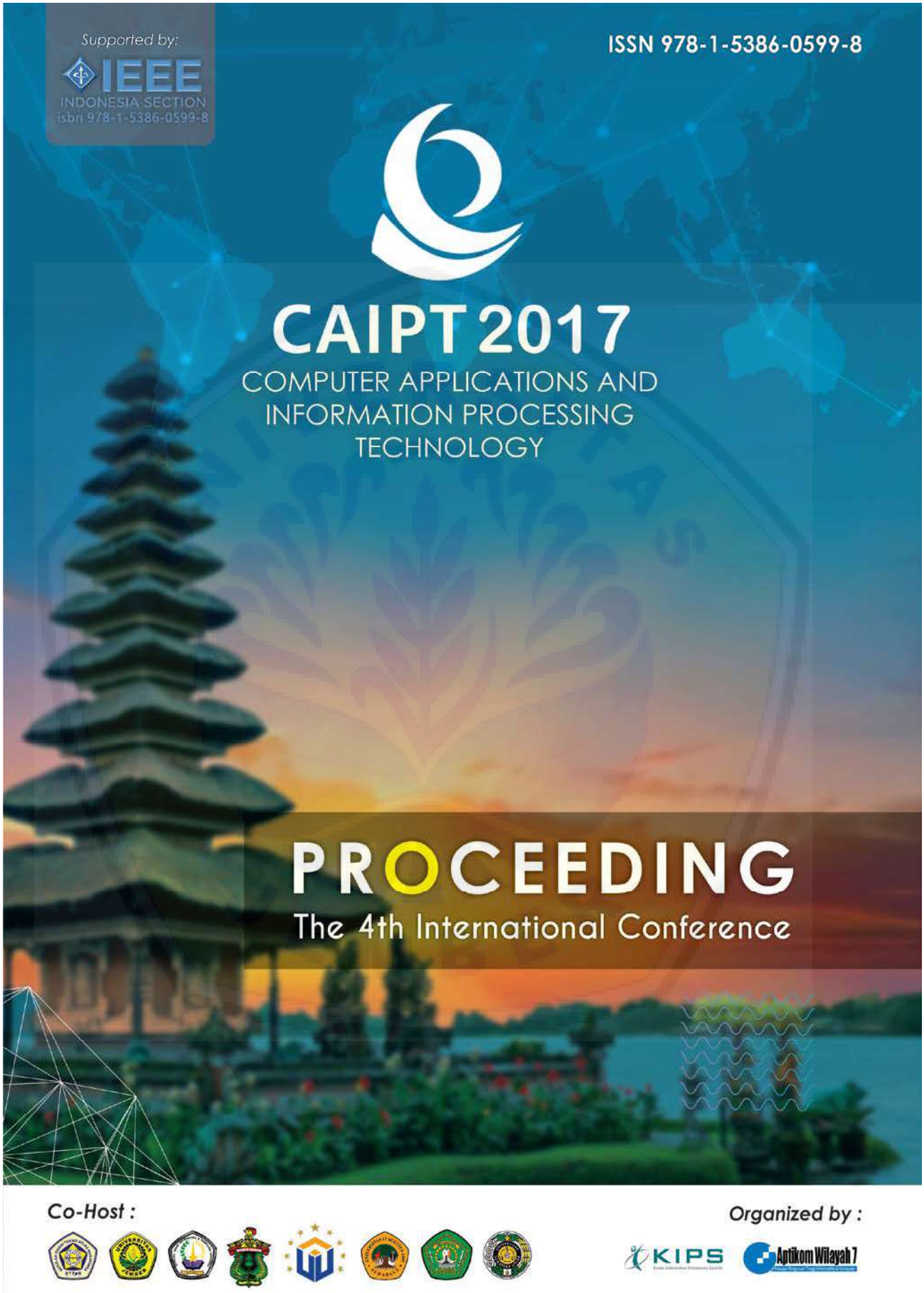

Supported by:
IEEE
INDONESIA SECTION
isbn 978-1-5386-0599-8

ISSN 978-1-5386-0599-8

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Preface

Organization

Table of Content

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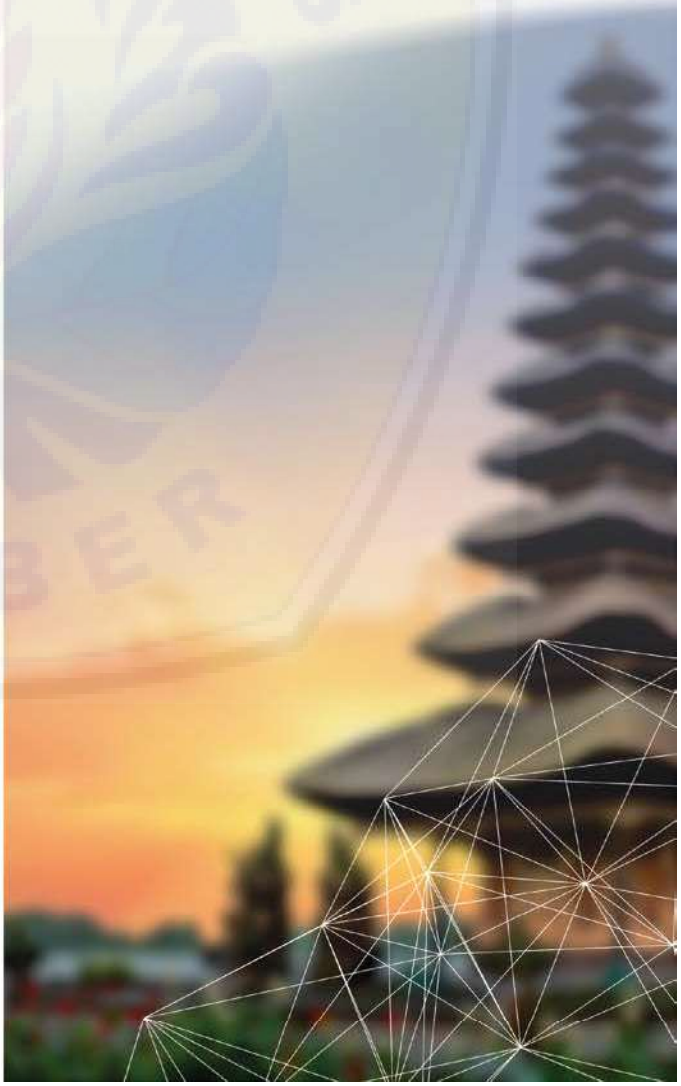

Welcome Message from CAIPT 2017 Honorary Chair

It is our great pleasure to welcome you to the 4th International Conference on Computer Applications and Information Processing Technology(CAIPT 2017), which is held in the historically rich and naturally beautiful city, Bali, Indonesia on August, 8-10, 2017.

CAIPT 2017 is Organized by Korea Information Processing Society (KIPS) and Hosted by Association of Higher Education in Informatics and Computer (APTIKOM).

CAIPT 2017 will focus on various important aspects of advances in ubiquitous information technologies and applications and will provide an opportunity for researchers and practitioners in academia and industry to discuss the state-of-art issues, research results, and progress in ubiquitous information technologies and applications. We expect that the conference and its publications will stimulate related research and technology improvements on this important subject.

We would like to thank the Program Committee members for their contributions to build up an excellent technical program.

We would like to sincerely thank the following speakers who kindly accepted our invitations, and, in this way, helped to meet the objectives of the conference: Prof. Dr.,Ricardus Eko Indrajit (ABFI Institute Perbanas, Indonesia).

