

## THE IMPACT OF SUPPLY CHAIN MANAGEMENT COMPETENCIES ON THE RICE COMMUNITY ENTERPRISES

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**Abstract:** A study on the factors analysis and indicators of supply chain competency for rice community enterprises was a descriptive research. The purposes of this research were to study the components and indicators of supply chain competency for rice community enterprises. The samples were 90 members of the rice community enterprise from a community enterprise that received a moderate level of performance evaluation in Nonthaburi Province. The research instruments were questionnaire about supply chain management competency indicators which was in the form of a Likert's Rating Scale of 5 levels. Analyze the data by using analysis of confirmatory components such as Alpha, composite reliability, factor loadings and AVE along with path analysis for hypothesis testing with the help of AMOS software. The research found that there were 5 components and competency's indicators supply chain management of rice community enterprises in Nonthaburi, which were planning, procurement of raw material sources, production, delivery and return according to the SCORE Model. These 5 components and competency's indicators supply chain management were consistent with empirical data and statistically significant element weight values of 0.05.

**Keywords:** competency, supply chain management, rice community enterprise

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### Introduction

Thailand is an agricultural country and it is very important to the economy and society of Thailand because employment is up to more than 30 percent of the country's labor force, covering 6.4 million households and agricultural area covers 40 percent of the

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nationwide (Laosillapacharoen, Tanaboriboon, & Jermstittiparsert, 2019; Somjai, Chankoson, & Jermstittiparsert, 2020). From the past to the present, Thai agricultural sector has undergone significant structural changes throughout the world such as labor reduced and replaced with modern machinery and technology instead. The pattern of agricultural growth has changed from focused on quantitative expansion such as expand the cultivated area and the use of more inputs become as a quality growth and productivity. In the past, Thailand had experienced the expansion of the world's top qualitative factors but fell down to a low level continuously until it was overtaken by neighboring countries. Today, mostly farmers continue to produce conventional crops, especially monocultures. From the studies have shown that the yield is low especially the public plants that are at risk of oversupply in the world market (high risk, low return). Farmers were borne with rising production costs, low net income, and large debt (Sommarat Chantararat et al., 2019). Then a community enterprise was born to help farmers who were faced with such problems related to product manufacturing. Provision of a service or other act which operated by a group of persons with ties have a common way of life and come together to operate such businesses to generate income and self-reliance (Secretariat Office of Community Enterprise Promotion Board, 2005).

In Nonthaburi province, there is about 50 percent of the total area of farming. There are 10 rice community enterprises spreading in 3 Bang Yai districts, 5 Sai Noi districts and 2 Bang Bua Thong districts (Community Enterprise Information Report Nonthaburi Province, 2011). However, these rice community enterprises faced problems such as production factors, high cost of production, middlemen, the central market for rice exchange, rice seeds production (Sajja Banchongsiri et al, 2011) which can be seen that rice community enterprises encountered problems from upstream to downstream. So it came up with an idea to bring supply chain management is used to help solve this problem by establishing competency's indicators supply chain management of rice community enterprises in Nonthaburi province. It uses five components of SCOR Model: plan, source, make, delivery and return to provide competency's indicators. The competency's indicators are developed to be used to determine the source of the problem and to find appropriate solutions in the future. What are the SCOR Model components which can be used to be competency's indicators supply chain management of rice community enterprises in Nonthaburi province? To analyze the components and competency's indicators supply chain management of rice community enterprises in Nonthaburi province.

### Literature review

From related research such as Stank et al. (2001) studied the efficiency of supply chains by taking various data which has a direct effect on the supply chain and use SCOR Model 4.0 to measure the performance of all four aspects of the supply chain: planning, procurement of raw materials, production and transportation.

Lu and Su (2002) studied about improvement the efficiency of import and inbound transportation from third-party service providers (3PLs) to participate in related services and use SCOR charts to simulate work processes and analyze the operation efficiency.

Yeo and Ning (2002) studied about the principles of Supply Chain Management and SCOR Model. It is applied to build relationships among subcontractors to improve construction management efficiency.

