Quantitative Study on the Mechanism of Synergy between Agricultural Institutions of Higher Learning and Agricultural Enterprises

Congmu Yu, Xiaohong Wang*
School of Management, Harbin Institute of Technology, 92 West Dazhi Street, Nan Gang District, Harbin, China, P.C.150001
*Corresponding author (E-mail: Wangxh@hit.edu.cn)

Abstract

The purpose of the study is to explore the mechanism and effect of the equivalent synergies on the collaborative cooperation between university and enterprise. The characteristics of collaboration include three dimensions: organizational synergy, strategic synergy, and knowledge synergy. Each dimension is determined by the internal and external factors of the partners. Therefore, whether the partners can provide equal resources in different dimensions will impact the intensity of cooperative willingness. Taking the students of agricultural colleges and universities as the research object, this paper analyses the necessity of students' participation in teaching management in agricultural colleges and universities from the perspective of cultivating students' self-development, adapting to the transformation of management concept and perfecting modern university system. Students' participation in teaching management in agricultural colleges and universities is guaranteed by concepts, subjects and laws. In order to verify the effect of equivalence and the hypotheses proposed, the study obtained and analyzed data via the questionnaire. The results show that equivalence has a positive influence on the cooperative willingness and synergy, then the willingness can also indirectly affect the collaborative performance. This study provides a new path to improve the collaborative performance for university-enterprise collaborative cooperation.

Key words: Equivalence, Synergy, Willingness, Cost Performance, Agricultural Enterprises.

1. Introduction

Within the study domain of partner selection in strategic alliance, scholars represented by Lewis (1990), Ring, Van (1994), and Uzzi (1999) summarized some of the factors influencing partner selection as relationship-orientated factors, which were stated to play gradually important roles in the cooperation. With the advancement of the time and the demand of core competitiveness, the form of cooperation has been evolved into the pattern that has transcended disciplines, types and organizations, as represented by the collaborative cooperation of “industry-university-research”. This paper aims to further explore the mechanism of synergy between enterprise and university, and the inherent relations influencing the collaborative performance.

Collaboration is the process of integration of knowledge and technology between organizations. The relationship between organizations affects the interaction and complementary effects of cooperation between the two parties. Lewis (1990) proved that maintaining a good cooperative relationship between enterprises can reduce the uncertainty in the interaction and improve the efficiency. In addition, Reuer and Arino (2002) and Martin et al. (2014) discussed and supplemented the influence factors from the perspectives of the leadership of organizational managers and interest distribution. However, previous research has neglected whether enterprises and universities are sharing consistent goals, and whether their interaction and collaborative relationship are close.

Denisa (2013) pointed out that collaboration between industry, universities, and research institutes should be a process in which enterprises and universities have a common medium and long-term strategic goal, and that the combination of science and technology and economic activities for the purpose of knowledge appreciation and value creation. Collaborators need to integrate and share resource elements to achieve interaction. In view of this, this study will deeply explore the factors and relationships that affect the collaborative cooperation between enterprises and universities in order to find important links that can enhance synergies and improve cooperation efficiency, thus revealing and resolving the status quo of organizational inefficiencies in the process of collaborative collaboration.

The structure of this paper is as follows: The second part organizes the relevant theories applied in this study, proposes hypotheses, and establishes the theoretical model of collaboration. In the third part, the
methodology, data source, variables and indicator system are explained. In the fourth part, statistical methods and tools are used to obtain research results and verify the hypotheses and models. At last, the discussion and conclusion are made in the fifth part.

2. Theoretical Basis

2.1. Definition of Agricultural Enterprise Synergy

What is synergy? The word “synergy” originates from the physics discipline to explain the definition of multidimensional space theory. It points out that different systems of interaction will evolve from chaotic to ordered laws and phenomena. Managerial researchers have rooted this concept and proposed that the synergetic effect of the enterprise and the university is the integration of a series of resources such as information, knowledge, technology, and funds. With this integration, the organization promotes interactions, and then realizes the non-linear superposition of cooperative performance, achieving the effect of “1+1>2”.