The coordination with the General Co-Chairs (Sang Hoon Kim, Teddy Mantoro, Eva Handriyantini), the Steering Co-Chairs(Jin Kwak, Joko Lianto), the Program Co-Chairs(Kyung Oh Lee, Media A. Ayu),the Organization Chair (Betty Dewi Puspasari), the Publication Chair (Mukhlis Amien), the Publicity Co - Chairs (Eun Young Cho, Rangga Firdaus,Nurul Hidayat), was essential for the success of the final program. We sincerely appreciate their constant support and guidance.

Finally, we would like to thank the Korea Information Processing Society and Asosiasi Pendidikan Tinggi Ilmu Komputer Indonesia for providing valuable assistance to the conference.

We hope you will find the conference very productive and enjoyable.

CAIPT 2017 Honorary Chair
Seok-Cheon Park
Chairman of KIPS IT Convergence Society

Prof. Dr. Lee Kyeong Oh

The Fourth Industrial Revolution is a very hot topic in Korea and I want to share the notion of it with Indonesia educators and researchers.
The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.
Previous industrial revolutions liberated humankind from animal power, made mass production possible and brought digital capabilities to billions of people. This Fourth Industrial Revolution is, however, fundamentally different. It is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.
The resulting shifts and disruptions mean that we live in a time of great promise and great peril. The world has the potential to connect billions more people to digital networks, dramatically improve the efficiency of organizations and even manage assets in ways that can help regenerate the natural environment, potentially undoing the damage of previous industrial revolutions.
The Fourth Industrial Revolution builds on the Digital Revolution, representing new ways in which technology becomes embedded within societies and even the human body. The Fourth Industrial Revolution is marked by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, The Internet of Things, 3D printing and autonomous vehicles. These technologies have great potential to continue to connect billions more people to the web, drastically improve the efficiency of business and organizations and help regenerate the natural environment through better asset management.[9]

Prof. Dr. Ir. R. Eko Indrajit, M.Sc., MBA., Mphil., MA

Utilizing Big Data to Gain Competitive Advantage: Hypothetical Cases of Indonesia

Many modern companies are flooded with data and information gleaned from their day-to-day business activities. However, there are very few of them who can turn it into a precious asset and provide benefits to the company. Lack of knowledge and competence in the field of data science became one of the causes.
Competition in the 21st century lies in how far the company can learn and master knowledge - where the main source is data and information. Initially, Big data is merely a supporting technology, but has now become a very powerful competing weapon for those who successfully utilize it effectively.
This session provides an overview of how strategic and technical big data use can improve business competitiveness during its significant utilization.

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Table of Contents

Selection of Supplier Using Analytical Hierarchy Process

Creating Value Added in the Supply Chain Agribusiness

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***Abstract*— The concept of Supply Chain Management (SCM) has significant potential for added value which can be utilized with the concepts of innovative economy. One of the added value in SCM is the supplier selection process. This research is model in SCM Agribusiness supplier selection using Analytical Hierarchy Process (AHP). The criteria used in this model is the price, past performance, delivery time, professionalism, quality, locations, responsive, and guarantee. The value of criteria entered by suppliers assessed with weights determined by the agro-industrial company by using AHP. Based on experiments with the value of each supplier, then processed using the AHP generated ranking of suppliers. The first ranking generated is the first option to supply the raw material in which the supplier register**

Keywords—Added Value, Supply Chain Management, Analytical Hierarchy Process, Agro-Industrial, Ranking of Supplier

I. INTRODUCTION

Economics and finance continue to grow. The rapid development of information technology effects the global communication services. For example in modern exchange economies, the smooth functioning of economic activity is heavily dependent on the reliability and the efficiency of payment systems. Cash transactions are steadily diminishing; consumers and firms generally settle their obligations through banks or other financial intermediaries [2]. This condition causes the reaction of the community faster and more frequent interaction between people. The interaction between economic actors and the rapid reaction led to competition between companies are getting tougher.

Market penetration is well influence the development of new economic actors with different strategies. The role of new economic actors enables new business venture succeeded in penetrating the market and win market share. This strategy prioritizes sustainable competitive advantage, which can help to build a new business in the market [5].