Bolstorff and Rosenbaum (2003) shown the benefits of using the SCOR model as follows:

- Reduced costs and improved customer service to increase 3% of total revenue.
- Within 12 months of operation, return on investment (ROI) increased almost 2 - 6%
- Return on assets (ROA) improved the ability to make informed capital decisions.
- Setting the standards of the supply chain and applying technology can reduce a lot of overheads and costs.
- Continuously increasing profits 1-3% every year by supply chain management

Huang, et.al. (2005) used the SCOR Model as a conceptual framework for building a benchmark to evaluate the best practice and position value.

Chutidej Wisanitti (2012) studied on the supply chain management of vegetable safety in Nakhonpathom Province, by studying the linkage of supply chains between groups of farmers, product gatherers and exporters of vegetable safety products. The research found that the implementation of the supply chain management in safety agricultural products took time since the harvesting process to the final consumer delivery up to 60 hours. After the SCOR model was applied for process improvement, the time remained 50 hours.

From the research that has been studied, it was found that the study of supply chain management by using the SCOR Model is well-accepted and widely used. Therefore, the researchers had applied the SCOR Model to be a measure of the supply chain management competency of rice community enterprises. The supply chain competencies have greater influence on the textile companies' process such as on their plans on the sources and also on their making and deliver processes (Dhonde & Patel, 2020). In addition, a study by Jarka (2018) who also exposed that supply chain competencies also have positive impact on the fashion designing making and

supplying process. Moreover, the entrepreneurial competencies along with supply chain competencies have positively affected the business process of the institutions (Solesvik, 2019). In addition, a study by Mahdiraji, Mokhtarzadeh, Shateri, and Beheshti (2019) conducted on the supply chain competencies and found that the business processes are positive impacted by the effective competencies of supply chain. Furthermore, if the competencies of supply chain that are implemented by the business are effective then these competencies could play a positive role on the business processes of the company (Đurić, Todorović, Đorđević, & Borota Tišma, 2019). Finally, a study conducted by Erjavec, Popovič, and Trkman (2019) exposed that high performing business processes could be achieved by the organization if it implemented the effected supply chain competencies. Thus, the past literature exposed that the effective supply chain competencies positively influence all the business processes of the organization and based on these kind of literatures the present study has developed the following hypotheses.

H1: Supply chain competences positively influence the planning process of the rice community enterprises.

H2: Supply chain competences positively impacted the source process of the rice community enterprises.

H3: Supply chain competences positively affected the making process of the rice community enterprises.

H4: Supply chain competences positively influence the delivery process of the rice community enterprises.

H5: Supply chain competences positively influence the returning process of the rice community enterprises.

The conceptual framework of the research is as shown in Figure 1.

