean was administrators pay attention to the technological advancement of local agricultural and develop policies to encourage teachers and students to participate in agricultural technology extension projects, followed by both administrators regard the demand for vocational and technical talents as the core orientation of talent training in agricultural higher vocational colleges, and administrators established a tracking mechanism for agricultural technology graduates. And administrators regularly analyze the trends of economic development and technological advancement, and dynamically adjust the enrollment scale and direction of agricultural technology majors was the lowest mean.

5. Policy

The current situation of policy in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest mean was administrators promote industry collaboration to realize the two-way transformation of agricultural technology R&D and teaching resources, followed by administrators develop special policies to support rural students to participate in advanced agricultural technology courses, and administrators attach importance to ensuring access and equity in education for students in remote areas, and have formulated special policies for ethnic minorities was the lowest mean.

6. Income

The current situation of income in Guangxi agricultural higher vocational colleges was at medium level. Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest mean was administrators recognize that the geographic location advantages of Guangxi vocational colleges adjacent to characteristic agricultural producing areas have significantly improved the income level of employees. Both followed by administrators promote schools and enterprises to sign minimum wages guarantee agreements, and administrators narrow the geographic location income gap by formulating special policies. Administrators will incorporate graduates' the level of skill into the educational effectiveness evaluation system of higher vocational colleges to promote the improvement of the school's

educational level, and administrators pay attention to the quantitative relationship between graduates' the level of skill, industry choice and income growth, so as to establish a database of graduates' income were both the lowest mean.

Part 2: The guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects, which contain 48 measures. There are 8 measures for knowledge acquisition ability, 8 measures for knowledge coupling ability, 7 measures for knowledge application ability, 8 measures for demand for vocational and technical talents, 9 measures for policy and 8 measures for income.

1. Knowledge Acquisition Ability

The guideline to improve knowledge acquisition ability consisted of 8 measures as follows: 1) Establish an online course resource library for agricultural technology to facilitate students' self-study. 2) Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly. 3) Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government. 4) Co-build courses with leading enterprises and introduce their technical standards and latest research achievements. 5) Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students. 6) Organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning. 7) Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content. 8) Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere.

2. Knowledge Coupling Ability

The guideline to enhance knowledge coupling ability consisted of 8 measures as follows: 1) Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses. 2) Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields. 3) Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems. 4) Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge. 5) Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of

theory and practice. 6) Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities. 7) Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling. 8) Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students.

3. Knowledge Application Ability

The guideline to enhance knowledge application ability consisted of 7 measures as follows: 1) Expand the modern agricultural technology training center to simulate a real production environment. 2) Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness. 3) Allow students to participate in enterprise technology improvement projects to accumulate practical experience. 4) Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements. 5) Regularly hold agricultural technology operation competitions to test students' application abilities. 6) Involve enterprise technicians in the design of training courses to meet industry demands. 7) Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.

4. Demand for Vocational and Technical Talents

The guideline to enhance demand for vocational and technical talents consisted of 8 measures as follows: 1) Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added. 2) Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans. 3) "Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents. 4) Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions. 5) The employment situation of graduates will be tracked to optimize the talent cultivation model. 6) Agricultural career development courses will be offered to help students clarify the direction of technical positions. 7) Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students. 8) Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions.

5. Policy

The guideline to enhance policy consisted of 9 measures as follows: 1) Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff. 2) Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization. 3) Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development. 4) Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects. 5) Promote the credit bank system to recognize students' learning achievements obtained through various channels. 6) Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies. 7) Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application". 8) Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers. 9) Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects.

6. Income

The guideline to enhance income consisted of 8 measures as follows: 1) Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally. 2) Carry out social training services, providing paid technical training to farmers and enterprises. 3) Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship. 4) Sign salary agreements with cooperative enterprises to safeguard students' rights and interests. 5) Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects. 6) Provide scholarships or training subsidies to students who obtain senior vocational skills certificates. 7) Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises. 8) Introduce the alumni donation mechanism and establish an agricultural technology education development fund.

Part 3: The suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects were at highest level, which means the guidelines to education administration of Guangxi higher vocational colleges are suitability and feasibility. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: The highest mean of suitability were both demand for vocational and technical talents, income, followed by knowledge acquisition ability, and knowledge coupling ability was the lowest mean. The highest mean of feasibility was demand for vocational and technical talents, followed by knowledge coupling ability, and knowledge acquisition ability was the lowest mean.

1. Knowledge Acquisition Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability is suitability. Considering the results of this research suitability of aspects ranged form the highest to lowest mean were as follows: the highest mean of suitability was co-build courses with leading enterprises and introduce their technical standards and latest research achievements, followed by support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content. And organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability is feasibility. Considering the results of this research feasibility of aspects ranged form the highest to lowest mean were as follows: Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students was the highest, followed by support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content.

And co-build courses with leading enterprises and introduce their technical standards and latest research achievements was the lowest mean.

2. Knowledge Coupling Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability was the highest level, which means the guidelines to education administration based on agricultural technology innovation for higher vocational colleges for Guangxi in knowledge coupling ability is suitability. Considering the results of this research aspects ranged form the highest to the lowest mean were as follows: Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice the highest mean, followed by jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge. And integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability was the highest level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability is feasibility. Considering the results of this research aspects ranged form the highest to the lowest mean were as follows: Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields was the highest mean, followed by cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice, and set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students was the lowest mean.

3. Knowledge Application Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability was the high level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability is suitability. Considering the results of this research aspects ranged form the highest to the lowest mean were as follows: Involve enterprise technicians in the design of training courses to meet industry demands was the highest mean, followed by allow students to participate in

enterprise technology improvement projects to accumulate practical experience, and encourage students to apply for agricultural technology patents and support the promotion and application of their achievements was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability was the high level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability is feasibility. Considering the results of this research aspects ranged form the highest to the lowest mean were as follows: Expand the modern agricultural technology training center to simulate a real production environment was the highest mean, followed by regularly hold agricultural technology operation competitions to test students' application abilities. And encourage students to apply for agricultural technology patents and support the promotion and application of their achievements was the lowest mean.

4. Demand for Vocational and Technical Talents

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents is suitability. Considering the results of this research suitability of aspects ranged form the highest to lowest mean were as follows: Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans was the highest mean, followed by agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions. And comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents is feasibility. Considering the results of this research feasibility of aspects ranged form the highest to lowest mean were as follows: Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students was

the highest, followed by regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans. And comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions was the lowest mean.

5. Policy

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy is suitability. Considering the results of this research suitability of aspects ranged form the highest to lowest mean were as follows: Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization was the highest mean, followed by introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects, establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy is feasibility. Considering the results of this research feasibility of aspects ranged form the highest to lowest mean were as follows: Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies was the highest, followed by cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization, optimize the assessment and evaluation system. And incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers was the lowest mean.

6. Income

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income is suitability. Considering the results of this research suitability of aspects ranged form the highest to lowest mean were as follows: Encourage teachers and students to

participate in agricultural technology research projects, and distribute the benefits proportionally was the highest mean, followed by establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship. And relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects was the lowest mean.

The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income is feasibility. Considering the results of this research feasibility of aspects ranged form the highest to lowest mean were as follows: Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship, followed by relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects. And carry out social training services, providing paid technical training to farmers and enterprises was the lowest mean.

Discussion

The research in the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. The researcher summarizes the conclusion into three parts, details as follows:

Part 1: The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 2: The guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 3: The suitability and feasibility of guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

Part 1: The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects was at medium level. Considering the results of this research aspects ranged from the highest to lowest level were as follow: the highest level was demand for vocational and technical talents, followed by knowledge acquisition ability and income, and knowledge coupling ability and knowledge application ability were both the lowest level.

The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges is considered to be at a moderate level, with low overall management efficiency. There are mainly reflected in the following five aspects:

1. Insufficient resource integration: In terms of knowledge acquisition and knowledge coupling, the performance of resource integration and cross-departmental collaboration mechanisms is weak, resulting in insufficient support for practical teaching and technology incubation; the lack of a unified resource management platform makes it difficult to effectively integrate diverse resource systems to support knowledge acquisition by teachers and students.

2. Incomplete policy implementation and incentive mechanisms: Special policies formulated for ethnic minorities are not implemented with sufficient strength, and there is a lack of performance evaluation indicators for teachers based on the effectiveness of agricultural technology promotion; there is a disconnect between policy formulation and implementation, leading to the failure to fully leverage policy effects.

3. Loosely linked income and skill levels: The quantitative relationship between graduates' skill levels and income growth has not been fully established, and the construction of income databases lags behind; there is a lack of mechanisms to incorporate graduates' skill levels into the educational effectiveness evaluation system, resulting in a disconnect between income growth and skill levels.

4. Weak teaching staff: Counselors have weak awareness of innovation and entrepreneurship, insufficient knowledge reserves, and are busy with miscellaneous tasks, thus participating less in innovation and entrepreneurship education and teaching; there is a lack of professional innovation and entrepreneurship education teaching staff, making it difficult to meet students' needs for systematic learning.

5. Unreasonable course settings: The proportion of theoretical education is relatively large, and the practical courses conducted in combination with projects lack systematicness and coherence; the course settings do not fully align with the job process, making it difficult for students to apply the knowledge they have learned to actual work.

The analysis results show that Guangxi's higher vocational colleges lack a unified resource management platform for agricultural technology integration, making it difficult to efficiently match laboratory, training base, and enterprise resources with the needs of teachers and students. For instance, although Guangxi Agricultural Vocational and Technical University has jointly built a crop experiment station with

Laos, the domestic on-campus resource coordination is still insufficient, and it is difficult to form cross-disciplinary research teams (Zhou & Li, 2025). In addition, the construction of agricultural training bases lags behind, and some colleges and universities are short of key training resources such as cold chain logistics and intelligent agricultural equipment, which restricts the ability to incubate technologies (Deng, 2018). Although Guangxi has launched the "Dream Realization Plan for Migrant Workers" and expanded enrollment in agricultural-related majors, the implementation rate of special training financial subsidies for ethnic minority areas is less than 50%, and the performance evaluation of teachers does not include the effectiveness of agricultural technology promotion (GED, 2023). Research shows that the class hours of teachers participating in field technology guidance only account for 10% of the assessment weight, far lower than theoretical teaching (Zhong, 2024). The policy disconnection leads to a lack of motivation for teachers to go deep into rural areas, resulting in a low conversion rate of agricultural technology. Studies show that the income growth data of graduates from agricultural-related majors is missing, making it impossible to accurately match the course settings with market salary trends (Zhang et al., 2025). For example, the correlation analysis between the skill levels of livestock major students and their salaries is lacking, making it difficult for schools to optimize training content (Tang, 2025). Moreover, the evaluation system of educational effects ignores the skill premium index, leading to a mismatch between talent cultivation and industrial demands (M.E, 2024). The proportion of "dual-qualified" teachers in Guangxi Vocational University of Agriculture is only 50%, and counselors are often trapped in administrative affairs, with less than 20% of their time spent on innovation and entrepreneurship education (I.R, 2024). Some teachers' agricultural technology updates are lagging behind, with an average of less than one training session per year in cutting-edge fields such as smart agriculture and biotechnology breeding (Liu, 2025). Agricultural-related colleges and universities need to establish a "dual-mentor system" of schools and enterprises, but the coverage rate of the enterprise mentor recruitment mechanism is less than 40% (Li, 2024). The theoretical class hours of agricultural-related majors in Guangxi's higher vocational colleges account for as high as 65%, while project-based practical courses lack coherence (Tang, 2025). For instance, the course of agricultural product e-commerce mainly teaches general marketing theories, ignoring the practical operations of cross-border trade with ASEAN (Liu, 2025). Compared with industrial demands, only 30% of the courses are in line with the standards of emerging occupations such as "Smart Agriculture Operator" and "Cold Chain Logistics Specialist" (M.E, 2024). It is necessary

to reconstruct a "job-oriented work process" curriculum system to enhance the ability of technology transfer.

1. Knowledge Acquisition Ability

The analysis reveals that the main problems in the knowledge acquisition ability of the existing agricultural vocational colleges in Guangxi are as follows: The existing resource system is scattered and lacks cross-platform integration (such as the literature database and enterprise technical resources are not effectively connected); Big data technology has not been fully utilized to analyze the knowledge needs of agricultural practitioners, resulting in a disconnection between resource updates and industrial demands; Teachers have limited opportunities to access international agricultural new technologies, and the frequency and depth of training are insufficient. Li Fang et al. (2022, p.15) pointed out: "The digital educational resources for agriculture in vocational colleges are scattered and lack a sharing mechanism, leading to low efficiency for teachers and students to obtain cutting-edge technical information." Wang Lin pointed out (2023, p.32): "The update cycle of agricultural technology knowledge base is long, failing to respond to the upgrading of the industry in a timely manner."

2. Knowledge Coupling Ability

The analysis reveals that the main problems in the knowledge coupling ability of the existing agricultural vocational colleges in Guangxi are as follows: The integration of agricultural technology with other disciplines such as information technology and management is insufficient, and cross-departmental collaboration is merely formal; Teachers' enthusiasm for conducting cross-disciplinary research is low, and there are insufficient supporting incentive policies; Agricultural research projects and course teaching have not been effectively combined. Zhang (2021, p.48) pointed out: "The cross-disciplinary course design in agricultural vocational colleges is insufficient, and disciplinary barriers inhibit technological innovation coupling." Liu (2022, p.77) pointed out: "The knowledge sharing platform in school-enterprise cooperation is missing, resulting in a low rate of technological research and development and teaching resource conversion."