The concept of SCM has significant potential for added value which can be utilized with the concepts of innovative economy. This is not only related to transactions in supply chain management, but also by the management and owners of the company. High impact of the implementation of supply chain management in the company's success is the reduction of costs in purchasing and logistics, increased efficiency, optimization of working capital, improve the level of service delivery etc. The main challenge is to make decisions on the basis of value-oriented and implement a sustainable manner [6].

This research develops SCM agro industrial using AHP. The concept of SCM has been regarded as an important part of development in modern management. SCM has proven develop traditional companies such as manufacturing and retail to improve performance and efficiency in the coordination of transactions between suppliers and customers. However, SCM development in the domain of agro-industry still not widely discussed.

An agro-industry system consisting organization responsible for the production and distribution of agricultural products. It can generally be divided into two main types: (a) Agribusiness chain for fresh agricultural products' (such as fresh fruit, vegetables, and flowers). In general, this chain may consist of farmers, auctions, wholesalers, importers and exporters, retailers and specialty stores and their input and service suppliers. The main processes carried out in the agribusiness chain is the handling, storage, packing, transport and trade, (b) Agribusiness chain for processed food products (such as snacks, juices, canned food products). In this chain, agricultural products used as raw materials to produce consumer products with higher added value [4]. Participants in

both types of chains, such as farmers, traders, processors, retailers, etc., understand that a quality product can be damaged due to improper service supplier. This research is model in SCM Agribusiness supplier selection using AHP.

The rest of this paper is organized as follows: The theoretical consideration that supports the related works is described in section 2. The proposed model for SCM in Agribusiness using AHP is discussed in section 3. Section 4 discusses Selection of supplier using AHP in agribusiness.

II. Related Works

Research [8] discusses Maintained the supply chain framework used to evaluate a variety of marketing issues and to evaluate the performance of the marketing system. The results of this research is refreshingly positive. It was found that the marketing system is so excited. It is characterized by entrepreneurial behavior by the private sector, where businesses along the chain to compete and innovate in order to expand their business. However, they are constrained by poor infrastructure, so it takes the high cost of doing business. The conclusion of this research that the use of Supply Chain Framework can improve the performance of agricultural marketing systems in developing countries.

The research of [1] using AHP to assess risk in the SCM. The purpose of this research is to develop models that assess risk in the supply chain and involve AHP in the definition of priority decisions. From the results of the case study shows that the model is very helpful in creating awareness of the risk factors of the supply chain. Manager involvement is very important in building a comprehensive decision related to critical issues and interdependencies in determining the risk analysis complete.

III. The Proposed Model

The sectors of agribusiness is very broad and diverse. This industries categorized by different types such as fresh food industry, the organic food industry, processed food industry and animal feed industry. If applied SCM in the agribusiness then needed a different strategy. Each Types requires different supply chain strategies such as, distribution management, inventory management, procurement and sourcing, packaging and labelling systems, and warehouse management [3].

SCM in agribusiness is the management of agricultural products into food products which form a very complex network. Each company at least establish a supply chain with other companies, usually have multiple suppliers and customers that vary at the same time and from time to time.

The implication of SCM agribusiness is the management of the relationship between the supply of products from the farm to the consumer to meet the needs of consumers in terms of quantity, quality and price is getting better. In practice, this often includes management of both horizontal and vertical alliances and continuous process between companies.

The SCM framework consists of three major and closely related elements: business processes, management components, and the structure of the supply chain. Supply chain business processes associated with the processes that should be linked with each of these key supply chain members. Business processes are the activities that produce a specific output of value to the customer. Supply chain management components is the level of integration and management that should be applied for each process link. The management components are the components by which the business processes are structured and managed. Supply chain network structure associated with the key supply chain members with whom to link process. The supply chain structure is the configuration of companies within the supply chain [3].