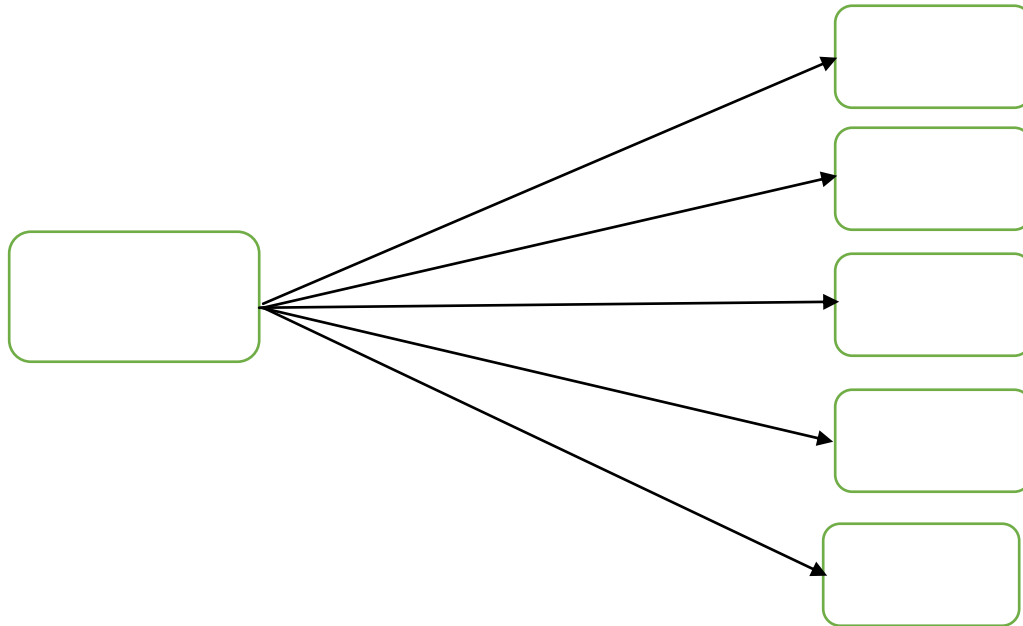


Figure 1: Conceptual model

### Materials and methods

The sample groups total 90 respondents which consisted of agricultural district officers, community development officers, community leaders and members of rice community enterprises. The sample selection was purposive sampling. The condition for sample selection is to be evaluated at a moderate level by Secretariat Office of Community Enterprise Promotion Board (SCEB). The purposive sampling were 3 groups as follow:

- Ban Na Luang Rice Grower Community Enterprise, Sai Noi District
- Community Enterprise, Community Rice Production Center, Bang Khuat Subdistrict, Bang Bua Thong District
- Community Enterprise, Ban Mai Community Rice Center, Bang Yai District

The reason for this selection criteria was because of the moderate performance results that the community enterprise could improve upward. The reason why we did not select the improvement level because there was a risk that the community enterprise would out of business and shut down soon.

For the sample group that uses 90 respondents, because 1 community enterprise group must have at least 30 members, therefore use the minimum number of members. In addition, there are 3 groups of community enterprises at a medium level, each group of 30 members.

The questionnaire was divided into 3 parts, for part 1 was general information about respondents, part 2 was a questionnaire about the competency indicators of supply chain management using the 5 Likert's Rating Scale and part 3 was an open-ended questionnaire showing comments or suggestions about supply chain management of rice community enterprises in Nonthaburi province. The process of creating a questionnaire was as follows:

- 1) Study and research papers and concepts regarding the SCOR Model.
- 2) The researcher created and improved the drafting questionnaire for each factor concerning with the objectives and goals of the research and sorting questions into each part of questions.
- 3) Examine and improve the draft of the questionnaire by examining the words, idioms, meaning, clarity the questions, explanations of the questions and the completeness of the information to be obtained from each question.
- 4) Validity test by presenting questionnaires to research consultants and experts to check the quality and content validity by IOC (Index of Item Objective Congruence), amount 3 persons. The result of the analysis found that every item has value between 0.6 - 1.00
- 5) Test the questionnaire (Tryout) by testing with 30 non-sample community enterprise members. It uses the method of Cronbach. The confidence value obtained by this method is called "Alpha coefficient" ( $\alpha$ ) is equal to 0.96.
- 6) Finally, Bring the questionnaire that has been tried and improved to consult the consultants and experts in order to publish the complete version and use it to collect data. The researcher analyzed the First Order Confirmatory components and analyzed the Second Order Confirmatory components in order to examine the structural validity of the hypothetical model by using software packages.

## Results

The 1st component in planning, consisted of 1.1) Targeting 1.2) Member participation in planning 1.3) Defining organizational management structure and division of duties 1.4) Regulation 1.5) Disclosure of information to members. For the result about planning was weight from 0.62 - 0.96.

The 2nd component of raw materials sourcing consisted of 2.1) Methods for selecting rice varieties 2.2) Methods of selecting rice products 2.3) Cost management for raw

material procurement 2.4) Delivery between suppliers and community 2.5) Delivery between suppliers and community enterprises. For the result about raw materials sourcing was weight from 0.73 - 0.95.

The 3rd component of production consisted of 3.1) Linkage with community enterprise activities 3.2) Product realization system 3.3) System control 3.4) Continuous improvement and development 3.5) Production cost management. For the result about production was weight from 0.77 - 0.98.

The 4th component of delivery consisted of 4.1) Method of delivery 4.2) Delivery safety 4.3) Delivery cost management 4.4) Delivery time and 4.5) Customer satisfaction on delivery. For the result about delivery was weight from 0.77 - 0.99

Finally, the 5th component of return consisted of 5.1) Return procedures 5.2) Safety in return 5.3) Return cost management 5.4) Speed of return and 5.5) Customer satisfaction on return. For the result about return was weight from 0.59 – 0.99.

Therefore, the conclusion of 25 sub-elements can be used as indicators of supply chain management competency for rice community enterprises in Nonthaburi. As shown in Table 1.