3. Knowledge Application Ability

The analysis reveals that the primary issues with the knowledge application ability of agricultural higher vocational colleges in Guangxi include: a lack of practical platforms, limited coverage of training centers that simulate real production environments; low conversion rates of research outcomes, as student patents lack promotion channels and fail to connect with the market; and low

enterprise participation, with insufficient involvement of enterprise technical personnel in course design. Chen (2021, p.63) noted, "Agricultural technology training bases have outdated equipment, and the simulated scenarios differ from actual enterprise production." Zhao (2023, p.91) pointed out, "The conversion rate of scientific research results from higher vocational colleges is less than 20%, and the industry-university-research cooperation mechanism needs urgent optimization."

4. Demand for Vocational and Technical Talents

The analysis reveals that the main problems in the demand for vocational and technical talents in the existing agricultural higher vocational colleges in Guangxi are as follows: the professional Settings lag behind, and the newly added majors (such as smart agriculture) fail to match the local industrial upgrading demands in a timely manner; The employment data of graduates has not been systematically analyzed, which affects the adjustment of the training program. The cultivation of compound abilities is insufficient, and the integration of agricultural technology with management and marketing is relatively weak. Huang (2022, p.105) pointed out: "The professional adjustment cycle of agricultural higher vocational colleges in Guangxi is long, lagging behind the demand for talents in emerging fields such as smart agriculture." The Vocational Education Center of the Ministry of Education (2023, p.28) pointed out: "The lack of a database on the career development of graduates leads to low accuracy in predicting the supply and demand of talents."

5. Policy

The analysis reveals that the main policy problems of the existing agricultural higher vocational colleges in Guangxi are as follows: insufficient special funds, complex application process for special funds for agricultural technology education, and low utilization efficiency; The connection between grassroots policies is insufficient, and higher vocational education has not been deeply bound with the policies of rural revitalization. The teacher evaluation system is rigid, and the effectiveness of technology promotion has not been included in the performance assessment. Zhou (2021, p.56) pointed out: "The delay rate of the disbursement of special funds for vocational education related to agriculture exceeds 40%, affecting the renewal of practical training equipment." Wu (2023, p.122) pointed out: "Teacher evaluation focuses more on the indicators of papers, and the contribution of technology promotion has not been quantitatively evaluated."

6. Income

The analysis reveals that the main problems in terms of income of the existing agricultural higher vocational colleges in Guangxi are as follows: the distribution of interests between schools and enterprises is ambiguous, and the revenue-sharing mechanism for teachers and students' participation in technological research and development is not clear. The cost of starting a business is high, and the venues and financial support of agricultural entrepreneurship incubation bases are insufficient. The regional income gap is significant, and there is a lack of salary guarantee policies for graduates in remote areas. Yang (2022, p.88) pointed out: "In school-enterprise cooperation, the ownership of intellectual property rights is unclear, and the proportion of technical dividends for teachers and students is lower than the industry standard." The Department of Human Resources and Social Security of Guangxi (2023, p.17) pointed out: "The salary level of agricultural enterprises in counties is 35% lower than that in cities, but higher vocational colleges have not formulated targeted compensation policies."

Part 2: The guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The researcher put forward guidelines for education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects, with a total of 48. There were 8 guidelines for knowledge acquisition ability, 8 guidelines for knowledge coupling ability, 7 guidelines for knowledge application ability, 8 guidelines for demand for vocational and technical talents, 9 guidelines for policy, and 8 guidelines for income. The researchers found that there are many measures to promote the education administration based on agricultural technology innovation of higher vocational colleges in Guangxi.

1. Knowledge Acquisition Ability

There were 8 guidelines for knowledge acquisition ability: 1) Establish an online course resource library for agricultural technology to facilitate students' self-study. 2) Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly. 3) Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government. 4) Co-build courses with leading enterprises and introduce their technical standards and latest research achievements. 5) Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students. 6) Organize students to participate in agricultural innovation competitions to stimulate their

motivation for active learning. 7) Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content. 8) Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere. Related to the above results, core measures include establish online course library, resource management platform, school-enterprise co-built courses, expert training, etc. Studies show that higher vocational colleges need to integrate industry resources through digital platforms to improve the efficiency of knowledge acquisition. For example, Guangxi Agricultural Vocational and Technical College has achieved cross-domain integration of agricultural technology data by constructing the "Smart Agricultural Education" resource management platform (Chen, 2019); The construction of online educational resource libraries has been proven to enhance students' autonomous learning ability (Smith, 2020); Zhang (2021) et al. pointed out that digital resource libraries and school-enterprise cooperative courses can significantly improve the knowledge update efficiency of agricultural higher vocational colleges. Especially with the support of big data technology, dynamic adjustment of teaching resources can precisely match industry demands. Liu & Wang (2020, p.487-502) emphasized that international cutting-edge technology training is the key to narrowing the gap in agricultural education, and regular organization of teacher training can enhance the advancement of teaching content.

2. Knowledge Coupling Ability

There were 8 guidelines for knowledge coupling ability: 1) Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses. 2) Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields. 3) Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems. 4) Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge. 5) Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice. 6) Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities. 7) Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling. 8) Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students. Related to the above results, the core measures include interdisciplinary courses, school-enterprise joint research, industrial college

construction and multi-tutor system. Research from Guangxi Vocational University of Agriculture shows that conducting agricultural technology research projects through school-enterprise cooperation can promote the combination of theory and practice (Liang, 2023); Zhou et al. (2022, p.321-340) verified the effectiveness of interdisciplinary teams in solving agricultural practice problems and held that industrial colleges are ideal platforms for coupling technical and management knowledge. Chen (2019, p.96-105) proposed that the research topics of school-enterprise cooperation can accelerate the transformation from theory to practice, but a supporting incentive mechanism is needed to ensure the participation. Chen & Wang (2021) pointed out: "The joint establishment of industrial colleges by schools and enterprises can promote knowledge coupling and technology transformation, but the benefit distribution mechanism needs to be clarified."

3. Knowledge Application Ability

There were 7 guidelines for knowledge application ability: 1) Expand the modern agricultural technology training center to simulate a real production environment. 2) Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness. 3) Allow students to participate in enterprise technology improvement projects to accumulate practical experience. 4) Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements. 5) Regularly hold agricultural technology operation competitions to test students' application abilities. 6) Involve enterprise technicians in the design of training courses to meet industry demands. 7) Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.

Related to the above results, the core measures include the construction of training centers, the integration of skill certificates, participation in enterprise projects, and entrepreneurship courses. Li et al. (2023, p.67-89) demonstrated that practical training centers that simulate real production environments can enhance students 'technical application skills. Integrating skill certificates into courses directly boosts employment competitiveness. Wang & Liu (2022, p.45-60) noted that involving enterprise technical personnel in course design ensures that the teaching content aligns with industry needs. Mao & Shi (2021) pointed out that Guangxi Vocational and Technical College has integrated agricultural technical skill certificates into its curriculum through the' industry-research-competition 'approach. Lee (2021) emphasized that while integrating skill certificates into courses can enhance employment competitiveness, it is crucial to avoid the' certificate utilitarianism.'

4. Demand for Vocational and Technical Talents

There were 8 guidelines for demand for vocational and technical talents: 1) Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added. 2) Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the teaching plans. 3) "Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents. 4) Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions. 5) The employment situation of graduates will be tracked to optimize the talent cultivation model. 6) Agricultural career development courses will be offered to help students clarify the direction of technical positions. 7) Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students. 8) Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions. Related to the above results, the core measures include dynamic adjustment of majors, order-based training, integration of vocational standards and graduate tracking. Huang (2021, p.412-428) emphasized that adding majors (such as smart agriculture) based on the demands of the regional agricultural industry is the core strategy for higher vocational colleges to respond to the shortage of talents; Zhao (2020, p.210-228) holds that embedding professional qualification standards into courses can effectively bridge the gap between teaching and job requirements, but a long-term enterprise research mechanism needs to be established. The practice of Guangxi Vocational and Technical College shows that by building agricultural-related professional clusters and aligning with industrial demands, the employment rate of graduates has significantly increased (Mao & Shi, 2021); Zhao & Zhang (2021) emphasized that the "order-based" talent cultivation model can precisely match the demands of enterprises, but a balance needs to be struck between general and specialized skills.

5. Policy

There were 9 guidelines for policy: 1) Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff. 2) Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization. 3) Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development. 4) Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for

cooperation projects. 5) Promote the credit bank system to recognize students' learning achievements obtained through various channels. 6) Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies. 7) Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application". 8) Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers. 9) Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects. Related to the above results, the core measures include the application for special funds, the connection of rural revitalization policies, scientific research rewards, and credit banks, etc. Xu (2022) proposed that policy coordination between local governments and higher vocational colleges (such as special funds for rural revitalization) is the institutional guarantee for promoting the transformation of agricultural technological achievements; Tan & Li (2019, p.689-704) confirmed that the credit bank system can promote the certification of diverse learning outcomes, but it needs to be accompanied by a cross-departmental data intercommunication mechanism. The practice of Guangxi Vocational and Technical College shows that by building agricultural-related professional clusters and aligning with industrial demands, the employment rate of graduates has significantly increased (Mao & Shi, 2021); Wang (2021) et al. pointed out that policy coordination such as the combination of higher vocational education and rural revitalization is the key to promoting the popularization of agricultural technology.

6. Income

There were 8 guidelines for income: 1) Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally. 2) Carry out social training services, providing paid technical training to farmers and enterprises. 3) Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship. 4) Sign salary agreements with cooperative enterprises to safeguard students' rights and interests. 5) Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects. 6) Provide scholarships or training subsidies to students who obtain senior vocational skills certificates. 7) Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises. 8) Introduce the alumni donation mechanism and establish an

agricultural technology education development fund. Related to the above results, the core measures include the benefit distribution mechanism, social training services, entrepreneurship incubation bases, alumni funds, etc. Yang et al. (2023, p.332-348) pointed out that the minimum wage agreement and revenue-sharing model in school-enterprise cooperation can guarantee students' rights and interests, while the services of the technical consulting team can generate sustainable income. Liu (2021, p.812-830) emphasized that the alumni endowment fund is an innovative path for diversified financing in higher vocational colleges, but transparent management is needed to enhance trust. Chen (2019, p.45-50) pointed out that Guangxi Vocational and Technical College of Agriculture realizes the feedback of income to education through the operation of demonstration farms and agricultural product processing projects. Liu & Chen (2021, p.78-85) pointed out: "The mechanism of sharing benefits between schools and enterprises (such as technology equity participation) can stimulate teachers' enthusiasm for scientific research."

Part 3: The suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges.

The suitability and feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in six aspects were at highest level, which means the guidelines to education management of Guangxi higher vocational colleges are suitability and feasibility. Considering the results of this research aspects ranged from the highest to lowest mean were as follow: The highest mean of suitability were both demand for vocational and technical talents and income, followed by knowledge acquisition ability, and knowledge coupling ability was the lowest mean. The highest mean of feasibility was demand for vocational and technical talents, followed by knowledge coupling ability, and knowledge acquisition ability are the lowest mean.

1. Knowledge Acquisition Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability was the high level, which means guidelines to education administration based on agricultural

technology innovation for Guangxi higher vocational colleges in knowledge acquisition ability is feasibility. The related to Smith (2020, p.15) pointed out that through measures such as establishing an online course resource library of agricultural technology, jointly building courses with enterprises to introduce technical standards, and supporting teachers to participate in international training, industry resources and academic resources have been effectively integrated; Wang & Li (2019, p.23) research shows that digital resource platforms can significantly enhance students' autonomous learning ability; The curriculum design of integrating industry and education has enhanced the cutting-edge nature of teaching content (Chen, 2021, p.8). Furthermore, Zhao & Liu (2022, p.34) believes that inviting experts in the agricultural field to conduct specialized training has further broadened the horizons of teachers and students and is in line with the development trend of "open knowledge acquisition" in vocational education.

2. Knowledge Coupling Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability was the highest level, which means the guidelines to education administration based on agricultural technology innovation for higher vocational colleges for Guangxi in knowledge coupling ability is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability was the highest level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge coupling ability is feasibility. The related to Li & Wang (2020, p.45) pointed out that through measures such as interdisciplinary curriculum integration, joint research and development of key topics by schools and enterprises, and the establishment of on-campus technical exchange forums, the barriers of traditional disciplines have been broken. Johnson et al (2018, p.67) found that the cross-integration of agricultural technology with information technology and management can enhance students' ability to solve complex practical problems. The "dual-mentor system" (academic mentor + industry mentor) promotes the knowledge coupling between theory and practice (Huang, 2021, p.12). Furthermore, the industrial colleges established through school-enterprise cooperation provide institutionalized guarantees for knowledge sharing (Zhang & Li, 2023, p.56), further verifying the operability of this guideline.

3. Knowledge Application Ability

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability was the high level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability was the high level, which means the guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in knowledge application ability is feasibility. The related to Liu & Chen (2020, p.78) pointed out that through measures such as expanding the modern agricultural technology training center, incorporating skills certificate assessment, and supporting students to participate in enterprise technology improvement projects, the practice-oriented teaching mode has been strengthened; The empirical research by Wang (2019, p.56) shows that the training base that simulates the real production environment can significantly enhance students' technical application ability. The incentive mechanism of "patent application + technology transfer" has stimulated innovation vitality (Zhao et al., 2022, p.32). Guo (2021, p.44) pointed out that the participation of enterprise technicians in curriculum design further ensures a high degree of matching between teaching content and industry demands, reflecting the practical value of the integration of industry and education.

4. Demand for Vocational and Technical Talents

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in demand for vocational and technical talents is feasibility. The related to Wang & Li (2020, p.12) believes that through measures such as dynamically adjusting the enrollment scale, adding emerging majors like intelligent agriculture, and establishing "order classes" for targeted training, the technical

demands of the regional agricultural industry have been precisely matched. The research of Huang (2019, p.21) pointed out that vocational education needs to optimize the talent cultivation structure based on the industrial technology gap. Through measures such as tracking the employment situation of graduates and integrating vocational qualification standards, higher vocational colleges in Guangxi have achieved a precise match between talent cultivation and job demands (Liu, 2021, p.34). Furthermore, Zhang & Wang (2023, p.67) believes that jointly holding special job fairs with enterprises has further promoted high-quality employment.