Dispute exists between scholars about whether enterprises and universities can maintain effective synergies. Scholars with skeptical opinions argue that, first of all, enterprises and universities are two different types of organizations. There is a fundamental conflict between values and organizational culture. Enterprises are interest-oriented organizations that attach great importance to economic profits, whereas universities are research-oriented organizations that lay emphasis on the exploration of truth. Therefore, it is difficult to form unified conceptual. Second, the strategic resources and core competencies of the two organizations are significantly different; some cases reflect the conflicts that arise between enterprises and universities in the process of collaborative cooperation. Many business managers believe that the scientific research projects undertaken by universities and their results are too ideal to satisfy the practical needs. Even under the collaborative cooperation, the theoretical results obtained by the university cannot be transformed into the business economy of the enterprise, and a large amount of time and labor cost is exhausted. In addition, corporate managers also reveal that there are problems with the way universities train talents. Some highly-educated talent is ideologically disconnected from the reality of the enterprise and society, and it is difficult to bring real contributions to the enterprise, resulting in a lot of costs for the enterprise to receive these "highly educated, low-benefit" talents. However, university scholars hold that enterprises are too concerned about the immediate interests and fails to carry out long-term strategic plans; even worse, some enterprises face the problems of disordered management, serious redundancy of homogenous resources, and low efficiency.

However, more scholars who hold a positive attitude firmly believe that the university's research-oriented culture does not conflict with the enterprise's application-oriented culture. The problem lies in the lack of understanding and tolerance before cooperation. Geisler (1995) found that the stronger the understanding and recognition of values and cultures are, the more consistent the cooperative relationship lasts. It means that mutual understanding and tolerance can enable heterogeneous organizations to reach a consensus of reciprocity. In fact, in collaboration, enterprises can directly acquire knowledge to improve their technological capabilities or convert into new technologies, and they can also increase the number of ways to solve problems. On the other hand, universities can acquire industry-specific information and industry strategic resources, because knowledge or technical information is usually embedded in the organization, which makes the organization unique, and there is no value if the knowledge is not within the organization. Collaboration between enterprises and universities not only has a relatively solid knowledge acquisition approach, but also reduces the risk and competition probabilities caused by cooperation with enterprises in the same industry. The documents about the diversity of alliance portfolios shows that collaboration with universities will guide the flow of non-redundant resources, such as diversified management, marketing, and innovation models. In addition, cooperation with universities can directly bring the expertise of technicians and save the enterprise's expenses in maintaining research. Therefore, enterprises can launch more R&D projects and schedule more new products development. Pangarkar and Wu (2012) stated that the cooperation between enterprises and universities, especially the prestigious universities, has other benefits as well: Not only can a more comprehensive knowledge base be obtained, but also they are able to build relationships with well-known alumni and local enterprises, in order to open up new opportunities.

2.2. Dimensions of Cooperation between Agricultural Enterprises and Agricultural Universities

From the perspective of organizational management, collaboration is a process in which different organizations’ values and cultures are mutually integrated, and bilateral relations are an important factor influencing collaborative interaction. Organizational synergy is the process of integration and optimization of resources, ideas, and behaviors. The integration of various elements is not a simple addition of values, but an evolutionary process of nonlinear systems.
Collaboration between the university and enterprise is an open organization relationship. Scholars expect that the two types of organizations will combine with each other to overcome the risks arising from cooperation between enterprises and continuously improve cooperation performance. Trust, an important factor in solidifying organization relationships, is a core element that promotes harmonious relations. The establishment of a trust mechanism has a direct relationship with the history of cooperation between both parties and the effective evaluation of potential collaborators' information. The mastery of potential collaborator information (including social influence, reputation, status, etc.) builds the foundation for initial trust. Universities and enterprises can only invest in resources, communicate information, and maintain relations under the condition of trust.