**Table 1. Convergent validity**

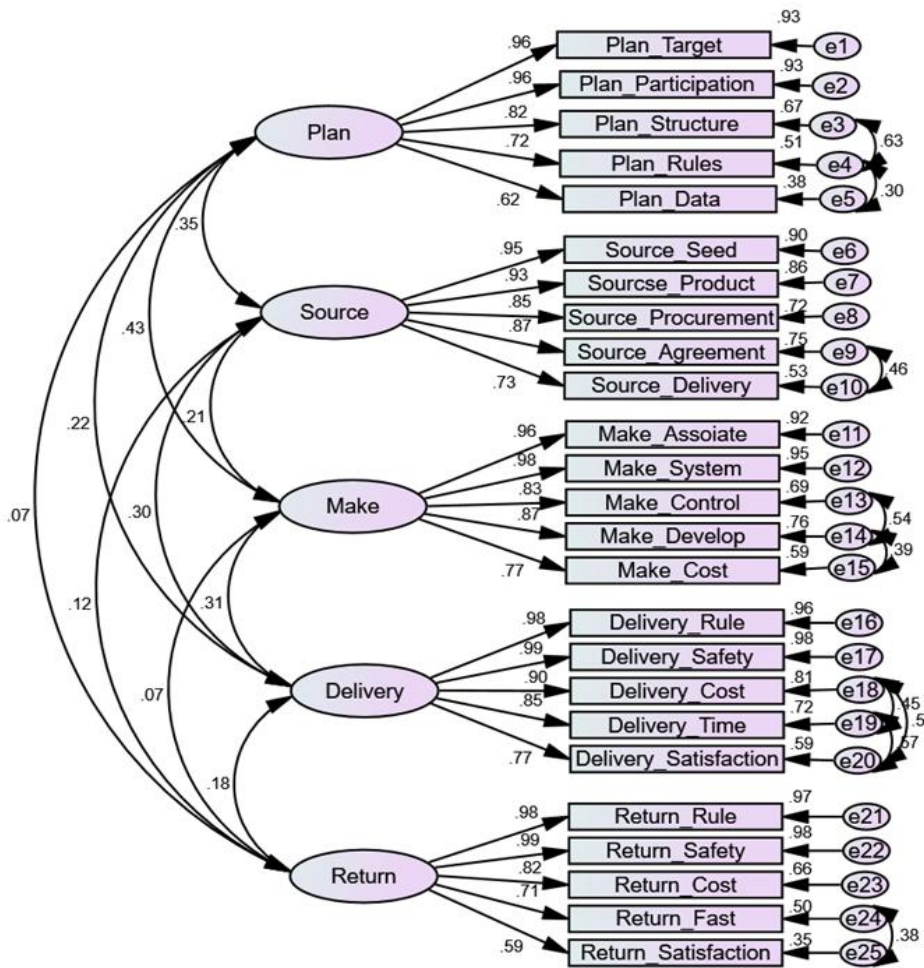
<b>Indicators</b>	<b><math>\beta</math></b>	<b>R2</b>	<b>Composite Reliability AVE</b>	
<b>1. Plan</b>			<b>0.91</b>	<b>0.68</b>
Targeting	0.963*	0.928		
Member participation in planning	0.963*	0.927		
Defining organizational management structure and division of duties	0.817*	0.668		
Regulation	0.718*	0.515		
Disclosure of information to members	0.618*	0.382		
<b>2. Source</b>			<b>0.94</b>	<b>0.75</b>
Methods for selecting rice varieties	0.949*	0.901		
Methods of selecting rice products.	0.929*	0.863		
Cost management for raw material procurement	0.849*	0.720		
Establishing agreements between suppliers	0.866*	0.749		
Delivery between suppliers and community enterprises.	0.727*	0.529		
<b>3. Make</b>			<b>0.94</b>	<b>0.78</b>
Linkage with community enterprise activities	0.959*	0.920		
Product realization system	0.977*	0.954		
System control	0.830*	0.689		
Continuous improvement and development	0.872*	0.760		