5. Policy

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in policy is feasibility. The related to Liu (2021, p.45) pointed out that through measures such as applying for special funds, being included in the rural revitalization policy system, and establishing agricultural innovation funds, a multi-dimensional policy guarantee mechanism has been constructed; Chen & Li (2020, p.56) research shows that the investment of special funds can effectively improve the conditions of practical training equipment and teaching staff. The "credit bank" system has broadened the channels for recognizing students' learning achievements (Wang, 2022, p.78). Furthermore, Zhao & Liu (2023, p.23) pointed out that incorporating the effectiveness of technology promotion into the assessment indicators for teachers has strengthened the incentive effect of policy implementation and reflected the synergy and operability of policy tools.

6. Income

The suitability of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income was the high level, which means guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income is suitability. The feasibility of guidelines to education administration based on agricultural technology innovation for Guangxi higher vocational colleges in income was the high level, which means guidelines to education administration based on

agricultural technology innovation for Guangxi higher vocational colleges in income is feasibility. The related to Yang & Zhao (2022, p.15) pointed out that through measures such as encouraging teachers and students to participate in the dividends of technological research and development, conducting social paid training, and operating entrepreneurship incubation bases, diversified income growth paths have been explored; The research of Li (2021, p.34) found that the revenue distribution mechanism of technological achievement transformation can significantly enhance the innovation enthusiasm of teachers and students. The operation of demonstration farms and agricultural product processing projects has created economic value by relying on the technical advantages of colleges and universities (Guo, 2019, p.56). Furthermore, the introduction of the alumni donation mechanism and the education development fund provides institutional guarantees for sustainable income growth (Zhang et al., 2023, p.45).

Recommendations

Implications

Based on interviews and data analysis, the researchers have proposed the following suggestions for the guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges:

1. Knowledge Acquisition Ability: Higher vocational colleges in Guangxi should focus on courses related to digital resource integration and enterprise cooperation. Establish an exclusive online course resource library for agricultural technology, integrate industry, academic and government data, develop an intelligent agricultural education resource management platform, and achieve cross-platform resource intercommunication. Jointly build courses with agricultural technology enterprises, introduce enterprise technical standards and the latest achievements, and regularly organize agricultural innovation competitions to stimulate students' active learning. Support teachers in participating in domestic and international agricultural technology training, develop an agricultural technology learning APP, and achieve mobile learning.

2. Knowledge Coupling Ability: Higher vocational colleges in Guangxi should focus on strengthening the school-enterprise cooperation mechanism and breaking through disciplinary barriers. Integrate agricultural technology, information technology and management science to develop project-based courses, such as "Design of Smart Agricultural Systems". Organize agricultural technology innovation projects and encourage students to form cross-disciplinary teams to solve practical

problems, such as the application of agricultural Internet of Things. Jointly build industrial colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge, such as the operation of e-commerce for agricultural products.

3. Knowledge Application Ability: Higher vocational colleges in Guangxi should focus on improving the coverage of training equipment and strengthen the integration of production. We will expand the modern agricultural technology training center, introduce intelligent agricultural machines, drones and other equipment to simulate the real production environment. Integrate agricultural technical skills certificate into the course, such as "intelligent agricultural equipment operation certification, improve job competitiveness. Encourage students to participate in enterprise technology improvement projects, apply for agricultural technology patents, and support its popularization and application.

4. Demand for Vocational and Technical Talents: Higher vocational colleges in Guangxi should focus on establishing a tracking mechanism for graduates. In response to the demands of Guangxi's agricultural industry, new majors such as smart agriculture and agricultural big data have been added, while lagging ones have been phased out. Jointly set up order classes with enterprises, such as the "Modern Agronomist Order Class", to cultivate talents in a customized manner. Offer career development courses, hold special job fairs, and cultivate comprehensive capabilities in agricultural technology, management and marketing.

5. Policy: Higher vocational colleges in Guangxi should focus on policy coordination (such as rural revitalization and cohesion) and capital. We will apply for special funds for agricultural technology innovation, and promote the integration of education into the rural revitalization policy system. Students who participate in the development of agricultural technology give scientific research rewards and credit recognition and encourage technological innovation. We will establish a secondary college and enterprise rapid docking mechanism, promote the credit banking system, and recognize the results of multiple studies.

6. Income: Higher vocational colleges in Guangxi should focus on entrepreneurship incubation bases and technical services for revenue generation. Establish a revenue distribution mechanism for scientific research projects to encourage teachers and students to participate in agricultural technological innovation. Carry out technical training for farmers and enterprise consulting services, establish entrepreneurship incubation bases, and reduce the risks of students' entrepreneurship. Introduce an alumni donation mechanism and establish an

agricultural technology education development fund to support long-term development.

Future Research

1. Expansion of Research Subjects

Cross-regional Comparative Research: Compare Guangxi's higher vocational colleges with those in other major agricultural provinces such as Jiangsu and Shandong to analyze the differences in policy environment, industrial foundation, and talent cultivation models among different regions, and distill replicable experiences.

Multi-subject Collaborative Research: From the perspectives of multiple subjects including the government, enterprises, schools, and farmers, explore the collaborative mechanisms in agricultural technology innovation education management, especially the roles and functions of local governments in policy implementation and enterprises in technology transformation.

2. Deepening of Research Content

Construction of Long-Term Mechanisms: Addressing the current shortcomings in policy implementation and incentive mechanisms, study how to establish a long-term connection mechanism between higher vocational colleges and the agricultural industry through legislation or institutional design to ensure the continuous implementation of educational management guidelines.

Research on the Integration of Emerging Technologies: Focus on the application of new technologies such as artificial intelligence and the Internet of Things in agricultural education, explore the upgrade path of the "Smart Agricultural Education" platform, and the in-depth integration model of virtual simulation technology in practical teaching.

Research on Sustainable Development: In line with the "dual carbon" goals and the rural revitalization strategy, study the educational management innovations of agricultural higher vocational colleges in the promotion of ecological agricultural technologies and the innovation of green production models, and expand the ecological dimension of talent cultivation.

3. Innovation in Research Methods

Big Data Tracking and Analysis: Utilize graduate income databases and enterprise talent demand big data to establish dynamic prediction models, provide early warnings for the supply and demand gap of agricultural technology talents, and offer real-time data support for professional adjustments and curriculum optimization.

Hybrid Research Design: On the basis of existing quantitative analysis, incorporate qualitative research methods (such as in-depth interviews and case tracking) to deeply explore hidden issues in educational management practices (such as the intrinsic motivation of teachers in technology promotion and the actual obstacles faced by students in entrepreneurship).

International Comparative Research: Introduce practical cases of agricultural vocational education in ASEAN countries, analyze their experiences in policy support, school-enterprise cooperation, and technology transformation, and provide an international perspective for Guangxi's connection with ASEAN agricultural industries.

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Appendix

Appendix A
List of Specialists and Letters of Specialists Invitation for IOC Verification

Specialists for IOC Verification

No	Name	Personal introduction
1	Jiang Feiyan	Degree: Ph.D. Workplace: Guangxi Vocational University of Agriculture
2	Liao Dongsheng	Degree: Ph.D. Workplace: Guangxi Minzu University
3	Xiong Na	Degree: Ph.D. Workplace: Guangxi Minzu University
4	Li Guanghai	Degree: Ph.D. Workplace: Guangxi Normal University
5	Wei Zengxin	Degree: Ph.D. Workplace: Guangxi University

Ref No. MHESI 0643.14/ 935

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to validate research instrument

Dear Professor Dr. Jiang Feiyan, Guangxi Vocational University of Agriculture

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

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Thonburi Bangkok 10600

21 March 2025

RE: Invitation to validate research instrument

Dear Professor Dr. Liao Dongsheng, Guangxi Minzu University

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

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Ref.No. MHESI 0643.14/937

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to validate research instrument

Dear Professor Dr. Xiong Na, Guangxi Minzu University

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
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Ref.No. MHESI 0643.14/ 938

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to validate research instrument

Dear Professor Dr. Li Guanghai, Guangxi Normal University

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

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(Vice Dean of Graduate School for Dean of Graduate School)

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Ref.No. MHESI 0643.14/939

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to validate research instrument

Dear Professor Dr. Wei Zengxin, Guangxi University

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
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Appendix B
Official Letter

Ref.No. MHESI 0643.14/ 934

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Request for Data Collection

Dear Sir or Madam

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research. List of universities and colleges according to the attached document.

With your expertise, we would like to request to collect the data to be used in the research. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
www.bsru.ac.th
E-mail: grad@bsru.ac.th

No	University and College
1.	Guangxi Vocational University of Agriculture
2.	Guangxi Agricultural Engineering Vocational Technical College
3.	Guangxi Eco Engineering Vocational and Technical College
4.	Guangxi Natural Resources Vocational and Technical College
5.	Guangxi Manufacturing Engineering Vocational and Technical College
6.	Fangchenggang Vocational and Technical College

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Ref.No. MHESI 0643.14/925

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Zhu Yulin, Guangxi Vocational University of Agriculture

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

With your expertise, we would like to ask your permission to evaluate the attached guideline. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
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Ref.No. MHESI 0643.14/926

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Pang Zhenghong, Guangxi Eco Engineering Vocational and Technical College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

With your expertise, we would like to ask your permission to evaluate the attached guideline. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

Assistant Professor Dr.Thanaput Chancharoen
(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
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Ref.No. MHESI 0643.14/927

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Chen Xincun, Guangxi Vocational University of Agriculture

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

With your expertise, we would like to ask your permission to evaluate the attached guideline. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

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Bansomdejchaopraya Rajabhat University
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Ref.No. MHESI 0643.14/928

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Zhu Zhendong, Guangxi Internaitonal Business Vocational College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

With your expertise, we would like to ask your permission to evaluate the attached guideline. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Sincerely,

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(Vice Dean of Graduate School for Dean of Graduate School)

Bansomdejchaopraya Rajabhat University
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Ref.No. MHESI 0643.14/929

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Zhou Zejian, Guangxi Eco Engineering Vocational and Technical College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

With your expertise, we would like to ask your permission to evaluate the attached guideline. Would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

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Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
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Ref No. MHESI 0643.14/930

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Feng Bing, Guangxi Natural Resources Vocational and Technical College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

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Bansomdejchaopraya Rajabhat University
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Ref.No. MHESI 0643.14/ 931

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Dr. Ouyang Qundong, Fangchenggang Vocational and Technical College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

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Sincerely,

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Bansomdejchaopraya Rajabhat University
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Ref.No MHES10643.14/932

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Dr. Yang Changpeng, Guangxi College of Sports Education

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

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Sincerely,

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Ref No. MHESI 0643.14/933

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

21 March 2025

RE: Invitation to evaluate the guideline

Dear Professor Huang liang, Guangxi Manufacturing Engineering Vocational and Technical College

Mr.Xiao Shalang is a graduate student in Doctor of Philosophy Program in Educational Administration of Bansomdejchaopraya Rajabhat University. He is undertaking research entitle "Guideline of Education Administration Based on Agricultural Technology Innovation for Guangxi Higher Vocational Colleges"

The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research.

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Appendix C
Research Instrument

Questionnaire about current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

Explanation

This questionnaire aims to understand the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges. We sincerely invite you to participate in filling it out. Thank you very much for taking the time to read and fill in the questionnaire in your busy schedule. Except for the "Personal Information" section, all other questions are scored on a 5-level scale:

5 refers to the level of agricultural technology innovation at the highest level

4 refers to the level of agricultural technology innovation at a high level

3 refers to the level of agricultural technology innovation at a medium level

2 refers to the level of agricultural technology innovation at a low level

1 refers to the level of agricultural technology innovation at the lowest level

This questionnaire survey is conducted anonymously, and the data obtained will only be used for academic research. It will not disclose any of your personal information. Please answer according to your actual situation. Thank you very much for your support and help!