From the perspective of strategic synergy, collaboration depends on whether inter-organizational knowledge, information, and goals can form long-term, stable and mutually beneficial relationships. If we recalling previous university-enterprise cooperation, we will find that enterprises seek to sign employment agreements with universities for specific technology solutions, and to provide corresponding returns to universities. This type of cooperation is characterized as “one-off event” or “service outsourcing activity”. And The cooperation between the two parties is loose and it is difficult to reach a strategic consensus. However, collaborative cooperation is featured by the realization of long-term strategic cooperation between the university and enterprise with common goals, the integration of resources of both parties to enable the full mobility of resources and mutual sharing, and the conclusion of good cooperation to jointly solve problems and bear risks.

In the view of knowledge management, the essence of collaborative cooperation between the university and the enterprise is the creation process with knowledge appreciation as the core. The process of knowledge appreciation is implied in the flow of knowledge between organizations, and constantly excavates and uses knowledge in interactions, turning knowledge into commercial profits through the process of integration-sharing-overflow. The main way of knowledge synergy is to generate knowledge transfer through information exchange.

Knowledge is the core resource of collaboration. In the process of knowledge synergy, knowledge spreads from universities to enterprises and forms knowledge flow. Under the continuous interaction of information, knowledge is gradually absorbed and digested, and shared knowledge flow is formed between organizations. Enterprises and universities will integrate and manage knowledge flow and form innovative resources. Parkman and Walsh (2007) summarized the process of knowledge synergy as the course that aggregates and manages various knowledge flows and applies them both within and outside the organization. Factors that influence knowledge flow include geographical location, interaction, knowledge absorption and transformation, knowledge spillover, etc. Therefore, enhancing the mobility of knowledge and expanding the flow of knowledge is an effective way to enhance knowledge synergy.

In summary, organizational synergy, strategic synergy, and knowledge synergy are in systemic relationships. Organizational synergy is the basis of collaborative cooperation. Strategic synergy is the guarantee of collaborative cooperation. Knowledge synergy is the core of collaborative cooperation.

2.3. Hypothesis

Is the partner's scale status equal? Is the degree of emphasis on cooperation between the two parties the same? Is the provided resource or condition equivalent? And does return and pay match? Discovering and proving its internal connections can only find ways to enhance synergies.

Equivalence, on the ground of economics, embodies the principle of fair market exchange. In order to meet their own needs, enterprises and universities exchange their own resources for those of their partners. The process of establishing a cooperative relationship may be considered as a process of bargaining in the market, and the two parties will eventually exchange and combine the same basic resources. Equivalence includes explicit elements (such as industry status, self-scale, and economic resources), and implicit factors (such as network relations and social roles).

Explicit elements. Status, scale, and reputation are special words to evaluate an organization’s identity within the industry. The financial data of well-known enterprises shows that well-known status, scale, and reputation can bring significant economic benefits to the enterprise. Podolny (1993, 1994) proposed that the status of the organization is influenced by its own strength and external connections.

Based on the characteristics of the organization's cooperation, the cooperation relationship will be formed between organizations with homogenous status, where organizations with high industry status tend to cooperate with their high-status counterparts. The reason is that if the organization's industry ranks high, its current or future scale will be even greater, and it will possess stronger knowledge reserves or technical capabilities. Therefore, cooperation with such organizations will be more valuable. Although access to the partner knowledge base is effective, the effective use of information is highly dependent on the organization's own strength. The stronger the organization's strength is, the easier it is to absorb knowledge from outside sources, and the greater the likelihood that this knowledge will be used to convert into commercial value. In addition,
organizations with strong capabilities can better provide partners with the trust and resources they need, while also helping organizations avoid opportunistic behavior. The structural equivalence of cooperative subjects means that both parties have similarities in thinking and behavior and are more conducive to the exchange of information. This means that well-known enterprises need to be cautious when choosing their partners. If they choose a lower-level organization to cooperate, their own status advantages will be diluted.

H1: The more equal the organizational characteristics of the university and the enterprise are, the better effectiveness will the organizational synergy have.