Indicators	$\beta$	R2	Composite Reliability AVE	
Production cost management	0.767*	0.588		
<b>4. Delivery</b>			<b>0.96</b>	<b>0.81</b>
Method of delivery	0.982*	0.965		
Delivery safety	0.991*	0.983		
Delivery cost management	0.903*	0.815		
Delivery time	0.849*	0.721		
Customer satisfaction on delivery	0.767*	0.588		
<b>5. Return</b>			<b>0.92</b>	<b>0.69</b>
Return procedures	0.983*	0.966		
Safety in return	0.990*	0.980		
Return cost management	0.815*	0.665		
Speed of return	0.709*	0.503		
Customer satisfaction on return	0.590*	0.348		

Chi-Square = 407.453,  $p=0.00$ ,  $df=256$ ,  $\chi^2 / df = 1.592$ , GFI = 0.747, AGFI = 0.679, CFI = 0.944, TLI = 0.934 RMSEA = 0.082 RMR = 0.015

The harmony analysis result of the 1st confirmative model in supply chain management competency indicators for rice community enterprises at Nonthaburi Province by using the SCOR Model found that the Chi-Square value was 407.453, Goodness of Fit (GFI) was 0.747, Adjusted goodness of fit index (AGFI) was 0.679, Comparative Fit Index (CFI) was 0.944, Root Mean Square Error of Approximation (RMSEA) was 0.082 and Root Mean square Residual (RMR) was 0.015 which had a very near zero value. Therefore, it shows that the model was consistent with the empirical data as shown in Figure 2. In addition, the analysis shown that the competency indicators for supply chain management of rice community enterprises in Nonthaburi all 5 aspects were composite reliability or internal consistency according to the criteria (not less than 0.70) which indicates that the questions represent the same underlying variable. The Convergent Validity or Average Variance Extracted (AVE) aspects ratio of the questionnaire had higher than the criteria (0.50), indicating shown the variance of all observed variables used in the measurement was sufficient.





Chi-sq=407.453, df=256, P-Value=.000,  
 Chi-sq/df=1.592,  
 GFI=.747, AGFI=.679, CFI=.944, TLI=.934,  
 RMSEA=.082, SRMR=.015

Figure 2: Measurement model assessment

The results of the second confirmatory factor analysis found that in each component of supply chain management competency indicators for rice community enterprises in Nonthaburi Province, there were positive values and statistically significant at the level of 0.05 only 4 components. It shown that the four components were planning, procurement of raw materials, production, and delivery and can be used for measurement indicators in supply chain management competency of rice community enterprises at Nonthaburi. The planning had the highest weight of 0.65, followed by the production had the weight of 0.60, the third was the procurement of raw material sources had the weight of 0.51 and the delivery component had the smallest weight of 0.47. In the four components, the confidence in the measurement (R2) was between 0.22 - 0.43., From the result, we can confirm the model of competency indicators Supply chain management of rice community enterprises in Nonthaburi Province according to the theoretical framework defined by the researchers as in Table 2.

**Table 2. Path analysis and factor loadings**

Indicators	Factor Loading	SE	t	R2
<b>Plan</b>	0.654*			0.428
<b>Source</b>	0.514*	0.352	3.055	0.264
<b>Make</b>	0.599*	0.355	3.239	0.359
<b>Delivery</b>	0.466*	0.473	2.928	0.217
<b>Return</b>	0.181	0.534	1.333	0.033

Chi-Square = 488.910, p = 0.00, df = 266,  $\chi^2 / df = 1.838$ , GFI = 0.712, AGFI = 0.648, CFI = 0.917, TLI = 0.907 RMSEA = 0.097 RMR = 0.018

The harmony analysis result of the 2nd confirmative model of supply chain management competency indicators for rice community enterprises at Nonthaburi Province by using the SCOR Model found that the Chi-Square value was 488.910, Goodness of Fit (GFI) was 0.712, Adjusted goodness of fit index (AGFI) was 0.648, Comparative Fit Index (CFI) was 0.917, Root Mean Square Error of Approximation (RMSEA) was 0.097 and Root Mean square Residual (RMR) was 0.018 which had a very near zero value. Therefore, it shown that the model was consistent with the empirical data.