Part 1: Respondent Status (Personal Information)

1. Workplace

☐ Guangxi Vocational University of Agriculture

☐ Guangxi Agricultural Engineering Vocational Technical College

☐ Guangxi Eco Engineering Vocational and Technical College

☐ Guangxi Natural Resources Vocational and Technical College

☐ Guangxi Manufacturing Engineering Vocational and Technical College

☐ Fangchenggang Vocational and Technical College

2. Gender

☐ Male ☐ Female

3. Age

☐ 30 years old and under ☐ 30-40 years old ☐ 41-50 years old

☐ 51 years old and older

4. Highest degree

☐Bachelor's degree ☐ Master's degree ☐ Doctor's degree

5. Professional title

☐ Junior and other ☐ Intermediate ☐ Associate senior ☐ Full senior

6. Work experience

☐ 0-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 years ☐ 20 years above

Part 2: The current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
Knowledge acquisition ability						
1	Administrators establish digital learning platforms to enhance the efficiency of teachers and students in acquiring new knowledge, new technologies and new information.					
2	Administrators establish diversified learning platforms to improve the effectiveness of agricultural innovation training.					
3	Administrators integrate diverse resource systems to provide support for teachers and students in structuring knowledge acquisition.					
4	Administrators regularly organize agricultural new technology training to help teachers master international cutting-edge technologies.					
5	Administrators attach importance to the real-time update and dissemination of new knowledge and cooperate with agricultural research institutions to establish a technology information sharing mechanism.					
6	Administrators attach importance to the transformation of new knowledge and incorporate agricultural innovation achievements into the teaching resource library.					
7	Administrators have constructed convenient knowledge acquisition channels for farmers and agricultural practitioners, designing online and offline combined courses (such as mobile micro-courses).					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
8	Administrators focus on the comprehensive application ability of new technologies and information, thereby promoting interdisciplinary knowledge integration.					
9	Administrators attach importance to optimizing the content of the resource systems and utilize big data technology to analyze the knowledge needs of agricultural practitioners for dynamic adjustment.					
10	Administrators provide real-time technical problem-solving services for teachers and agricultural practitioners and have established an expert consultation platform.					
Knowledge coupling ability						
1	Administrators attach importance to knowledge in the fields of agricultural production technology, agricultural economic management, agricultural research and practice, and fully integrate it through interdisciplinary curriculum design.					
2	Administrators pay attention to promoting the deep coupling of agricultural environment and sustainable development knowledge, so as to build a systematic teaching system.					
3	Administrators attach importance to teachers' research on the cross-integration of knowledge in agriculture and different fields, and formulate relevant incentive mechanisms.					
4	Administrators managers pay attention to students' ability to master the comprehensive agricultural knowledge system, and strengthen and integrate it through project-based teaching.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
5	Administrators pay attention to the integration of agricultural research practice and theoretical teaching resources, and establish cross departmental collaboration mechanisms for this purpose.					
6	Administrators regularly organize agricultural production technology experts and agricultural economic management experts to carry out knowledge collaborative innovation seminars, so as to solve some practical problems in the industry.					
7	Administrators pay attention to the promotion of systematic teaching knowledge modules, and transform the front-line experience of agricultural production into innovative teaching content through school-enterprise cooperation.					
8	Administrators pay attention to the use of systematic teaching system, and realize the visual correlation and sharing of knowledge of different agricultural disciplines through digital platforms.					
9	Administrators pay attention to the effect of knowledge coupling ability in actual teaching, and set up special assessment indicators in the curriculum evaluation system.					
10	Administrators attaches importance to the development of comprehensive agricultural production technology innovation courses, and has set up a team of interdisciplinary teachers.					
11	Administrators attach importance to improving the existing knowledge coupling system and introducing cutting-edge agricultural knowledge through international exchanges.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
Knowledge application ability						
1	Administrators clearly listed knowledge application ability as the core training goal of agricultural higher vocational education to highlight its important position.					
2	Administrators establish the practical teaching system is conducive to systematically strengthening students' knowledge transformation ability.					
3	Administrators attach importance to promoting IUR collaborations in order to promote the practical productivity transformation of agricultural technological achievements.					
4	Administrators attach importance to the return of scientific research and innovation achievements to teaching practice, so as to develop policies to encourage teachers to participate in horizontal technology projects.					
5	Administrators cooperate with enterprises to design targeted positions in internships management to ensure that students solve real agricultural technology problems.					
6	Administrators take knowledge application ability as a key index to measure the educational effectiveness of agricultural higher vocational colleges to test the actual level of running schools.					
7	Administrators give priority to practical production benefits rather than pure academic value in evaluating educational effectiveness and innovation achievements.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
8	Administrators attach importance to practical teaching and technology incubation, and provide support by integrating university-enterprise resources.					
9	Administrators attach importance to improving students' knowledge application ability, so as to continuously optimize the structure of professional courses.					
10	Administrators attach importance to students' innovation achievements based on actual needs, and stimulate students through continuous innovation and entrepreneurship competitions.					
11	Administrators pay attention to the effectiveness of IUR collaborations, and incorporate it into departmental performance assessment.					
Demand for vocational and technical talents						
1	Administrators regard the demand for vocational and technical talents as the core orientation of talent training in agricultural higher vocational colleges, so as to clarify the training orientation.					
2	Administrators regularly analyze the trends of economic development and technological advancement, and dynamically adjust the enrollment scale and direction of agricultural technology majors.					
3	Administrators pay attention to the industry--specific needs in order to optimize the curriculum system to train the appropriate technical personnel.					
4	Administrators attach importance to the research of labor market dynamics in order to adjust the content of practical teaching.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
5	Administrators attach importance to the crafts and technical field in the industry, and work closely with enterprises when formulating training programs to ensure that the course content is consistent with them.					
6	Administrators attach importance to the transformation of scientific research results into teaching resources to match the industry-specific needs, so they establish an incentive mechanism for teachers to participate in horizontal technology projects.					
7	Administrators pay close attention to the labor market dynamics, which helps schools to accurately grasp the changes in the demand for vocational and technical talents and further adjust education management strategies.					
8	Administrators attach importance to labor market feedback, so they have established a tracking mechanism for agricultural technology graduates to optimize the skill matching degree of talent training.					
9	Administrators include the service of regional economic development (such as rural revitalization, characteristic agriculture) into the talent training goals in order to better serve local economic development.					
10	Administrators pay attention to the technological advancement of local agricultural and develop policies to encourage teachers and students to participate in agricultural technology extension projects.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
Policy						
1	Administrators clearly include vocational education strategic plans into the long-term development goals of colleges and universities, so as to clarify the school-running positioning.					
2	Administrators attaches importance to the effectiveness of the implementation of the current policy and includes it in the annual assessment of the university management.					
3	Administrators have specific initiatives implemented to ensure that they systematically support curriculum development for agricultural technology majors.					
4	Administrators give priority to the use of government funding support to ensure practical training equipment and teaching resources related to agricultural technology innovation.					
5	Administrators attach importance to the full implementation of teacher training funding promised in documents at all levels, and establish a special fund audit system for this purpose.					
6	Administrators fully implement the dual-teacher training policy to promote the improvement of teachers' practical teaching ability.					
7	Administrators will include the achievements of teachers' participation in the horizontal topics of agricultural technology into the bonus points of the professional title evaluation policy, so as to stimulate the scientific research potential of teachers.					
8	Administrators promote industry collaboration (such as the establishment of industrial colleges) to realize the two-way transformation of agricultural technology R&D and teaching resources.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
9	Administrators develop special policies (e.g. grants, skills training subsidies) to support rural students to participate in advanced agricultural technology courses.					
10	Administrators attach importance to the quality assurance of school education and teaching, and conduct a third-party quality assessment to conduct an annual audit of the teaching results of agricultural technology majors.					
11	Administrators attach importance to ensuring access and equity in education for students in remote areas, and have formulated special policies for ethnic minorities (such as the development of Zhuang language agricultural technology textbooks).					
Income						
1	Administrators will incorporate graduates' the level of skill into the educational effectiveness evaluation system of higher vocational colleges to promote the improvement of the school's educational level.					
2	Administrators pay attention to the analysis of salary differences in the industry, so as to dynamically adjust the professional curriculum.					
3	Administrators attach importance to the fair compensation of agricultural technical personnel, and actively promote the policy of linking vocational skill level certification with salary.					
4	Administrators focus on enhancing the wages competitiveness of graduates in technology intensive positions and cooperate with enterprises to develop high value-added technology courses.					

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Level				
		5	4	3	2	1
5	Administrators pay attention to improving the work experience of graduates and establish a stepped internship system (such as "apprenticeship + on-site internship").					
6	Administrators recognize that the geographic location advantages of Guangxi vocational colleges adjacent to characteristic agricultural producing areas (such as sugarcane and mango planting belt) have significantly improved the income level of employees.					
7	Administrators promote schools and enterprises to sign minimum wages guarantee agreements to ensure that agricultural technology internship positions provide reasonable remuneration.					
8	Administrators will include gender equality wages into the assessment index of school-enterprise cooperation to safeguard the legitimate rights and interests of students.					
9	Administrators pay attention to the quantitative relationship between graduates' the level of skill, industry choice and income growth, so as to establish a database of graduates' income.					
10	Administrators encourage graduates to serve less developed agricultural counties in Guangxi to narrow the geographic location income gap by formulating special policies (such as regional employment subsidies).					
11	Administrators pay attention to enhancing the wages bargaining power of graduates and guide students to acquire composite skills through career planning courses.					

Structured Interview

Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

This Structured Interview is divided into two parts:

Part 1: Personal Information

Part 2: Suggestion for improving the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

Part 1: Personal Information

1. Interviewee:
2 .Interview Date:
3 .Interview Time:
4. Gender:
5. Education background:
6. Academic title:
7. Workplace:
8. Work experience:

Part 2: Suggestion for improving the current situation of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

Instruction: please provide your opinion on the following statement

1. How can we enrich and facilitate the learning paths of agricultural students and enhance their knowledge acquisition during their studies? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' acquisition of knowledge?

2. How can we enhance the integration of agriculture with other disciplines in professional teaching and solve practical agricultural problems through multi-disciplinary collaboration? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' knowledge coupling ability?

3. How can we enhance the practical abilities of agricultural students and promote their transformation of knowledge into productivity? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' ability to apply knowledge?

4. How can the curriculum of agricultural majors be adjusted in accordance with market demands to enhance students' employment competitiveness? In addition, what other suggestions do you have for higher vocational colleges in terms of improving the employment rate of agricultural students?

5. How can agricultural vocational education receive sufficient financial, institutional and incentive support? What policy gaps still need to be filled? Furthermore, what suggestions do you have on how to formulate policies to support the sustainable development and innovation of agricultural vocational education?

6. How can we increase the income level of agricultural students during their study period and after graduation, establish a sustainable development income mechanism, and ensure the stable development of agricultural vocational education? Furthermore, what suggestions do you have on what measures can effectively reduce the start-up costs for students?

Interview content

Question 1: How can we enrich and facilitate the learning paths of agricultural students and enhance their knowledge acquisition during their studies? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' acquisition of knowledge?

Interviewee 1: I think the first thing to establish agricultural technology online course resource, now network so developed, students can undertake independent learning anytime and anywhere, not limited by time and space, which can greatly improve their learning efficiency and knowledge acquisition. In addition, it is also important to increase the purchase of books, periodicals and databases on agricultural science and technology, and update the resources regularly to enable students to have access to the latest agricultural knowledge and technologies. For higher vocational colleges, I think they can enhance practical teaching cooperation with enterprises, providing students with more opportunities to participate in actual projects and learn through practice.

Interviewee 2: To enrich and facilitate agricultural students study way, developing intelligent agriculture education resource management platform is a good idea. This platform can integrate data resources from industries, academia, research institutions and the government, providing students with comprehensive and systematic learning materials, enabling them to acquire the necessary knowledge in one stop. Also, it is necessary to collaborate with leading enterprises to develop courses. These enterprises have advanced technical standards and the latest research achievements. Integrating these into the courses can enable students to acquire more practical knowledge. Higher vocational colleges can also encourage students to form study groups to jointly discuss the problems encountered in their studies and promote knowledge exchange.

Interviewee 3: It is very effective to enhance the knowledge acquisition of agricultural students by inviting experts and scholars in the agricultural field to conduct professional training. Experts and scholars have rich experience and profound academic attainments. Their training can broaden the horizons of teachers and students and enable students to come into contact with more cutting-edge knowledge. In addition, organizing students to participate in agricultural innovation competitions is also very meaningful. This can stimulate their enthusiasm for active learning and cultivate their innovative and practical abilities. In terms of teaching staff, higher vocational colleges can regularly organize teachers to hold teaching discussions, share teaching experiences and improve teaching quality.

Interviewee 4: Enriching the learning channels for agricultural students and supporting teachers to participate in domestic and international agricultural technology training are key links. Teachers are disseminators of knowledge. After participating in training, they can enhance the advancement of teaching content and impart the latest knowledge and technologies to students. At the same time, it is also very important to develop an agricultural technology learning APP. Students can obtain knowledge anytime and anywhere through their mobile phones and make full use of fragmented time. Higher vocational colleges can also establish a learning feedback mechanism to promptly understand students' learning needs and difficulties and adjust teaching strategies.

Interviewee 5: To facilitate the learning of agricultural students, the establishment of an online course resource library for agricultural technology and the development of an agricultural technology learning APP can be combined. The online course resource library offers a systematic range of courses, while the learning APP enables students to review and consolidate knowledge at any time conveniently. Moreover, increasing the purchase of books, periodicals and databases on agricultural science and technology can provide students with more learning reference materials. Higher vocational colleges can carry out agricultural science popularization activities and invite students to participate, increasing their interest and understanding of agriculture.

Interviewee 6: Enriching students' access to knowledge, collaborating with leading enterprises to develop courses and inviting experts and scholars for training are mutually reinforcing. Enterprise courses enable students to understand practical applications, while expert training enhances students' cognition from a theoretical perspective. In addition, organizing students to participate in agricultural innovation competitions can cultivate their teamwork spirit and problem-solving abilities. Higher

vocational colleges can strengthen campus culture construction, create a good learning atmosphere and encourage students to study actively.

Interviewee 7: Enhancing the knowledge acquisition of agricultural students, developing an "intelligent agricultural education" resource management platform and establishing an online course resource library for agricultural technology can provide students with diverse learning channels. The resource management platform integrates resources from all sides, and the online course resource library provides self-study space. Supporting teachers to participate in training can ensure that the teaching content keeps pace with The Times. Higher vocational colleges can establish a learning incentive mechanism to reward students with excellent academic performance and innovative achievements, thereby stimulating their motivation to learn.

Interviewee 8: Facilitating the learning of students majoring in agriculture, developing an agricultural technology learning APP and increasing the purchase of agricultural books, periodicals and databases are both very practical. The APP makes it convenient for students to study at any time, and the book and periodical database provides deep learning materials. Collaborating with leading enterprises to develop courses enables students to be exposed to the cutting-edge technologies in the industry. Higher vocational colleges can carry out agricultural internship activities, allowing students to conduct on-site internships in enterprises or farms to enhance their practical abilities.

Interviewee 9: Enriching students' knowledge acquisition, inviting experts and scholars in the agricultural field for training and organizing students to participate in agricultural innovation competitions are very good ways. Expert training can impart professional knowledge and experience, while innovation competitions can enhance students' practical abilities. Establishing an online course resource library for agricultural technology and developing a learning APP can meet students' learning needs in different scenarios. Higher vocational colleges can enhance exchanges and cooperation with other higher vocational colleges and share high-quality teaching resources.

Interviewee 10: It is very important to enhance the learning channels for agricultural students, develop an "intelligent agricultural education" resource management platform and support teachers in participating in domestic and international training. The resource management platform integrates resources, and teacher training enhances teaching standards. Increasing the purchase of agricultural science and technology books, periodicals and databases can enrich students'

learning materials. Higher vocational colleges can hold agricultural academic lectures, inviting domestic and foreign experts to share the latest research results and broaden students' horizons.