Implicit elements. Social science research finds that roles and structures exist in social networks, and that similar roles or structures between individuals have similar effects. Even if the two parties do not have any direct correlation in advance, they will have structural equivalence effects. It indicates that behavioral bodies with similar social roles have implied structural associations. Therefore, the behavioral bodies of similar structures exhibit consistent behavioral propensities. Under uncertain conditions, the subjects will have a tendency to find other similar counterparts.

In order to pursue common goals and develop collaboration and cooperation, the coordination ability of universities and enterprises to solve problems dynamically is enhanced. The problem-solving methods by synergy avoid unilateral errors and make the solution more diversified. Ritala and Hurmelinna-Laukkonen believe that when different organizations continue to face the same problem in collaborative collaboration, they will make the goals more clear and consistent, and reduce the vagueness of knowledge acquisition. At the same time, collaborative cooperation can improve the efficiency of information exchange. The process of information exchange is embedded in the cooperation of the organization and is more relevant and accurate than the information provided alone.

H2: The more equal the roles and structures of the university and the enterprise are, the better effectiveness will the strategic synergy have.

Willingness refers to the possibility or tendency to perform an activity. Many scholars believe that relationship-oriented factors play an important role in organizational cooperation and indirectly raise the importance of willingness. Dan Li (2008) emphasized the role of willingness many times in the articles published by AMJ, “The willingness of participants declines with the decrease of intellectual property rights”. “If partners continue to infringe on the interests of other partners during the cooperation, then these enterprises will not be sure whether they will continue to maintain the alliance.” Since the quantification of willingness is more difficult, it has not been verified in previous studies.

In fact, both enterprises and universities have ideological and behavioral awareness as organizations. The decision-making of cooperation often depends on the willingness of the subject. This willingness includes the objective evaluation of the stock of the partners, such as resources, capabilities, scale, as well as the subjective evaluation of the potential partners, such as reputation, exchange feedback, cooperation, goal, satisfaction, etc.

H3: The more significant the equivalent features between universities and enterprises are, the more intense the cooperation willingness will be.

The distribution of interests is the tail link of collaborative cooperation and is also the focus of cooperation organizations. The main forms of interest are economic interests and intellectual rights. Economic benefits reflect immediate income, and intellectual rights represent long-term benefits. However, both enterprises and universities are concerned about the benefits of their own cooperation. Studies have shown that the distribution of benefits will affect the stability of the cooperation between the two parties. The rationality of the distribution of benefits will directly affect the cooperative relationship between the two parties. Bruneel (2010) pointed out that the conflict between the distribution of intellectual property rights, economic interests, and value-added knowledge is an important factor influencing the collaborative relationship between the enterprise and the university. Therefore, the settlement of the distribution of benefits is an important means to stabilize the bilateral strategic cooperative relationship.

H4: The more equal the distribution of benefits between universities and enterprises, the more willingness of cooperation there will be.

Performance is the result of behavioral activities. Performance evaluation indicators of enterprises and universities mainly include new product output (product improvement) and knowledge output. However, many documents have suggested that talent cultivation is also considered as implicit performance output. The direct factor in determining output (performance) is input. Besides, the organization's absorption and digestion of external resources (knowledge and information) is also seen as an implicit indicator of impact on performance. These two indicators will determine the transformation of resources. Plewa and Quester (2007) believed that the performance of collaborative cooperation between universities and enterprises is influenced by factors such as resources, relationships, and behavior. At the same time, the performance evaluation of collaborative cooperation should take into account both enterprises and universities.

H5a: The better equivalence between universities and enterprises have, the higher cooperative performance there will be.
H5b: The more intense cooperation willingness exist between universities and enterprises, the higher cooperative performance there will be.

H5c: The better collaborative performance between universities and enterprises are, the higher cooperative performance there will be.