### Result discussions

Based on the analysis of the second confirmation component model, it was found that there were only four components: planning, source, make and delivery which can be used for competency's indicator supply chain management of rice community

enterprises in Nonthaburi province and this could be matched with the study of Erjavec et al. (2019) who also exposed that the positive influence of supply chain competencies and business processes. For returns component cannot be used as an indication, the results are consistent with the results of Jarka (2018) who also exposed that the positive influence of supply chain competencies and business processes. The results showed that rice community enterprises do not have a return delivery process, as the rice community enterprise buys paddy from members for milling and packing them for sale on behalf of the rice community enterprise. (In case the community enterprise has its own mill). The rice community enterprise has never encountered from rice purchased with substandard. Therefore, community enterprises do not have a return methodology and return cost management. In case of rice community enterprise sell directly to consumers, rice community enterprise mill by themselves then product qualities meet the standard requirement and never found a problem that the customer wants to return therefore, community enterprises do not have a returning process management.

### **Conclusion and recommendations**

The development of competency's indicator supply chain management of rice community enterprises should increase the testing measurement invariance across group's process and finally, the indicator can be applied to all rice community enterprises in Thailand. According to the benefits obtained from this research, the rice community enterprises and Nonthaburi Provincial Agricultural Office have competency's indicator of supply chain management as a measurement benchmark and suggest ways accurately to improve supply chain management performance of rice community enterprises in Nonthaburi province. The researcher in the future can study about the perspective of problems and obstacles in the supply chain management of community enterprises in order to develop the capacity of community enterprises to become more competitive.

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## WPLYW KOMPETENCJI ZARZĄDZANIA ŁAŃCUCHEM DOSTAW NA PRZEDSIĘBIORSTWA WSPÓLNOTY RYŻU

**Streszczenie:** Badanie dotyczące analizy czynników i wskaźników kompetencji łańcucha dostaw dla przedsiębiorstw zajmujących się uprawą ryżu miało charakter opisowy. Celem tego badania było zbadanie składników i wskaźników kompetencji łańcucha dostaw dla przedsiębiorstw zajmujących się uprawą ryżu. Próbkę obejmowały 90 członków przedsiębiorstwa zajmującego się ryżem z przedsiębiorstwa społecznego, które uzyskało umiarkowany poziom oceny wyników w prowincji Nonthaburi. Narzędziem badawczym był kwestionariusz dotyczący wskaźników kompetencji zarządzania łańcuchem dostaw, który miał postać 5-stopniowej Skali Oceny Likerta. Przeanalizuj dane, korzystając z analizy komponentów potwierdzających, takich jak alfa, niezawodność złożona, ładunki czynnikowe i AVE, wraz z analizą ścieżek do testowania hipotez za pomocą oprogramowania AMOS. Badanie wykazało, że istniało 5 komponentów i wskaźników kompetencji do zarządzania łańcuchem dostaw przedsiębiorstw zajmujących się ryżem w Nonthaburi, które obejmowały planowanie, zaopatrywanie się w surowce, produkcję, dostawy i zwroty zgodnie z modelem SCORE. Te 5 komponentów i wskaźników kompetencji w zarządzaniu łańcuchem dostaw było spójnych z danymi empirycznymi i statystycznie istotnymi wartościami wagi elementu wynoszącymi 0,05.

**Słowa kluczowe:** kompetencje, zarządzanie łańcuchem dostaw, przedsiębiorstwo zajmujące się społecznością ryżu

### 供应链管理能力和大米社区企业的影响

**摘要:**对水稻社区企业供应链能力的因素分析及指标研究是一项描述性研究。本研究的目的是研究水稻社区企业供应链能力的组成和指标。样本是来自一家社区企业的水稻社区企业的 90 名成员, 该企业在暖武里府获得了中等水平的绩效评估。研究工具是关于供应链管理能力的问卷, 采用李克特(Likert)的 5 个等级量表。通过使用验证性成分(例如 Alpha), 复合材料可靠性, 因子载荷和 AVE 进行分析, 并借助 AMOS 软件进行假设分析的路径分析来分析数据。研究发现, 暖武里稻米社区企业的供应链管理有 5 个组成部分和能力指标, 分别是根据 SCORE 模型进行计划, 原材料采购, 生产, 交付和退货。这 5 个组成部分和能力的指标供应链管理与经验数据一致, 且具有统计学意义的元素权重值为 0.05。

**关键词:**能力, 供应链管理, 水稻社区企业