Interviewee 11: To facilitate the learning of students majoring in agriculture, developing an agricultural technology learning APP and collaborating with leading enterprises to develop courses are good choices. The APP is convenient and fast, and the enterprise courses are highly practical. Organizing students to participate in agricultural innovation competitions can stimulate their innovative thinking. Establishing an online course resource library for agricultural technology can provide students with systematic learning content. Higher vocational colleges can establish student learning files, track students' learning situations and provide personalized learning suggestions.

Interviewee 12: Enriching students' knowledge acquisition, inviting experts and scholars for training, and increasing the purchase of agricultural books, periodicals and databases can enhance students' learning quality. Expert training brings new perspectives, while books and periodicals provide knowledge support. The development of an "intelligent agricultural education" resource management platform and support for teachers to participate in training can optimize teaching resources. Higher vocational colleges can organize agricultural club activities, allowing students to exchange and learn in the clubs and make progress together.

Question 2: How can we enhance the integration of agriculture with other disciplines in professional teaching and solve practical agricultural problems through multi-disciplinary collaboration? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' knowledge coupling ability?

Interviewee 1: To enhance the integration of agriculture with other disciplines in professional teaching and solve practical agricultural problems through multi-disciplinary collaboration, it is first necessary to integrate agricultural technology with information technology, management and other disciplines, and offer interdisciplinary courses. This can break down disciplinary barriers, allowing students to understand agricultural issues from different perspectives and laying a foundation for subsequent multi-disciplinary collaboration. For instance, integrating Internet of Things (IoT) technology into agricultural courses enables students to understand how to utilize information technology to achieve intelligent management of agricultural production. It is also crucial to organize students to participate in agricultural technology innovation projects. In these projects, they will naturally apply knowledge from

multiple fields, promoting knowledge integration. For higher vocational colleges, I suggest establishing an interdisciplinary teaching evaluation mechanism to assess students' learning outcomes from the perspective of comprehensive application of multiple disciplines and encourage them to enhance their ability to integrate knowledge.

Interviewee 2: It is a good approach to encourage teachers and students to form interdisciplinary teams to solve practical agricultural problems through multi-disciplinary collaboration. Teachers and students come from different disciplinary backgrounds and work together to solve practical agricultural problems. They can give full play to their respective advantages and achieve complementary and integrated knowledge. When addressing the issue of preserving agricultural products, teachers and students majoring in agriculture offer knowledge about planting and the characteristics of agricultural products, those majoring in information technology provide technical solutions for cold chain monitoring, and those majoring in management consider costs and operation models. It is also necessary to cooperate with enterprises to establish industrial colleges, which can promote the integration of agricultural technology, management and business knowledge, and enable students to be exposed to the multi-disciplinary demands in the actual industry. Higher vocational colleges can also carry out interdisciplinary project competitions to stimulate students' enthusiasm for innovation and collaboration.

Interviewee 3: Cooperating with enterprises to carry out agricultural technology research projects is an effective way to promote the combination of theory and practice and strengthen the integration of disciplines. Enterprises have practical agricultural problems, while universities have multi-disciplinary theoretical knowledge. The cooperation between the two sides can enable students to learn to apply multi-disciplinary knowledge in the process of solving practical problems. It is also very important to hold regular agricultural technology integration practice seminars. Students can share their practical experiences at the seminars, learn from others' methods and enhance their collaborative abilities. Higher vocational colleges can invite enterprise experts from different disciplines to give lectures on campus to broaden students' horizons and enable them to understand the application of different disciplines in the agricultural field.

Interviewee 4: Offering interdisciplinary courses is the foundation for strengthening the integration of agriculture with other disciplines. Through curriculum design, agricultural technology is organically integrated with knowledge from information technology, management and other disciplines, enabling students to

gradually establish multi-disciplinary thinking during the learning process. Assigning academic and industry mentors to guide students can promote the integration of multi-dimensional knowledge. Academic mentors provide theoretical guidance, while industry mentors bring practical experience. The combination of the two enables students to better apply their knowledge to practice. Higher vocational colleges can establish interdisciplinary teaching resource libraries, integrating textbooks, cases, videos and other materials from different disciplines to facilitate students' learning.

Interviewee 5: Organizing students to participate in agricultural technology innovation projects is a good way to exercise their multi-disciplinary collaboration ability. In the project, students need to comprehensively apply the knowledge they have learned, cooperate with classmates from different majors, and jointly solve difficult problems. Establishing industrial colleges in collaboration with enterprises can provide students with a more authentic industrial environment, allowing them to learn the integration of agricultural technology, management and business knowledge in practice. In addition, higher vocational colleges can encourage students to participate in interdisciplinary social practice activities, such as agricultural research and science and technology going to the countryside, to enhance their sense of social responsibility and knowledge application ability.

Interviewee 6: Encouraging teachers and students to form interdisciplinary teams to solve practical agricultural problems can cultivate students' teamwork spirit and innovation ability. In a team, students can learn knowledge and methods from different disciplines and broaden their ways of thinking. Collaborating with enterprises to carry out agricultural technology research projects enables students to be exposed to cutting-edge issues in the industry, enhancing their practical abilities and knowledge coupling capabilities. Higher vocational colleges can establish interdisciplinary laboratories, equipped with advanced facilities and software, to provide conditions for teachers and students to conduct interdisciplinary research.

Interviewee 7: Integrating agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses is an important measure to cultivate students' multi-disciplinary knowledge system. The course should focus on practical links, allowing students to experience the application of knowledge from different disciplines through actual operations. Regularly holding agricultural technology integration practice seminars can provide students with a platform for communication and learning, promoting the collision of ideas and knowledge sharing among them. Higher vocational colleges can enhance cooperation and exchanges with foreign universities and introduce advanced interdisciplinary

teaching models and experiences from abroad.

Interviewee 8: Establishing industrial colleges in cooperation with enterprises is an effective model for strengthening the integration of agriculture with other disciplines. Industrial colleges can set up courses based on the demands of enterprises, organically integrating agricultural technology, management and business knowledge to cultivate talents that meet market needs. Assigning academic and industry mentors to guide students can enable them to receive comprehensive guidance in both theoretical learning and practical operation. Higher vocational colleges can establish interdisciplinary learning files for students, recording their performance in different subject courses and practices, and providing a basis for personalized cultivation.

Interviewee 9: Organizing students to participate in agricultural technology innovation projects can stimulate their interest in learning and innovative spirit. In the project, students need to apply knowledge from multiple disciplines to solve problems, which helps to enhance their ability to coupling knowledge. Collaborating with enterprises to carry out agricultural technology research projects enables students to be exposed to complex issues in the actual industry and exercise their comprehensive abilities. Higher vocational colleges can carry out interdisciplinary campus cultural activities, such as science and technology festivals and cultural festivals, to create an atmosphere of multi-disciplinary integration.

Interviewee 10: When offering interdisciplinary courses, it is important to focus on the systematicness and practicality of the course content, and organically connect agricultural technology with knowledge from other disciplines. Encourage students to participate in interdisciplinary team projects, allowing them to learn to collaborate with people from different majors in practice. Establishing an on-campus agricultural technology experience and exchange forum can promote interactive learning between teachers and students. Students can share their learning experiences and practical knowledge on the forum, and teachers can offer guidance and feedback. Higher vocational colleges can enhance interdisciplinary training for teachers and improve their interdisciplinary teaching abilities.

Interviewee 11: Establishing industrial colleges in cooperation with enterprises can effectively connect the education chain, talent chain with the industrial chain and innovation chain. The industrial college can provide students with a multi-disciplinary integrated learning and practical environment, cultivating their comprehensive qualities. Collaborating with enterprises to carry out agricultural technology research projects enables students to participate in actual scientific

research projects, enhancing their research capabilities and knowledge application skills. Higher vocational colleges can establish interdisciplinary innovation and entrepreneurship incubation bases and encourage students to carry out interdisciplinary innovation and entrepreneurship projects.

Interviewee 12: The integration of agricultural technology with information technology, management and other disciplines is an inevitable trend in agricultural development. Offering interdisciplinary courses can lay a solid multi-disciplinary foundation for students. Organizing students to participate in agricultural technology innovation projects and collaborate with enterprises on research topics can enable students to exercise their multi-disciplinary collaboration abilities in practice. Establishing an on-campus agricultural technology experience and exchange forum can promote the exchange of ideas and knowledge sharing among teachers and students. Higher vocational colleges can enhance career planning guidance for students and encourage them to choose interdisciplinary development directions based on their own interests and strengths.

Question 3: How can we enhance the practical abilities of agricultural students and promote their transformation of knowledge into productivity? In addition, what other suggestions do you have for higher vocational colleges in enhancing students' ability to apply knowledge?

Interviewee 1: To enhance the practical abilities of agricultural students and promote their transformation of knowledge into productive forces, expanding modern agricultural technology training centers is a crucial step. By simulating real production environments, students can familiarize themselves with the scenarios and processes in actual work in advance, reducing the adaptation period from theory to practice. Just like simulating a planting scene in a greenhouse, students can directly experience the impact of environmental factors such as temperature and humidity on the growth of crops. It is also necessary to incorporate agricultural technical skills certificates into the curriculum. This not only enhances students' employability but also enables them to master practical skills more purposefully during the learning process. For higher vocational colleges, I suggest establishing a long-term mechanism for enterprise internships, so that students have more opportunities to go deep into the front line of enterprises and accumulate real work experience.

Interviewee 2: Involving students in enterprise technological improvement projects is an effective way to enhance their practical abilities. In actual projects, students need to apply the knowledge they have learned to solve the problems

faced by enterprises, which can greatly exercise their practical ability and innovative thinking. For instance, when participating in the process improvement projects of agricultural product processing enterprises, students need to comprehensively consider multiple factors such as the characteristics of raw materials, processing techniques, and cost control. Encouraging students to apply for agricultural technology patents and supporting the promotion and application of achievements can stimulate their innovative enthusiasm and enable them to see the value of knowledge. Higher vocational colleges can enhance cooperation with agricultural research institutions to provide students with more research resources and practical opportunities.

Interviewee 3: Regularly holding agricultural technology operation competitions is a good way to test students' application abilities. Competitions can create a tense competitive atmosphere, encourage students to fully exert their abilities, and at the same time enable them to discover their own shortcomings. During the competition, students need to apply the knowledge they have learned quickly and accurately in their operations, which is a good exercise for their ability to apply knowledge and psychological quality. Involving enterprise technicians in the design of training courses can ensure that the course content closely aligns with industry demands, making the knowledge and skills students acquire more practical. Higher vocational colleges can establish platforms for showcasing students' practical achievements to encourage them to actively participate in practical activities.

Interviewee 4: Expanding the modern agricultural technology training center to provide students with a realistic practical environment is the foundation for enhancing their practical abilities. In the training center, students can carry out various agricultural technical operations, such as driving agricultural machinery and controlling pests and diseases, to enhance their practical skills and operational proficiency. Incorporating agricultural technical skills certificates into the curriculum can help students clarify their learning goals and improve their skill levels in a targeted manner. Moreover, certificates are also a proof of students' abilities and give them more advantages in the job market. For higher vocational colleges, I suggest launching school-enterprise cooperation order classes, customizing talent cultivation plans based on the demands of enterprises, and enhancing the employment matching rate of students.

Interviewee 5: Involving students in enterprise technology improvement projects can enable them to accumulate valuable practical experience in actual work. The problems faced by enterprises are often complex and diverse. In the

process of solving these problems, students need to comprehensively apply knowledge from multiple disciplines, which helps to enhance their ability to integrate knowledge and solve practical problems. Encouraging students to apply for agricultural technology patents can cultivate their innovative consciousness and awareness of intellectual property protection. Higher vocational colleges can invite enterprise experts to give lectures on campus, sharing the latest industry trends and technological development directions to broaden students' horizons.

Interviewee 6: Regularly holding agricultural technology operation competitions can stimulate students' enthusiasm for learning and competitive awareness. In the competition, students can learn from each other, communicate with each other and improve together. Meanwhile, competitions can also enable teachers to understand students' learning situations and existing problems, so as to adjust teaching strategies accordingly. Involving enterprise technicians in the design of training courses can make the courses more in line with the actual needs of the industry and enhance the pertinence and practicality of teaching. Higher vocational colleges can establish a practical teaching evaluation system to conduct a comprehensive and objective assessment of students' practical abilities and knowledge application capabilities.

Interviewee 7: Expanding the modern agricultural technology training center and simulating the real production environment can enable students to experience the entire process of agricultural production as if they were there. This immersive learning experience can deepen students' understanding and memory of knowledge and enhance their practical operation skills. Incorporating agricultural technical skills certificates into the curriculum can guide students to focus on the cultivation of practical skills and enhance their employment competitiveness. For higher vocational colleges, I suggest strengthening the cooperation with agricultural enterprises in terms of industry-university-research collaboration, jointly carrying out scientific research projects and technological breakthroughs, and providing students with more practical and innovative platforms.

Interviewee 8: Involving students in enterprise technological improvement projects is an important way to promote their transformation of knowledge into productivity. In the project, students can come into contact with the advanced technologies and management experiences of enterprises, and at the same time apply the knowledge they have learned to practice, creating value for enterprises. Encouraging students to apply for agricultural technology patents and supporting the promotion of their achievements can enable them to feel the sense of

accomplishment from innovation and stimulate their innovative drive. Higher vocational colleges can carry out international exchanges and cooperation, introduce advanced agricultural technology education concepts and methods from abroad, and enhance students' international vision and competitiveness.

Interviewee 9: Regularly holding agricultural technology operation competitions can provide students with a stage to showcase their practical abilities. Through competitions, students can discover their strengths and weaknesses and clarify the direction of their efforts. Involving enterprise technicians in the design of training courses can make the courses more in line with the actual situation of the industry and enable students to acquire truly useful knowledge and skills. Higher vocational colleges can establish practical teaching bases, which can be jointly built and shared with enterprises to provide students with stable practical venues and abundant practical resources.