Supply Chain is not only associated with manufacturers and suppliers, but also, depending on the logistics flow, transporters, warehouses, retailers, and consumers themselves. Supply Chain more broadly related to new product development, marketing, operations, distribution, finance, and customer service [3].

The SCM framework in this research is starting with the process of entering data agro-products by the company that focuses on the procurement of raw materials. The information of agro-products store data of different raw materials. Data from each raw material is supplemented by attributes of quality and quantity required of each material. Agro-industry product data that has been entered by the company can be monitored by the supplier. Supplier bid by filling in raw material prices, transportation will be used for shipping, as well as information that will be submitted to the agro-industrial companies. Data supplier who enroll in the system can only be accessed by the company, then assessed by the company. The assessment criteria such as in Figure 1, after the assessment process continued by process of selecting suppliers by using AHP.

Based on the requirement of the supplier selection system using Analytical Hierarchy Process to create added value in the agribusiness supply chain, the proposed system as shown in Figure 2.

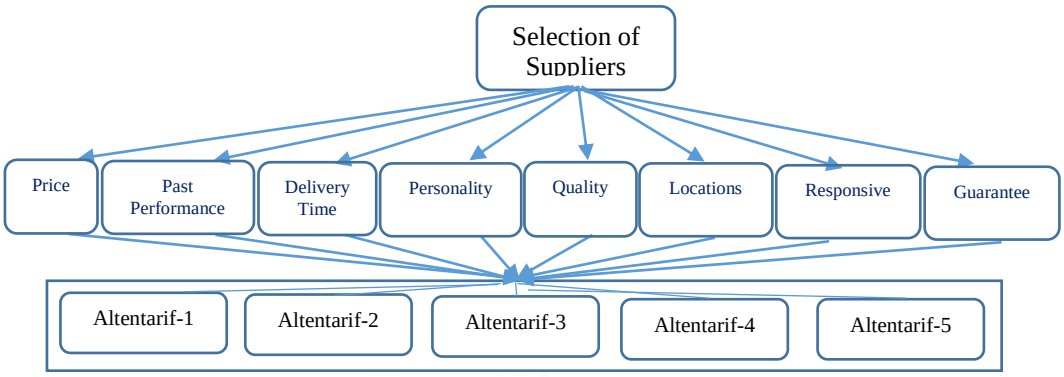

Fig. 1. The Assesment Criteria

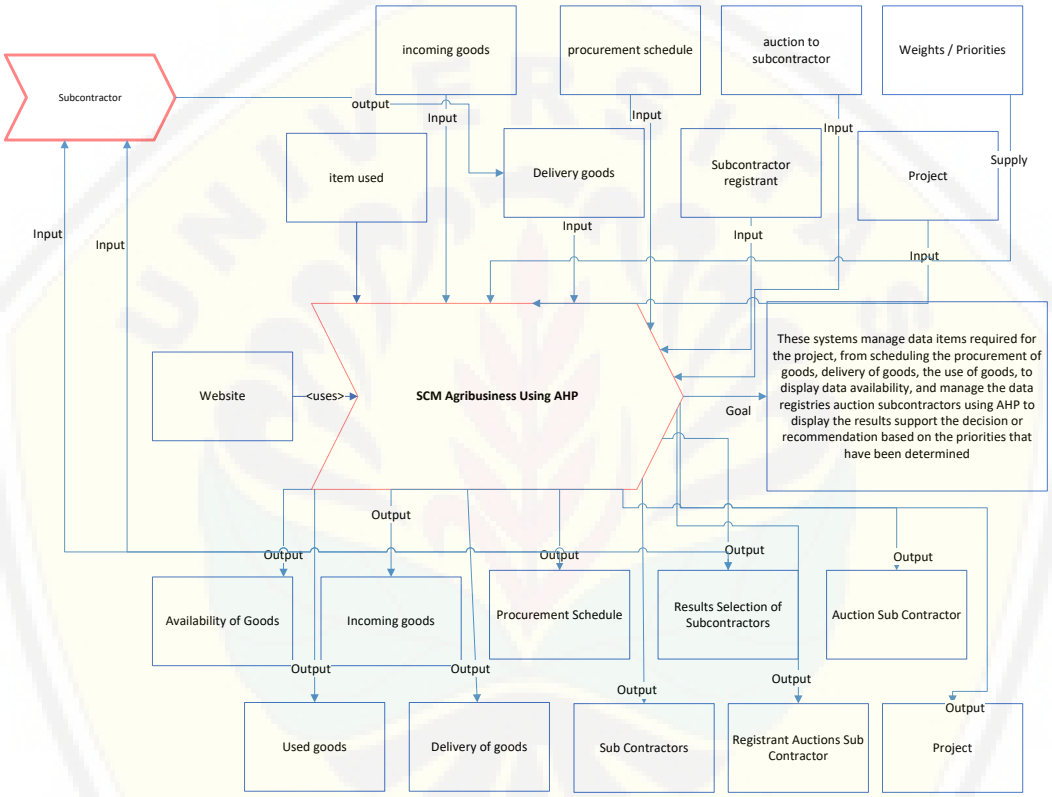

Fig. 2. Business Process SCM Agrobusiness Using AHP

IV. Results and Discussion

Selection of suppliers using AHP in principle is multiplying the weight criteria, which have been calculated by the AHP process, with input value in the supplier appraisal form. Based on supplier selection using AHP, then selected a supplier who has the highest value of each raw material in the agro-industrial products registered by the supplier.