**Figure 1. Relationship between influencing factors**

3. Methodologies

The survey subjects selected for this research are Chinese enterprises and universities. In traditional culture, China has always been a country that values the equivalence between rank and class. Whether it is marriage or friendship and cooperation, it emphasizes on the right person, that is, status, prestige, and class hierarchy. Therefore, from the perspective of cultural influence, it is more representative to choose the equivalent relationship between Chinese enterprises and universities for research collaboration and collaboration. In the sample selection, we choose a university and obtain the enterprise data that cooperates with the university. The purpose is to use the university as a reference, and the enterprise is easily differentiated from the reference object for clarity. The effect of equivalence on the collaborative performance is examined; in addition, the bi-directional data of university-enterprise collaboration can be more easily collected with reference to a university.

Questionnaires are used to collect data. In order to avoid respondents being asked questions about trade secrets or privacy, and to ensure the quality of the questionnaires, we adopted the "Likert" 5-mark scale method for sensitive questions, of which 1 represents “complete dissatisfaction”, and 5 represents “completely satisfied”. They distributed questionnaires to the Hunan University of Science and Technology of China and enterprises participating in collaboration. The content of the questionnaire involves scale, reputation, industry status, and external cooperation and other aspects. A total of 200 questionnaires were released, and 160 valid ones were obtained after eliminating those with incomplete information.

However, proceeding from information such as scale, reputation, and industry status alone cannot fully explain the synergies and implicit equivalence effects in the cooperation process, such as the role, structure, and external relations of the organization in external relations. Therefore, it is necessary to continually focus on the data collection. The second phase of data acquisition is based on the cooperation and interaction between the university and the enterprise, collaboration, external relations, performance gains, and benefit distribution.

3.1. Variables Description

(1) Organizational collaborative performance means that the organization's cooperation is affected by the resource endowments and organizational relationships. The resource elements of cooperation between universities and universities should include resources such as research funds, knowledge, and talents; and the impact of the organization's external relations on organizational collaboration should also be considered.

(2) Knowledge collaborative performance refers to the process of organizing-sharing-receiving knowledge (information). Collaborative cooperation should not only share knowledge and information resources, but also
include research equipment and test sites; absorptive capacity is considered to be the core of knowledge applications. Absorptive capacity refers to the ability of an enterprise to identify knowledge and digest knowledge, and to translate it into commercial use.

(3) Strategic collaborative performance refers to the medium and long-term cooperation behavior of the partners with a consistent strategic goal, and the importance of the organization’s senior management and strategic thinking will play a leading role[74]; in addition, bilateral talks and interactions will consolidate the strategic objectives [75]. The role of the organizations will determine the strategic dominance. The concept of network centrality is introduced here. If an organization represents a node in a relational network, the greater the number of nodes connected to other nodes, the more important the node is, which has higher centrality.

(4) The willingness to cooperate is the degree to which the subject accepts external things, so the willingness can be quantified. Cooperative rapport is a psychologically relevant factor produced by cooperative organizations. The organization leadership’s attitude and responsiveness to problems will drive the organization’s behavior. In addition, income is the ultimate goal of the organization's production activities. Accordingly, the distribution of benefits affects the subjective initiative of both parties in collaboration. The profit distribution coefficient of university-enterprise collaboration and cooperation should increase with the increase of the contribution of its innovation subject. In other words, the more types of resources invested by the organization in cooperation, the greater the degree of input and the greater the contribution to the performance, and the allocation ratio should be thus greater.

Performance reflects the result of behavioral activities. In addition to new product output (product improvement), academic paper (patent) output or knowledge output, talent training should also be included in the evaluation indicators, because the skills of participating personnel will be improved, which perfects the process and optimizes the management model. These methods will improve the performance of the organization.

Equivalence cannot be accurately assessed in heterogeneous organizations, but it can be used to effectively evaluate the resources provided by partners. Because when the two parties work together to solve a certain problem, they both do not want to be the loser. Therefore, they expect that the other party will pay more. Under the points of game, the two parties will reach a consensus at a certain balance point where they are relatively equivalent. Therefore, it is relatively scientific and reasonable to measure equivalence by judging the satisfaction of partner input.