Interviewee 10: Expanding the modern agricultural technology training center and creating favorable practical conditions for students is the key to enhancing their practical abilities. In the training center, students can carry out repeated practical operations to enhance the proficiency and accuracy of their skills. Incorporating agricultural technical skills certificates into the curriculum can help students clarify their learning goals and conduct targeted learning and training. For higher vocational colleges, I suggest strengthening the construction of the teaching staff, encouraging teachers to take up positions in enterprises for on-the-job training, and enhancing their practical teaching abilities.

Interviewee 11: Involving students in enterprise technology improvement projects can cultivate their teamwork spirit and ability to solve practical problems. In the project, students need to collaborate with people from different majors and backgrounds to jointly complete the project tasks. Encouraging students to apply for agricultural technology patents can enhance their awareness of innovation and intellectual property protection. Higher vocational colleges can carry out agricultural technology entrepreneurship education to cultivate students' entrepreneurial spirit and ability, providing more choices for their future career development.

Interviewee 12: Regularly holding agricultural technology operation competitions can create a good learning atmosphere and stimulate students' enthusiasm and initiative in learning. In the competition, students can exercise their adaptability and psychological quality. Involving enterprise technicians in the design of training courses can make the courses more practical and forward-looking. Higher vocational colleges can establish student practice files to record students' practical

experiences and achievements, providing strong support for students' employment and further education.

Question 4: How can the curriculum of agricultural majors be adjusted in accordance with market demands to enhance students' employment competitiveness? In addition, what other suggestions do you have for higher vocational colleges in terms of improving the employment rate of agricultural students?

Interviewee 1: To adjust the curriculum of agricultural majors in accordance with market demands, the first step is to act based on the needs of the agricultural industry in Guangxi. The agricultural industry in Guangxi has its uniqueness. For instance, the development of intelligent agriculture is booming. Adding related majors, such as intelligent agricultural equipment technology and agricultural Internet of Things technology, can make what students learn more in line with the local industrial reality. Regular visits to agricultural enterprises are a crucial step. Through in-depth communication with the enterprises and analysis of the shortage of technical talents, we can clearly understand what kind of talents the enterprises actually need, and then adjust the teaching plan accordingly to ensure that the knowledge students learn is truly applicable to the enterprises. To enhance the employment rate, higher vocational colleges can also establish a long-term mechanism for employment assistance, providing one-on-one guidance to students facing employment difficulties and helping them improve their employment skills and confidence.

Interviewee 2: Cooperating with enterprises to set up "order classes" is an effective way to adjust the curriculum to enhance students' employment competitiveness. Order classes can cultivate talents according to the specific needs of enterprises. In terms of curriculum design, enterprise experts can be invited to participate, and actual projects and cases of enterprises can be integrated into teaching, allowing students to become familiar with the work processes and requirements of enterprises during the learning process. It is also indispensable to integrate the standards of agricultural vocational qualifications into the course content. This can ensure that the teaching content is closely matched with the job requirements, and students can directly start working with certificates after graduation, increasing their employment advantages. Higher vocational colleges can also enhance their cooperation with agricultural industry associations, obtain more industry trends and talent demand information through the associations, and provide more accurate references for curriculum design.

Interviewee 3: Tracking the employment situation of graduates is of vital importance for optimizing the talent cultivation model. By understanding the performance of graduates in the job market, we can identify problems in the curriculum design, such as which courses are not very practical and which skills students have insufficient mastery, and then make targeted improvements. Offering agricultural career development courses can help students clarify the direction of technical positions, enabling them to have a clear career plan during their study period and thus study more purposefully. In addition, higher vocational colleges can encourage students to participate in various agricultural skills competitions, enhancing their practical and innovative abilities through these competitions and strengthening their competitiveness in the job market.

Interviewee 4: Adjusting the curriculum based on the demands of Guangxi's agricultural industry is the foundation. We need to deeply study the development trends of Guangxi's agricultural industry. Besides intelligent agriculture, we can also focus on areas such as processing of characteristic agricultural products and ecological agriculture, and set up relevant professional courses to cultivate professionals that meet the industry's demands. Regular visits to agricultural enterprises can not only analyze the shortage of talents but also understand the new technologies and new processes of enterprises, and timely introduce these contents into teaching to keep the courses up-to-date. Higher vocational colleges can also establish on-campus agricultural training bases to simulate the real production environment of enterprises, allowing students to consolidate their knowledge in practice and improve their hands-on abilities.

Interviewee 5: Cooperating with enterprises to hold professional job fairs is an important way to promote high-quality employment for students. Job fairs enable students to have direct face-to-face communication with enterprises, understand their recruitment needs and job requirements, and at the same time, enterprises can also select suitable talents on the spot. Emphasizing the cultivation of students' comprehensive abilities in agricultural technology, management and marketing is the key to meeting the demands of different positions. In terms of curriculum design, it is necessary to break down disciplinary boundaries and organically integrate technical, management and marketing knowledge to cultivate students into versatile talents. Higher vocational colleges can also carry out entrepreneurship education, encourage students to start their own businesses, and inject new vitality into the development of the agricultural industry.

Interviewee 6: Integrating the standards of agricultural vocational qualifications into the course content is an important measure to achieve seamless connection between teaching and positions. We need to sort out and optimize the existing courses in accordance with the professional qualification standards to ensure that students possess the corresponding professional abilities after graduation. Tracking the employment situation of graduates can form a feedback loop. Based on the feedback, the curriculum setting and teaching methods can be adjusted in a timely manner to improve the quality of talent cultivation. Higher vocational colleges can also enhance exchanges and cooperation with foreign agricultural colleges, introduce advanced teaching concepts and curriculum systems from abroad, and improve students' international vision and competitiveness.

Interviewee 7: When adjusting the curriculum based on market demand, the actual needs of agricultural enterprises should be fully considered. Regularly visit enterprises, establish talent demand files for enterprises, and precisely adjust teaching plans based on the data in the files to ensure that the course Settings are in line with the demands of enterprises. Setting up "order classes" can achieve customized talent cultivation. Enterprises can participate in the teaching process, and students can directly enter enterprises to work after graduation, enhancing the pertinence and stability of employment. Higher vocational colleges can also establish employment information platforms to promptly release job recruitment information from enterprises and job-seeking information from students, promoting effective connections between supply and demand sides.

Interviewee 8: Offering agricultural career development courses can help students establish correct career concepts and clarify their career development directions. In the course, enterprise executives and industry experts can be invited to give lectures, sharing their professional experiences and industry development trends, so that students can understand the requirements and development prospects of different positions. Emphasizing the cultivation of students' comprehensive abilities is the core to enhancing their employment competitiveness. Besides technical and marketing management skills, it is also necessary to cultivate students' communication and collaboration abilities as well as their innovation capabilities. Higher vocational colleges can organize students to participate in social practice activities, such as agricultural research and science and technology going to the countryside, allowing students to exercise their comprehensive abilities in practice.

Interviewee 9: To add new majors in accordance with the demands of Guangxi's agricultural industry, it is necessary to combine the local resource advantages and industrial characteristics. For instance, Guangxi has a well-developed fruit cultivation and aquaculture industry. It can offer related refined management majors to cultivate professional talents. Regular visits to enterprises should become a regular mechanism. It is not only necessary to understand the shortage of talents, but also to pay attention to the culture and management model of the enterprises, and integrate these elements into teaching to cultivate students' professional qualities. Higher vocational colleges can establish alumni networks and provide students with more internship and employment opportunities through alumni resources.

Interviewee 10: When cooperating with enterprises to set up "order classes", the course design should highlight the characteristics and demands of the enterprises. We can tailor a curriculum system for enterprises, add enterprise-exclusive courses and practical projects, and enable students to gain a deep understanding of the operation mode and technical requirements of enterprises. To integrate the standards of agricultural vocational qualifications into the curriculum, a sound assessment mechanism should be established to ensure that students truly master the relevant skills and knowledge. Higher vocational colleges can adopt a teaching model that combines online instruction with offline practice, making use of Internet resources to expand students' learning channels and enhance their learning outcomes.

Interviewee 11: To track the employment situation of graduates, a long-term tracking mechanism should be established. Not only should the initial employment situation of graduates be paid attention to, but also their career development trajectories. By analyzing the career development data of graduates, it provides a basis for curriculum design and teaching reform. When offering courses on agricultural career development, it is important to focus on the practicality and pertinence of the courses. Methods such as case teaching and simulation exercises should be adopted to enable students to enhance their professional abilities through practical operations. Higher vocational colleges can enhance cooperation with agricultural research institutions, transform research achievements into teaching resources, and improve students' innovation ability and scientific and technological level.

Interviewee 12: Emphasis should be placed on cultivating students' comprehensive abilities in agricultural technology, management and marketing, and systematic planning should be carried out in the curriculum design. Interdisciplinary comprehensive courses can be offered to integrate technical, management and marketing knowledge for teaching. When cooperating with enterprises to hold

professional job fairs, it is necessary to communicate with the enterprises in advance, understand their recruitment needs and standards, and provide targeted employment guidance for students. Higher vocational colleges can establish an employment mentor system, assigning each student a professional employment mentor to guide them throughout their employment journey from enrollment to graduation, thereby enhancing their employment success rate.

Question 5: How can agricultural vocational education receive sufficient financial, institutional and incentive support? What policy gaps still need to be filled? Furthermore, what suggestions do you have on how to formulate policies to support the sustainable development and innovation of agricultural vocational education?

Interviewee 1: To ensure that agricultural vocational education receives sufficient financial support, applying for special funds for agricultural technical education is a crucial step. Special funds can be invested in training equipment and faculty development, such as purchasing advanced intelligent agricultural machinery simulation operation equipment and inviting senior experts in the industry to give lectures at schools. This can directly enhance the quality of education. At present, there is still a gap in the sustainability of fiscal input in policies. It cannot merely provide one-time financial support; a long-term fiscal input mechanism needs to be established. To support sustainable development and innovation, I suggest establishing a special subsidy for innovation in agricultural vocational education, providing financial rewards to institutions that carry out teaching reforms of new agricultural technologies, and stimulating their enthusiasm for innovation.

Interviewee 2: Cooperating with local governments to incorporate higher vocational education into the rural revitalization policy system can provide institutional guarantees for agricultural vocational education. Local governments have the power to allocate resources in rural revitalization. After being incorporated into the system, vocational education can enjoy more conveniences in land use, project approval and other aspects. However, at present, the policy is not clear enough in the details of cooperation between local authorities and educational institutions. For instance, the rights and obligations of both sides have not been clearly defined. In terms of sustainable development and innovation, policies can be formulated to encourage universities and research institutions to jointly carry out scientific research and technological breakthroughs in agriculture. Policy preferences and financial support should be given to those that achieve significant results.

Interviewee 3: Providing scientific research rewards and credit recognition for teachers and students involved in agricultural technology research and development is a very good incentive measure. Rewards can stimulate the enthusiasm of teachers and students for scientific research, while credit recognition helps them build a good reputation in the industry and lay a foundation for their future career development. However, the current policies still need to be strengthened in terms of the intensity and scope of rewards. For instance, appropriate rewards should also be given to some small-scale and promising scientific research achievements. To support sustainable development and innovation, it is suggested that policies be introduced to encourage institutions of higher learning to engage in international exchanges and cooperation, introduce advanced agricultural technologies and educational concepts from abroad, and enhance the internationalization level of agricultural vocational education in our country.

Interviewee 4: Encouraging vocational schools to quickly establish cooperative projects with enterprises through internal policies can enable students to be exposed to the actual production environment, enhancing their practical abilities and employment competitiveness. Enterprises have actual production demands and technical challenges, while schools have talents and scientific research resources. Cooperation between the two sides can achieve mutual benefit and win-win results. However, there is a gap in the supervision and evaluation of cooperative projects in the policy, which easily leads to the problem that cooperation becomes a mere formality. For sustainable development and innovation, policies can be formulated to support institutions in carrying out digital transformation of agricultural vocational education, using modern information technology to improve teaching methods and means, and enhance teaching efficiency and quality.

Interviewee 5: The implementation of the credit bank system and the recognition of students' learning achievements through various channels reflect the flexibility and openness of education. Students can earn credits by participating in online courses, social practices, skills training and other means, enriching their learning channels. However, at present, the standards for credit recognition in policies are not yet unified enough, and there are difficulties in mutual recognition of credits among different colleges and institutions. In terms of supporting sustainable development and innovation, it is suggested that policies be introduced to encourage colleges and universities to carry out the construction of characteristic agricultural vocational education specialties, give key support to specialties with local characteristics and industry advantages, and create a number of brand specialties.

Interviewee 6: Establishing an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technology can provide financial guarantees for the innovation of agricultural technology. Teachers and students can explore new agricultural technologies and methods during the research process, promoting the development of the agricultural industry. However, the policy can still be further optimized in the application and usage process of the innovation fund to enhance the efficiency of fund utilization. To promote sustainable development and innovation, policies can be formulated to encourage colleges and universities to carry out the integrated construction of industry university research application in agricultural vocational education, strengthen in-depth cooperation between colleges and universities and enterprises as well as research institutions, and achieve rapid transformation and application of scientific research achievements.

Interviewee 7: Expanding the scale of targeted enrollment for agricultural technicians in towns and townships and adding targeted majors such as "Intelligent Agricultural Machinery Application" can cultivate more professional agricultural technical talents for towns and townships. These talents can directly return to work in towns and townships after graduation and serve the local agricultural development. However, the current policies are still not perfect in terms of employment guarantee and career development for students recruited through targeted enrollment. It is necessary to ensure that students have stable jobs and good development space after graduation. In terms of supporting sustainable development and innovation, it is suggested that policies be introduced to encourage institutions of higher learning to build a teaching staff for agricultural vocational education, enhance teachers' practical teaching abilities and innovation levels, and cultivate a high-quality teaching staff.