The first step of the AHP method is create a matrix of pairwise comparisons. The matrix of pairwise comparisons (Table 1) is based on the interest scale. Table pairwise comparison matrix determined by experts in the field of agro-industry (to match the actual conditions). Giving importance weight is based on a fundamental scale [7] as shown in Table 1. After the pairwise comparison matrix is obtained, followed by summing each column criteria.

Once obtained the Matrix of Pairwise Comparisons followed by determining the weights priorities. Priority weight calculation begins by dividing each value in the column with the number of values in the column as shown in table 2

After dividing each value in the column with the number of values in the column, then followed by summing each row of the result of the division in Table 2. The result of this sum is a priority vector to each criterion used as the basis for calculating the supplier selection. Priority vector as shown in Table 3. From these calculations resulting matrix of comparison with the results of the calculation priority weight as shown in Table 4.

.

Table 1 Matrix of Pairwise Comparisons

	Price	Past Performance	Delivery Time	Profesionalism	Quality	Locations	Responsive	Guarantee
Price	1	2	2	1	1	5	4	3
Past Performance	00.05	1	2	00.05	5	3	0,23125	0,23125
Delivery Time	00.05	00.05	1	00.05	00.05	3	2	2
Profesionalism	1	2	2	1	1	5	4	3
Quality	1	02.00	2	1	1	5	4	3
Locations	00.02	0,23125	0,23125	00.02	00.02	1	2	00.25
Responsive	00.25	3	00.05	00.25	00.25	00.05	1	0,23125
Guarantee	0,231	3	00.05	0,23125	0,23125	4	3	1
Amount	4.783	13.833	10.333	4.783	4.783	26.05.00	20.333	12.916

Table 2. Dividing each value in the column with the number of values in the column