Government and policy drivers are disturbance variables. In China, another important condition for cooperation between enterprises and universities is the attitude of government. Most universities are affiliated with the government education department, and state-owned enterprises also have special social backgrounds. In order to ensure that the results of the study are applicable to the free combination of university-enterprise collaboration, this study limits its role in the research system and therefore removes it.

<table>
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<tr>
<th>Table 1. Index system</th>
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<tr>
<td><strong>Variable</strong></td>
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<tr>
<td>Strategic Synergy</td>
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<tr>
<td>Knowledge Synergy</td>
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<tr>
<td>Organizational Synergy</td>
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<tr>
<td>Willingness</td>
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<tr>
<td>Equivalence</td>
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<td>Cooperation Performance</td>
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By sorting the data of two phases, the resulting enterprises and universities are not all equal in terms of size, role, and status. The relative sample size is 74. To ensure rigorousness, this study takes into account the equivalent and non-equivalent relationship.

4. Research Results

In order to prove whether the established theoretical model is valid, data reliability and validity tests must be performed first. Table 1 shows the model fitting results after the test. The relative fit indices CFI (0.989), NFI
(0.959), IFI (0.975), and the absolute fit index RMSEA (0.049), and GFI (0.946) all show ideal fitting results, indicating that the theoretical model is valid and the data results are trustworthy.

<table>
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<th>Tab1 the fitting results</th>
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<td>Fitting index</td>
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<td>Result</td>
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The model fitting effect is the basis for accurately assessing the influence relationship between variables. In order to test the role and effectiveness of equivalence in university-enterprise collaboration, this study should first verify the impact of this factor on cooperative performance, namely H5a;

<table>
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<th>Table 2. Significant differences test</th>
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<tr>
<td>Model</td>
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<td>Regression</td>
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<td>Residuals</td>
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<th>Table 3. The result of Coefficient test</th>
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<tr>
<td>Model</td>
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</tr>
<tr>
<td>(Constant)</td>
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<tr>
<td>Zscore(input)</td>
</tr>
<tr>
<td>Zscore(benefit)</td>
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<tr>
<td>Zscore(contract)</td>
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<td>Zscore(source share)</td>
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Through the regression test, the subject’s inner expectations of partners in cooperation have been shown to have a significant impact on cooperation performance (Table 4), with the highest significance being the satisfaction of income distribution, satisfaction of contract terms, and satisfaction with resource sharing (Sig<0.05). Their impact on cooperative performance is positive; while partner input satisfaction positively affects cooperative performance, the significance is not very high (0.1<Sig<0.05). Even so, the results still confirm that H5a is valid: equivalence has a positive effect on collaborative cooperation.

Next, we will verify whether the relationship between variables in the theoretical model and the index system, as well as the impact path are valid. It also means to verify how strategic synergy, organizational synergy, knowledge synergy, and willingness to cooperate affect cooperative performance. At this time, equivalence is a moderating variable. “1” represents the equivalence, while “0” means the opposite. The output is shown in Table 4.

<table>
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<th>Table 4. the influencing results between the given variables</th>
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<tr>
<td>Variable effect</td>
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<tr>
<td>Strategic Synergy</td>
</tr>
<tr>
<td><strong>Communication (.763)</strong>*</td>
</tr>
<tr>
<td>Attention from Leaders (.733)***</td>
</tr>
<tr>
<td>Interaction (.377)***</td>
</tr>
<tr>
<td>Network Centrálity (.672)***</td>
</tr>
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</table>
From the output of the test (Table 4), the P value of each variable is <0.1, indicating that in the construction of the model, the selected indicators have significant characteristics and have sufficient explanatory latent variables.