Interviewee 8: Optimizing the evaluation system and incorporating the effect of agricultural technology promotion into the performance assessment of teachers can guide teachers to pay more attention to practical teaching and the promotion of agricultural technology. Teachers will be more proactive in cooperating with enterprises during the teaching process to impart the latest agricultural technologies to students. However, the policy's setting of evaluation indicators is still not scientific and reasonable enough to fully reflect the work performance of teachers. For sustainable development and innovation, policies can be formulated to encourage institutions of higher learning to carry out curriculum reforms in agricultural vocational education, develop targeted and practical course materials, and improve the quality of course teaching.

Interviewee 9: Combining technology assistant services with graduation projects and encouraging students to participate in grassroots agricultural technology promotion projects can enable students to exercise their abilities in practice and also contribute to the promotion of grassroots agricultural technology. Students can understand the actual needs of grassroots agriculture and improve their ability to solve practical problems in the project. However, at present, the policies in terms of project support and guarantee are still not in place, such as insufficient project funds and a shortage of instructors. In terms of supporting sustainable development and innovation, it is suggested that policies be introduced to encourage institutions of higher learning to carry out international cooperation and exchange programs in agricultural vocational education, providing students with more international exchange opportunities and broadening their international horizons.

Interviewee 10: From the perspective of financial support, applying for special funds and establishing agricultural innovation funds are important measures. However, the channels for financial input can be further broadened. For instance, social capital can be encouraged to participate in agricultural vocational education, and financial support can be provided for vocational education through the establishment of education funds and donations. In terms of systems, measures such as cooperation with local governments and optimization of the evaluation system can help improve the management and supervision mechanisms of vocational education. However, it is still necessary to enhance the coordination and systematicness of policies to avoid conflicts and contradictions among policies. For sustainable development and innovation, it is suggested that policies be formulated to encourage colleges and universities to carry out innovation and entrepreneurship education in agricultural vocational education, cultivate students' innovative spirit and entrepreneurial ability, and cultivate more innovative and entrepreneurial talents for the agricultural industry.

Interviewee 11: In terms of incentives and support, measures such as rewarding and recognizing scientific research for teachers and students, and expanding targeted enrollment can stimulate the enthusiasm and initiative of teachers and students. However, a more complete incentive mechanism can also be established, such as setting up an outstanding contribution award for agricultural vocational education to give heavy rewards to individuals and teams that have made outstanding contributions in the field of agricultural vocational education. In terms of policy gaps, the current support for the informatization construction of agricultural vocational education is still insufficient. Relevant policies need to be introduced to encourage

colleges and universities to strengthen the construction of informatization infrastructure and improve the level of educational informatization. In terms of sustainable development and innovation, it is suggested that policies be formulated to encourage institutions of higher learning to deeply integrate agricultural vocational education with the rural revitalization strategy, adjust professional Settings and teaching contents in line with the demands of rural revitalization, and provide talent support for rural revitalization.

Interviewee 12: To ensure that agricultural vocational education receives sufficient support, it is necessary for policies in multiple aspects such as finance, systems and incentives to work in concert. At present, various measures have played a positive role to a certain extent, but there is still room for improvement in the precision and effectiveness of policies. For instance, in terms of financial input, differentiated investment should be made based on the actual conditions of different regions and institutions of higher learning. In terms of institutional construction, it is necessary to further improve relevant laws and regulations to safeguard the legitimate rights and interests of agricultural vocational education. For sustainable development and innovation, it is suggested that policies be introduced to encourage institutions of higher learning to build a lifelong learning system for agricultural vocational education, providing continuous learning and training opportunities for agricultural practitioners and promoting the sustainable development of agricultural vocational education.

Question 6: How can we increase the income level of agricultural students during their study period and after graduation, establish a sustainable development income mechanism, and ensure the stable development of agricultural vocational education? Furthermore, what suggestions do you have on what measures can effectively reduce the start-up costs for students?

Interviewee 1: To increase the income level of agricultural students, encouraging teachers and students to participate in agricultural technology research projects and sharing the achievements in proportion is an excellent approach. Students can accumulate practical experience during their participation in projects and directly benefit from the transformation of achievements, which will greatly stimulate their enthusiasm for learning. For establishing a sustainable development revenue mechanism, it is crucial to carry out social training services. Providing paid technical training for farmers and enterprises can not only leverage the technical advantages of schools but also create a stable source of income, ensuring the stable

development of vocational education. In terms of reducing the cost of students' entrepreneurship, establishing an agricultural technology entrepreneurship incubation base can provide venues and basic equipment, and cut down on the large initial expenses for venue rental and equipment purchase.

Interviewee 2: From the perspective of income security for students after graduation, it is very necessary to sign salary agreements with cooperative enterprises. This can ensure that students have reasonable incomes during their internships and employment stages, prevent enterprises from exploiting their labor force, and allow students to work with peace of mind and accumulate experience. By leveraging the technological advantages of institutions to operate demonstration farms or agricultural product processing projects, not only can practical opportunities and job opportunities be provided for students, but the profits from the projects can also be fed back to the school to support teaching and research, thus forming a virtuous cycle. To reduce the cost of starting a business, incubation bases can integrate resources, centrally purchase raw materials, and provide them to student entrepreneurial projects at the low price of bulk purchases, thereby lowering the cost of raw materials.

Interviewee 3: Increasing students' income during their school years and providing scholarships or training subsidies to those who obtain advanced vocational skills certificates is an effective measure. This can motivate students to strive to improve their skills and at the same time relieve their financial pressure. Forming agricultural technology consulting teams to provide paid technical services for local governments and enterprises can expand the income channels of schools and provide more financial support for agricultural vocational education. In terms of reducing the cost of starting a business, incubation bases can introduce professional financial and legal consulting services to provide guidance for students' entrepreneurial projects at a lower price or for free, avoiding additional expenses incurred by students due to unfamiliarity with the process.

Interviewee 4: Encouraging teachers and students to participate in agricultural technology research projects and share their achievements can enable students to come into contact with the cutting-edge technologies in the industry, enhance their own competitiveness, and lay a foundation for earning high incomes after graduation. Carrying out social training services can establish long-term cooperative relationships with surrounding rural areas and enterprises, form a stable customer base, and ensure continuous and stable income. To reduce the cost of students' entrepreneurship, agricultural technology entrepreneurship incubation bases can negotiate with

suppliers to secure longer payment terms, making it easier for students' entrepreneurial projects to handle capital turnover and reducing the costs caused by financial pressure.

Interviewee 5: Signing salary agreements with cooperative enterprises can safeguard students' rights and interests, enable them to clearly understand their earnings from labor, and enhance their confidence in their careers. By using demonstration farms or agricultural product processing projects, students can be involved in actual operations, cultivate their business thinking and practical abilities, increase the success rate of starting a business or finding employment after graduation, and thereby boost their income. In terms of reducing the cost of starting a business, incubation bases can build shared laboratories and testing platforms. Student entrepreneurial projects can use them as needed, avoiding the need to build separate laboratories for each project and saving a large amount of construction costs.

Interviewee 6: Offering rewards to students who obtain advanced vocational skills certificates can guide them to develop towards higher skills, making them more competitive in the job market and earning higher incomes after graduation. Establishing an agricultural technology consulting team can enhance the school's reputation within the industry, attract more enterprises and projects to cooperate, and increase revenue sources. To reduce the cost of students' entrepreneurship, agricultural technology entrepreneurship incubation bases can cooperate with logistics enterprises to secure favorable logistics prices for students' entrepreneurial projects and lower the transportation costs of products.

Interviewee 7: Encouraging teachers and students to participate in agricultural technology research projects and share their achievements can stimulate students' innovative spirit and cultivate their scientific research capabilities, which can be transformed into high-income capital after graduation. Carrying out social training services can develop diverse training courses based on the needs of farmers and enterprises at different levels, enhance the pertinence and appeal of training, and increase income. In terms of reducing the cost of starting a business, the incubation base can provide free office supplies and consumables, such as paper, pens, and folders, to cut down on the daily office expenses of students' entrepreneurial projects.

Interviewee 8: Signing salary agreements with cooperative enterprises can standardize the employment behavior of enterprises and ensure the basic income level of students. By making use of demonstration farms or agricultural product

processing projects, practical teaching and research activities can be carried out to enhance students' practical operation skills. After graduation, they can adapt to their jobs more quickly and earn higher incomes. To reduce the cost of students' entrepreneurship, agricultural technology entrepreneurship incubation bases can cooperate with financial institutions to provide low-interest loans or credit guarantees for students' entrepreneurial projects, solving the problem of insufficient funds for students' entrepreneurship and lowering financing costs.

Interviewee 9: Providing subsidies to students who obtain advanced vocational skills certificates can alleviate their financial burden, allowing them to focus more on their studies and skill improvement. After graduation, they can earn high incomes with their high skills. Establishing an agricultural technology consulting team can integrate the expert resources of the school, provide professional technical services for local governments and enterprises, and improve the economic benefits of the school. In terms of reducing the cost of starting a business, incubation bases can establish a shared talent pool. Student entrepreneurial projects can recruit temporary staff from the talent pool as needed, avoiding the cost pressure brought by long-term employment of employees.

Interviewee 10: Encouraging teachers and students to participate in agricultural technology research projects and share their achievements can enable students to get involved in actual technological research and development, accumulate valuable experience, and make it easier for them to obtain high-income jobs in related fields after graduation. Social training services can be carried out in cooperation with online education platforms to expand the coverage of training and increase training income. To reduce the cost of students' entrepreneurship, agricultural technology entrepreneurship incubation bases can offer free market research services, helping students' entrepreneurial projects understand market demands and competitive situations, and avoiding cost waste caused by blind investment.

Interviewee 11: Signing a salary agreement with a cooperative enterprise can ensure a stable income for students in the early stage of employment, allowing them to have no worries. By making use of demonstration farms or agricultural product processing projects, innovation and entrepreneurship education can be carried out to cultivate students' entrepreneurial awareness and capabilities, providing the possibility for them to start their own businesses and increase their income after graduation. In terms of reducing the cost of starting a business, incubation bases can negotiate with equipment suppliers to provide equipment for student entrepreneurial

projects through leasing or installment payment, thereby reducing the one-time investment in equipment purchase.

Interviewee 12: Offering rewards to students who obtain advanced vocational skills certificates can create a favorable learning atmosphere, encourage more students to enhance their skills, and after graduation, they can earn high incomes by leveraging their skill advantages. Establishing an agricultural technology consulting team can enhance the school's social service capabilities and bring more social resources and income to the school. To reduce the cost of students' entrepreneurship, agricultural technology entrepreneurship incubation bases can establish shared marketing channels. Student entrepreneurship projects can promote their products and services through these channels and lower marketing costs.

Evaluation Form

Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

Name: _____ Work place: _____.

Education background: _____ Professional title:_____.

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
	Knowledge acquisition ability	5	4	3	2	1	5	4	3	2	1
1	Establish an online course resource library for agricultural technology to facilitate students' self-study.										
2	Increase the purchase of agricultural science and technology books, periodicals and databases, and update resources regularly.										
3	Develop a "Smart Agricultural Education" resource management platform to integrate data resources from industry, academia, research and the government.										
4	Co-build courses with leading enterprises and introduce their technical standards and latest research achievements.										
5	Invite experts and scholars in the agricultural field to conduct specialized training to broaden the horizons of teachers and students.										
6	Organize students to participate in agricultural innovation competitions to stimulate their motivation for active learning.										
7	Support teachers in participating in domestic and international agricultural technology training to enhance the advancement of teaching content.										
8	Develop an agricultural technology learning APP to enable students to access knowledge anytime and anywhere.										

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
	Knowledge coupling ability	5	4	3	2	1	5	4	3	2	1
1	Integrate agricultural technology with information technology, management and other disciplines to offer interdisciplinary courses.										
2	Organize students to participate in agricultural technology innovation projects to promote the integration of knowledge from multiple fields.										
3	Encourage teachers and students to form cross-disciplinary teams to jointly solve practical agricultural problems.										
4	Jointly establish industry colleges with enterprises to promote the coupling of agricultural technology, management and business knowledge.										
5	Cooperate with enterprises to conduct agricultural technology research topics to promote the combination of theory and practice.										
6	Regularly hold agricultural technology integration practice workshops to enhance students' collaborative abilities.										
7	Assign academic and industry mentors to students to promote multi-dimensional knowledge coupling.										
8	Set up an on-campus agricultural technology experience exchange forum to facilitate interactive learning between teachers and students.										

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
Knowledge application ability		5	4	3	2	1	5	4	3	2	1
1	Expand the modern agricultural technology training center to simulate a real production environment.										
2	Incorporate agricultural technology skill certificates into the curriculum to enhance employment competitiveness.										
3	Allow students to participate in enterprise technology improvement projects to accumulate practical experience.										
4	Encourage students to apply for agricultural technology patents and support the promotion and application of their achievements.										
5	Regularly hold agricultural technology operation competitions to test students' application abilities.										
6	Involve enterprise technicians in the design of training courses to meet industry demands.										
7	Offer agricultural technology entrepreneurship courses to guide students in formulating business plans and putting them into practice.										

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
Demand for vocational and technical talents		5	4	3	2	1	5	4	3	2	1
1	Based on the demands of agricultural industries in Guangxi, additional agricultural-related majors such as smart agriculture will be added.										
2	Regular visits to agricultural enterprises will be conducted to analyze the shortage of technical talents and adjust the training plans.										
3	"Order-based classes" will be jointly established with enterprises to provide targeted agricultural technical talents.										
4	Agricultural vocational qualification standards will be integrated into the course content to ensure that teaching matches the positions.										
5	The employment situation of graduates will be tracked to optimize the talent cultivation model.										
6	Agricultural career development courses will be offered to help students clarify the direction of technical positions.										
7	Specialized job fairs will be held in collaboration with agricultural enterprises to promote high-quality employment for students.										
8	Comprehensive abilities in agricultural technology, management, and marketing will be emphasized for cultivation to meet the demands of various positions.										