	Price	Past Performance	Delivery Time	Profesionalism	Quality	Locations	Responsive	Guarantee
Price	1/4.783	2 / 13.833	2 / 10.333	1 / 4.784	1 / 4.784	5 / 26.500	4 / 20.333	3 /12.926
Past Performance	0.5/ 4.783	1 / 13.833	2 / 10.333	0.5 / 4.784	0.5 / 4.784	3 / 26.500	0.3 / 20.333	0.3 /12.926
Delivery Time	0.5/4.784	0.5 / 13.833	1 / 10.333	0.5 / 4.784	0.5 / 4.784	3 / 26.500	2 / 20.333	2 /12.926
Profesionalism	1/ 4.784	2 / 13.833	2 / 10.333	1 / 4.784	1 / 4.784	5 / 26.500	4 / 20.333	3 /12.926
Quality	1/4.784	2 / 13.833	2 / 10.333	1 / 4.784	1 / 4.784	5 / 26.500	4 / 20.333	3 /12.926
Locations	0.2/ 4.784	0.3 / 13.833	0.3 / 10.333	0.2 / 4.784	0.2 / 4.784	1 / 26.500	2 / 20.333	0.3 /12.926
Responsive	0.3/4.785	3 / 13.833	0.5 / 10.333	0.3 / 4.784	0.3 / 4.784	0.5 / 26.500	1 / 20.333	0.3 /12.926
Guarantee	0.3/4.786	3 / 13.833	0.5 / 10.333	0.3 / 4.784	0.3 / 4.784	4 / 26.500	3 / 20.333	1 /12.926

Table 3 Priority Vector

Criteria	Priority Vector
Price	0.198
Past Performance	0.092
Delivery Time	0.102
Profesionalism	0.198
Quality	0.198
Locations	0.042
Responsive	0.064
Guarantee	0.106

Table 4. Matrix of comparison and priority vector

	Price	Past Performance	Delivery Time	Profesionalism	Qty	Locations	Responsive	Guarantee	Priority Vector
Price	1.000	2.000	2.000	1.000	1.000	5.000	4.000	3.000	0.198
Past Performance	0.500	1.000	2.000	0.500	0.500	3.000	0.333	0.333	0.092
Delivery Time	0.500	0.500	1.000	0.500	0.500	3.000	2.000	2.000	0.102
Profesionalism	1.000	2.000	2.000	1.000	1.000	5.000	4.000	3.000	0.198
Quality	1.000	2.000	2.000	1.000	1.000	5.000	4.000	3.000	0.198
Locations	0.200	0.333	0.333	0.200	0.200	1.000	2.000	0.250	0.042
Responsive	0.250	3.000	0.500	0.250	0.250	0.500	1.000	0.333	0.064
Guarantee	0.333	3.000	0.500	0.333	0.333	4.000	3.000	1.000	0.106
Amount	4.783	13.833	10.333	4.783	4.783	26.500	20.333	12.916	

The next step is to test the consistency by multiplying the sum of the pairwise comparison matrix in each column with each of the priority vector to obtain the value of λmax.

λ_{max} = (4.783* 0.198) + (13.833* 0.092) + (10.333* 0.1102) + (4.783* 0.198) + (4.783* 0.198) + (26.500* 0.042) + (20.333* 0.064) + (12.926* 0.106)

λ_{max} = 8.951112

λmax value that has been obtained, is used to calculate the CI (Consistency Index) and CR (Consistency Ratio). Comparison matrix is called consistent if the CR value <0.10.

$$CI = \frac{(\lambda max - n)}{(n-1)} \quad (1)$$

$$CI = \frac{(8.951112 - 8)}{(8-1)}$$

CI = 0.136

$$CR = \frac{CI}{RI} \quad (2)$$

$$CR = \frac{0.136}{1.41}$$

CR = 0.096 (consistent)

The next step is calculate the AHP value that given to each supplier. The value assigned to the supplier (very low (=1), low (=2), enough (=3), good (=4), and very good (=5)) is considered as an alternative as shown in Table 5.

Table 5 Comparison Matrix and Priority Vector Alternatives

Alt.	1	2	3	4	5	Priority Vector
1	1.000	0,23125	0,1388889	0,0993056	0,0770833	0.03482
2	3.000	1.000	0,23125	0,1388889	0,0993056	0.06778
3	5.000	3.000	1.000	0,23125	0,1388889	0.12033
4	7.000	5.000	3.000	1.000	0,23125	0.26023
5	9.000	7.000	5.000	3.000	1.000	0.50282
Sum	25.000	16.333	9.533	4.676	1.787	

λ_{max} = 5,24032; CI = 0,06008;

CR = 0.06675 (consistent)

After calculating the priority vector is completed and the value of each supplier has been entered by the assessors (Table 6), the next step is perform the multiplication operation the priority vector of each criterion with a vector priority alternative of each supplier.