Firstly, we should pay attention to the influence degree of each latent variable in the equivalence path: strategic synergy (0.061, P<0.01). The results show that the equivalence characteristics of enterprises and universities are conducive to the formation of a unified strategic ideology for both parties. Although the degree of influence of strategic coordination in the equivalence path is only 0.061 (quite limited), it can still prove that strategic cooperation in university-enterprise collaboration is a necessary factor. Knowledge synergy (0.720, P=0.016) shows that the equivalent characteristics of enterprises and universities are more conducive to the co-creation of knowledge value, such a significant effect, and prove that the structure and strength of organizations are similar, which is more conducive to knowledge transfer and knowledge absorption. The willingness to cooperate (0.968, P=0.044) shows that in the university-enterprise collaboration, the more significant the equivalence between organizations, the stronger the willingness of both parties to cooperate; the willingness to cooperate in the equivalence path has the highest degree of impact. The willingness to cooperate arises from the tendency of the heart, and it is expected that the input and behavior of the other side in the cooperation will be no different or better than itself. This just proves the principle of equal exchange of market fairness, and the enterprise and the university will eventually perform the exchange of resources that are roughly matched. Therefore, H3 passes the test. However, what surprises us is that organizational synergy (-0.017, P=0.081) has a negative effect on equivalence, which fails H1.

Secondly, in the influence of latent variables on cooperation performance, strategic synergy (0.175, P=0.072), organizational synergy(0.091, P=0.033), and knowledge synergy (0.691, P=0.016) all have direct and positive roles. However, strategic synergy and organizational synergy also indirectly affect cooperation performance, with the impact coefficients being 0.663 and -0.114, respectively; The effects of the three synergies can be observed from the column of total impact coefficients: Knowledge synergy (0.691)> Strategic synergy (0.215)> Organization synergy (0.093). Therefore, with the improvement of any one of them, the performance of the cooperation will be directly improved. Thus, H5c passes the test. The willingness to cooperate does not have a direct impact on the cooperative performance. However, as an intangible capital, it
participates in university-enterprise collaboration, which indirectly and positively affects the output of the cooperative performance (0.040). Therefore, H5b passes the test.

The influencing relationship between latent variables and decision variables are as such: (1) Strategic synergy is consistent with strategic goals (0.662), harmonious communication (0.763, P<0.01), leaders’ attention (0.733, P<0.01), interaction degree (0.377, P<0.01) and network centrality (0.672, P<0.01). Network centrality represents the role and structural position of the organization in the social network, which significantly and positively affects the strategic collaborative performance. Therefore, H2 passes test. (2) Organizational synergy was funded by research funding (0.634), relationship sharing (0.553, P<0.01), knowledge (0.816, P<0.001), talent input (0.717, P<0.042), and equipment input (0.178, P=0.027). (3) In the index system, knowledge synergy is designed to be influenced by five factors, but the results show that laboratory sharing has no significant effect on knowledge sharing, and the remaining four factors are: equipment sharing (0.560, P<0.01), knowledge absorption (0.736, P<0.01), information exchange (0.761, P<0.01), and knowledge sharing (0.581, P<0.01). They all have a positive and significant effect on knowledge collaboration. (4) Willingness to cooperate is determined by four factors: harmonious cooperation (0.761, P<0.01), problem-solving attitude (0.749, P<0.01), intellectual property distribution (0.427, P=0.065), and financial interests distribution (0.750, P=0.060). The rationality of the distribution of intellectual property and financial interests, especially, has significantly increased the willingness of the organization to cooperate, so assume that H4 passes the test.

The evaluation of cooperation performance consists of product innovation (improvement) (0.711, P<0.01), knowledge (patent) output (0.704, P<0.01), and the skill improvement of participating personnel (0.770, P<0.01). Of the results obtained, only H1 fails the test, and the rest of hypotheses are all valid.