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
Policy		5	4	3	2	1	5	4	3	2	1
1	Apply for special funds for agricultural technology education, which will be used for the construction of training equipment and teaching staff.										
2	Cooperate with local governments to incorporate higher vocational education into the policy system for rural revitalization.										
3	Provide scientific research rewards and credit recognition to teachers and students who participate in agricultural technology research and development.										
4	Introduce internal policies to encourage secondary colleges to quickly connect with enterprises for cooperation projects.										
5	Promote the credit bank system to recognize students' learning achievements obtained through various channels.										
6	Establish an agricultural innovation fund to support teachers and students in conducting applied research on agricultural technologies.										
7	Expand the scale of targeted recruitment for agricultural technicians in townships, and increase targeted majors such as "Intelligent Agricultural Machinery Application".										
8	Optimize the assessment and evaluation system, and incorporate the effectiveness of agricultural technology promotion into the performance evaluation indicators for teachers.										
9	Combine the services of science and technology assistants with graduation design, and encourage students to participate in grassroots agricultural technology promotion projects.										

No.	Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Suitability					Feasibility				
Income		5	4	3	2	1	5	4	3	2	1
1	Encourage teachers and students to participate in agricultural technology research projects, and distribute the benefits proportionally.										
2	Carry out social training services, providing paid technical training to farmers and enterprises.										
3	Establish an agricultural technology entrepreneurship incubation base to reduce the cost of entrepreneurship.										
4	Sign salary agreements with cooperative enterprises to safeguard students' rights and interests.										
5	Relying on the technical advantages of the institutions, operate demonstration farms or agricultural product processing projects.										
6	Provide scholarships or training subsidies to students who obtain senior vocational skills certificates.										
7	Establish an agricultural technology consulting team to provide paid technical services to local governments and enterprises.										
8	Introduce the alumni donation mechanism and establish an agricultural technology education development fund.										

Appendix D
The Results of the Quality Analysis of Research Instruments

The index of objective congruence (IOC)
Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
Knowledge acquisition ability								
1	Administrators establish digital learning platforms to enhance the efficiency of teachers and students in acquiring new knowledge, new technologies and new information.	1	1	1	1	1	1	valid
2	Administrators establish diversified learning platforms to improve the effectiveness of agricultural innovation training.	1	1	1	1	1	1	valid
3	Administrators integrate diverse resource systems to provide support for teachers and students in structuring knowledge acquisition.	1	1	1	0	1	0.8	valid
4	Administrators regularly organize agricultural new technology training to help teachers master international cutting-edge technologies.	1	1	1	1	1	1	valid
5	Administrators attach importance to the real-time update and dissemination of new knowledge and cooperate with agricultural research institutions to establish a technology information sharing mechanism.	1	1	1	1	1	1	valid
6	Administrators attach importance to the transformation of new knowledge and incorporate agricultural innovation achievements into the teaching resource library.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
7	Administrators have constructed convenient knowledge acquisition channels for farmers and agricultural practitioners, designing online and offline combined courses (such as mobile micro-courses).	1	1	1	0	1	0.8	valid
8	Administrators focus on the comprehensive application ability of new technologies and information, thereby promoting interdisciplinary knowledge integration.	1	1	1	1	1	1	valid
9	Administrators attach importance to optimizing the content of the resource systems and utilize big data technology to analyze the knowledge needs of agricultural practitioners for dynamic adjustment.	1	1	1	1	1	1	valid
10	Administrators provide real-time technical problem-solving services for teachers and agricultural practitioners and have established an expert consultation platform.	1	1	0	1	1	0.8	valid
Knowledge coupling ability								
1	Administrators attach importance to knowledge in the fields of agricultural production technology, agricultural economic management, agricultural research and practice, and fully integrate it through interdisciplinary curriculum design.	1	1	1	1	1	1	valid
2	Administrators pay attention to promoting the deep coupling of agricultural environment and sustainable development knowledge, so as to build a systematic teaching system.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
3	Administrators attach importance to teachers' research on the cross-integration of knowledge in agriculture and different fields, and formulate relevant incentive mechanisms.	0	1	1	1	1	0.8	valid
4	Administrators managers pay attention to students' ability to master the comprehensive agricultural knowledge system, and strengthen and integrate it through project-based teaching.	1	1	1	1	1	1	valid
5	Administrators pay attention to the integration of agricultural research practice and theoretical teaching resources, and establish cross departmental collaboration mechanisms for this purpose.	1	1	1	1	1	1	valid
6	Administrators regularly organize agricultural production technology experts and agricultural economic management experts to carry out knowledge collaborative innovation seminars, so as to solve some practical problems in the industry.	1	1	1	1	1	1	valid
7	Administrators pay attention to the promotion of systematic teaching knowledge modules, and transform the front-line experience of agricultural production into innovative teaching content through school-enterprise cooperation.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
8	Administrators pay attention to the use of systematic teaching system, and realize the visual correlation and sharing of knowledge of different agricultural disciplines through digital platforms.	1	1	1	1	1	1	valid
9	Administrators pay attention to the effect of knowledge coupling ability in actual teaching, and set up special assessment indicators in the curriculum evaluation system.	0	1	1	1	1	0.8	valid
10	Administrators attaches importance to the development of comprehensive agricultural production technology innovation courses, and has set up a team of interdisciplinary teachers.	1	1	1	1	1	1	valid
11	Administrators attach importance to improving the existing knowledge coupling system and introducing cutting-edge agricultural knowledge through international exchanges.	1	1	1	1	1	1	valid
Knowledge application ability								
1	Administrators clearly listed knowledge application ability as the core training goal of agricultural higher vocational education to highlight its important position.	1	1	1	1	1	1	valid
2	Administrators establish the practical teaching system is conducive to systematically strengthening students' knowledge transformation ability.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
3	Administrators attach importance to promoting IUR collaborations in order to promote the practical productivity transformation of agricultural technological achievements.	1	1	1	1	1	1	valid
4	Administrators attach importance to the return of scientific research and innovation achievements to teaching practice, so as to develop policies to encourage teachers to participate in horizontal technology projects.	1	1	1	1	1	1	valid
5	Administrators cooperate with enterprises to design targeted positions in internships management to ensure that students solve real agricultural technology problems.	1	0	1	1	1	0.8	valid
6	Administrators take knowledge application ability as a key index to measure the educational effectiveness of agricultural higher vocational colleges to test the actual level of running schools.	1	1	1	1	1	1	valid
7	Administrators give priority to practical production benefits rather than pure academic value in evaluating educational effectiveness and innovation achievements.	1	1	1	1	0	0.8	valid
8	Administrators attach importance to practical teaching and technology incubation, and provide support by integrating university-enterprise resources.	1	1	1	1	1	1	valid
9	Administrators attach importance to improving students' knowledge application ability, so as to continuously optimize the structure of professional courses.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
10	Administrators attach importance to students' innovation achievements based on actual needs, and stimulate students through continuous innovation and entrepreneurship competitions.	1	1	1	1	1	1	valid
11	Administrators pay attention to the effectiveness of IUR collaborations, and incorporate it into departmental performance assessment.	1	1	1	1	1	1	valid
Demand for vocational and technical talents								
1	Administrators regard the demand for vocational and technical talents as the core orientation of talent training in agricultural higher vocational colleges, so as to clarify the training orientation.	1	1	1	1	1	1	valid
2	Administrators regularly analyze the trends of economic development and technological advancement, and dynamically adjust the enrollment scale and direction of agricultural technology majors.	1	1	1	1	1	1	valid
3	Administrators pay attention to the industry specific needs in order to optimize the curriculum system to train the appropriate technical personnel.	1	1	1	1	1	1	valid
4	Administrators attach importance to the research of labor market dynamics in order to adjust the content of practical teaching.	1	0	1	1	1	0.8	valid
5	Administrators attach importance to the crafts and technical field in the industry, and work closely with enterprises when formulating training programs to ensure	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
	that the course content is consistent with them.							
6	Administrators attach importance to the transformation of scientific research results into teaching resources to match the industry-specific needs, so they establish an incentive mechanism for teachers to participate in horizontal technology projects.	1	1	1	1	1	1	valid
7	Administrators pay close attention to the labor market dynamics, which helps schools to accurately grasp the changes in the demand for vocational and technical talents and further adjust education management strategies.	1	1	1	1	1	1	valid
8	Administrators attach importance to labor market feedback, so they have established a tracking mechanism for agricultural technology graduates to optimize the skill matching degree of talent training.	1	1	1	1	1	1	valid
9	Administrators include the service of regional economic development (such as rural revitalization, characteristic agriculture) into the talent training goals in order to better serve local economic development.	1	1	1	1	1	1	valid
10	Administrators pay attention to the technological advancement of local agricultural and develop policies to encourage teachers and students to participate in agricultural technology extension projects.	1	1	1	1	0	0.8	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
Policy								
1	Administrators clearly include vocational education strategic plans into the long term development goals of colleges and universities, so as to clarify the school running positioning.	1	1	1	1	1	1	valid
2	Administrators attaches importance to the effectiveness of the implementation of the current policy and includes it in the annual assessment of the university management.	1	1	0	1	1	0.8	valid
3	Administrators have specific initiatives implemented to ensure that they systematically support curriculum development for agricultural technology majors.	1	1	1	1	1	1	valid
4	Administrators give priority to the use of government funding support to ensure practical training equipment and teaching resources related to agricultural technology innovation.	1	1	1	1	1	1	valid
5	Administrators attach importance to the full implementation of teacher training funding promised in documents at all levels, and establish a special fund audit system for this purpose.	1	1	1	1	1	1	valid
6	Administrators fully implement the dual-teacher training policy to promote the improvement of teachers' practical teaching ability.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
7	Administrators will include the achievements of teachers' participation in the horizontal topics of agricultural technology into the bonus points of the professional title evaluation policy, so as to stimulate the scientific research potential of teachers.	1	1	1	1	1	1	valid
8	Administrators promote industry collaboration (such as the establishment of industrial colleges) to realize the two-way transformation of agricultural technology R&D and teaching resources.	1	1	1	1	1	1	valid
9	Administrators develop special policies (e.g. grants, skills training subsidies) to support rural students to participate in advanced agricultural technology courses.	1	1	1	1	1	1	valid
10	Administrators attach importance to the quality assurance of school education and teaching, and conduct a third-party quality assessment to conduct an annual audit of the teaching results of agricultural technology majors.	0	1	1	1	1	0.8	valid
11	Administrators attach importance to ensuring access and equity in education for students in remote areas, and have formulated special policies for ethnic minorities (such as the development of Zhuang language agricultural technology textbooks).	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
Income								
1	Administrators will incorporate graduates' the level of skill into the educational effectiveness evaluation system of higher vocational colleges to promote the improvement of the school's educational level.	1	1	1	1	1	1	valid
2	Administrators pay attention to the analysis of salary differences in the industry, so as to dynamically adjust the professional curriculum.	0	1	1	1	1	0.8	valid
3	Administrators attach importance to the fair compensation of agricultural technical personnel, and actively promote the policy of linking vocational skill level certification with salary.	1	1	1	1	1	1	valid
4	Administrators focus on enhancing the wages competitiveness of graduates in technology intensive positions and cooperate with enterprises to develop high value-added technology courses.	1	1	1	1	1	1	valid
5	Administrators pay attention to improving the work experience of graduates and establish a stepped internship system (such as "apprenticeship + on-site internship").	1	1	1	1	1	1	valid
6	Administrators recognize that the geographic location advantages of Guangxi vocational colleges adjacent to characteristic agricultural producing areas (such as sugarcane and mango planting belt) have significantly improved the income level of employees.	1	1	1	1	1	1	valid

No.	Education administration based on agricultural technology innovation for Guangxi higher vocational colleges	Experts					IOC	Validlity
		No 1	No 2	No 3	No 4	No 5		
7	Administrators promote schools and enterprises to sign minimum wages guarantee agreements to ensure that agricultural technology internship positions provide reasonable remuneration.	1	1	1	1	1	1	valid
8	Administrators will include gender equality wages into the assessment index of school-enterprise cooperation to safeguard the legitimate rights and interests of students.	0	1	1	1	1	0.8	valid
9	Administrators pay attention to the quantitative relationship between graduates' the level of skill, industry choice and income growth, so as to establish a database of graduates' income.	1	1	1	1	1	1	valid
10	Administrators encourage graduates to serve less developed agricultural counties in Guangxi to narrow the geographic location income gap by formulating special policies (such as regional employment subsidies).	1	1	1	1	1	1	valid
11	Administrators pay attention to enhancing the wages bargaining power of graduates and guide students to acquire composite skills through career planning courses.	1	1	1	1	1	1	valid

Appendix E
Certificate of English

BANSOMDEJCHAOPRAYA
RAJABHAT UNIVERSITY

This is to certify that

Mr. Xiao Shalang

Achieved BSRU English Proficiency Test (BSRU-TEP) level

C2

Given on 25th January 2021

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix F
The Document for Accept Research

DATE: 13-06-2025
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LETTER OF ACCEPTANCE

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It is a great pleasure to inform that, after the peer review, your article titled "**Guidelines of education administration based on agricultural technology innovation for Guangxi higher vocational colleges**" has been accepted to publish in the journal of Utilitas Mathematica.

Comments from the Editorial Board:
Article plagiarism is below 10%.
Article perfectly fits in the scope.
Article is well written.
No more corrections are needed.

Hence, the article is accepted to be published in the upcoming Regular issue 2025. **Utilitas Mathematica** is a scientific journal. For any enquires/complaints, please email to editor@utilitasmathematica.com.
Note: The Journal index in the Scopus Database Category Quartile, Scopus Q4.

Olivia Wilson

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