One example calculation is the Supplier A with value for the criterion Price = 5, Past Performance = 4, Delivery Time = 4, Professionalism = 4, Quality = 5, Locations = 4 Responsive = 5, Guarantee = 4. Calculation to another Supplier conducted in the same manner as shown in table 7.

The calculation result of Supplier A by using AHP is as follows:

AHP_{result} = (0.198* 0.50282) + (0.092 * 0.26023) + (0.102 * 0.26023) + (0.198 * 0.26023) + (0.198 * 0.50282) + (0.042 * 0.26023) + (0.064 * 0.50282) + (0.106 * 0.26023) = 0.37188

Table 6. The Value of Each Supplier

Supplier	Price	Past Performance	Delivery Time	Profesionalism	Quality	Locations	Responsive	Guarantee
A	5	4	4	4	5	4	5	4
B	4	4	5	4	4	5	4	4
C	3	4	3	4	4	4	4	4
D	4	5	4	5	4	3	4	5
E	5	4	4	4	4	4	4	4
F	4	4	4	4	4	5	4	5
G	5	4	4	4	3	5	4	4
H	4	3	3	2	4	3	3	4
I	3	2	3	3	5	3	3	5
J	4	4	4	4	4	3	4	4
K	2	4	5	4	5	4	4	5
L	5	4	4	4	4	4	4	3

The next step is the ranking of suppliers based on calculations using AHP. Agro industrial company will choose suppliers with the highest scores based on raw materials needed agro industrial products. Supplier with the highest result is the winner of the tender and could be supplying

material suitable agro-products were selected upon registering (Table 7)

Table 7 Calculation and Rankings Results by using AHP

Supplier	AHP Results	Rangk
Supplier A	0.37188	1
Supplier D	0.35040	2
Supplier K	0.32058	3
Supplier E	0.30823	4
Supplier F	0.29623	5
Supplier B	0.29511	6
Supplier L	0.29337	7
Supplier G	0.29078	8
Supplier J	0.25433	9
Supplier I	0.23183	10
Supplier C	0.21833	11
Supplier H	0.18016	12

V. CONCLUSION

The concept of SCM using AHP has significant potential to increase the added value in decision making on the basis of value-oriented and implement a sustainable manner in selecting supplier's agribusiness with the criteria of price, past performance, delivery time, professionalism, quality, locations, responsive, and guarantee. The value of criteria entered by suppliers assessed with weights determined by the agro-industrial company by using AHP. Based on experiments with value of each suppliers are (A =(5, 4, 4, 4, 5, 4, 5, 4), B = (4, 4, 5, 4, 4, 5, 4, 4), C = (3, 4, 3, 4, 4, 4, 4,4), D = (4, 5, 4,5, 4, 3, 4, 5), E = (5, 4, 4, 4, 4, 4, 4, 4), F = (4, 4, 4, 4, 4, 5, 4, 5), G =(5, 4, 4, 4, 3, 5, 4, 4), H = (4, 3, 3, 2, 4, 3, 3, 4), I = (3, 2, 3, 3, 5, 3, 3, 5), J = (4, 4, 4, 4, 4, 3, 4, 4), K = (2, 4, 5, 4, 5, 4, 4, 5), L = (5, 4, 4, 4, 4, 4, 4, 3)) then generated that the first rank by using AHP is supplier A with value = 0.37188, so the supplier A is approved for supplying the raw materials that they registered.

ACKNOWLEDGEMENTS.

This research was fully supported by Hibah Kompetensi RISTEK DIKTI 2016 (Second Year).

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