5. Discussions and Conclusions

This paper aims to explore the synergy effect of university-enterprise cooperation, and verify the effect of collaborative characteristics on cooperative performance through the equivalence and willingness. Social network relations provide a new way for research to solve collaborative cooperation between industry, universities, and research institutes. That is to say, simply studying from the perspective of explicit resources can no longer meet the needs of disciplines. Continually investing in resource costs will not only lead to a continuous decrease in the rate of conversion of achievements, but will also be detrimental to the organization's innovation and development. With the expansion of autonomy in the management of agricultural colleges and universities, how to reduce the principal-agent problem between the government and University managers, and the mismatch of responsibilities and powers in the management system of agricultural colleges and universities, etc. Constructing a good governance model of Agricultural Universities after merger can not only improve the governance level of universities, but also try to avoid the systemic risks brought by the ups and downs of higher education in China. To this end, this study draws on the concept of equivalence in social relations, and discusses in depth the effect of willingness on the collaborative cooperation between universities and enterprises. The paper attempts to consider the relationship-oriented factors between organizations as the core, build the path of influence of collaborative dimension elements and collaborative relationship elements, and use collaborative performance as the criterion for the collaborative cooperation mechanism. It is expected that the research results will help enterprises and universities choose the right partners and increase the synergies and cooperation performance output by motivating key factors that have significant positive impact.

The first conclusion of this study is that the equivalence relationship between enterprises and universities will not only significantly increase the willingness of both parties to collaborate, but also indirectly affect the synergies and cooperation performance. The equivalence relationship can be expressed as mutual recognition and mutual selection among the cooperative partners, and joint research and creation of linkages for the realization of benefits. In the process of collaborative cooperation, the two parties are equal in status, jointly negotiating and making decisions, and the proceeds are distributed fairly, avoiding that one side is dominated by the other side. The hierarchical relationship will make the dominant organizations to be more active in the face of interests and core issues, and they are prone to have structural holes (easily controlling scarce resources or controlling information transmission), making the dominant organizations free-rider or paying relatively little for unequal gains, which is not beneficial to the cooperation.

The second conclusion drawn from this study is that the performance of organizational synergy, strategic synergy and knowledge synergy all have a positive and significant effect on cooperative performance. Among them, the role of knowledge synergy is most obvious. Just as the concept of collaborative innovation explains that the essence of collaborative innovation is the creation process with knowledge appreciation as the core, the sharing of knowledge and research equipment is strengthened, and the organization’s ability to absorb knowledge is improved. Both the frequency and integrity of information exchange can promote the improvement of cooperation performance.
The third conclusion drawn from this study is that the willingness of enterprises to collaborate with universities will affect their performance. The will reflects a state of mind. When the willingness is strong, the subject will have a tendency to behave. On the contrary, the subject will be forced to reverse its behavior. For example, if an actor wants to purchase a stock, his heart has already generated a purchase intention. At this time, his inner thought will drive his behavior, create a stock account, research stock market information, and invest funds. Therefore, organizations also have similar behaviors. After all, organizational behavior is influenced by the minds of managers. However, if there is only willingness to cooperate, it is impossible to obtain output, and output is directly determined by the input resources. Therefore, a strong willingness to cooperate can drive the enthusiasm of the partners and indirectly enhance the cooperation performance.

In addition, the hypothesis that “the more equal the organizational characteristics of the university and the enterprise have, the better the collaborative performance of the organization are” fails to pass the test. There may be three possible reasons for that. First, the indicators designed to measure organizational synergy are not comprehensive in this study design. Since the research object in this paper is the subject that has already formed a cooperative relationship, there is no consideration of how the organization establishes a cooperative relationship. Therefore, factors related to trust, compatibility of culture, and understanding of both parties have not been reflected. Second, excessive trust and cooperation between organizations can lead to risks, such as knowledge spillovers or associated competition. In particular, the business secrets of the enterprise or the university’s proprietary knowledge are easily passed on to opportunistic partners. However, in the process of university-enterprise collaboration, the organization will also have the knowledge and confidentiality of business information. Therefore, even if the organizational characteristics of both universities and enterprises are equal, the performance of organizational synergy is likely to be low. Thirdly, excessive trust and cooperation will also lead to stereotypes, posing detrimental effect to the cooperation like path dependence. Therefore, organizations should adjust the collaborative relationship between enterprises and universities with dynamic thinking and flexible ways.

REFERENCES


