

## Proposal for the Development of the Livestock 6<sup>th</sup> Industrial Producers Improvement Index Based on the Kano Model\*

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### Abstract

**Purpose** - The main purpose of this study is to contribute to the elevation of producers' production at various levels by proposing the creation of producer improvement indexes that can be used for the successful 6th industrialization of Korean agribusiness based on the Kano model and has synergistic effects on the development of the 6th industry through scientific researches.

**Research design, data, methodology** - To this end, this study derived better and worse index from the same estimation of Timko's customer satisfaction index as in the evaluation charts used in previous researches and theoretical studies on the Kano model.

**Results** - In this paper, we suggested that the formula for producing PSCI Index be applied to yield the producer improvement index in the 6th industry, in order to draw SIPPI.

**Conclusions** - If this suggestion is realized, then a lot of researchers will be supported to more systematically study producers, and it is expected to contribute to the development of the 1th industry, a basis for the successful 6th industry. Moreover, the central government and municipalities are expected to provide a variety of clues for applying various policies for successful agribusiness.

**Keywords:** 6<sup>th</sup> Industry, Livestock, SIPPI (6th Industrial Producers Improvement Index), Kano Model.

**JEL Classification Code:** D20, L11, M10, M11, Q10

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## **1. Introduction**

The Korea Rural Economic Institute reports that the production amount of whole agriculture field of our country has increased steadily since 2007 with the help of the increase of production amount of livestock and sericulture industry, but due to the effect of the foot-and-mouth disease etc. in 2011, the total agricultural production amount dropped to the 2009 level and it has gone back to the rising trend due to the rise of prices caused by the drop of production amount because of the cold waves, typhoon, drought and high temperature damage etc. in 2012. Specifically speaking, the agricultural production amount in 2012 was 44 trillion, 300 billion and 300 million won, an 7.1% increase compared to the previous year, and the production amount of cultivation business was 28 trillion 206 billion and 600 million won, an increase of 7.2% and the production amount of livestock and sericulture business was 16 trillion 093 billion and 700 million won, an increase of 7.0% compared to the previous year (The Korea Rural Economic Institute: KERI, 2014). However, according to this report, the agricultural income compared to the city laborer household income is in the decreasing trend from 57.6% in 2008 to 57.6% in 2012, and the difference of the incomes between the urban and rural areas is becoming bigger and aggravated and thus is judged to be because of the increase of old farms which have low income level. On another hand, with the help of efforts of our government related to the 'new growth mobilization of the agriculture and livestock industry' strategy and the agriculture and livestock industry related institutions and agriculture and livestock industry related people, the 6th industry of our country is being assessed to being paraded positively in various places.

By way of these strategies, the interest in the 6th industrialization of the agricultural food which was being performed in a minute way for the time being has increased explosively, and although the academic approach is still scarce, many proposals are being made (Yang et al., 2014) about the concept, process and business direction of the 6th industry by related institutions and researchers (e.g. Hwang, 2011; Jo et al., 2013; Kim et al., 2013; NHERI, 2014; Yoo, 2013). Especially, Yang et al. (2014) has verified from the producer's point of view in his study on the possibility of the Sextic industry's continuous development if the Sextic industry assessment index proposed by Kim et al.(2013) can be scaled and according to the result, reported that there is a possibility of scaling except for some variables.

This study is a continuous study of the study of Yang et al. (2014), and intended to propose for the development of the Sextic industrial producers' improvement index utilizing the Sextic industry assessment index through Kano model against the Korean livestock producers. The reason is because in order for the 6th industry to succeed as the business model, not the simple union of the 1st, 2nd and 3rd industries, but the organic and comprehensive fusion between industries should be made and which industry field's problem it is should be diagnosed when a problem occurs, eventually to secure the business competitiveness through swift improvement and change of direction (Yang et al., 2014).

The result of this study is expected to provide clues for the proposal of the political direction about the Sextic industry as in the conventional studies of Yang et al.(2014), to propose the direction for the development of diagnosis criteria about each industry from the fusion and complex point of view input in the 6th industry and eventually to become a foundation for the development of various criteria like the satisfaction criteria against the consumers, the Sextic industry's actual demanders. In addition, it will be possible to improve scientifically the livestock industry in Korea by suggesting how the producers should improve in order to develop the 6<sup>th</sup> industry of the livestock industry.

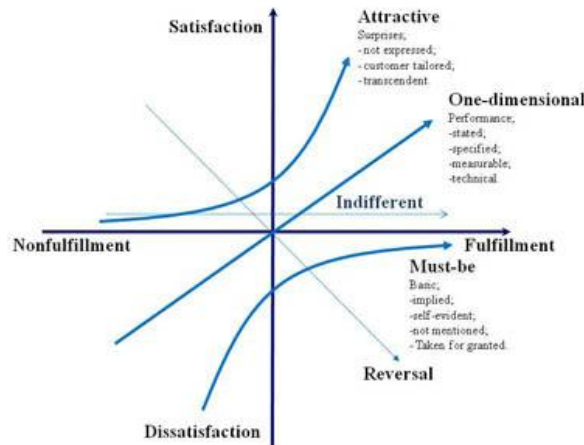
## **2. Literature Review**

### **2.1. Kano model**

The Kano model was proposed by the professors of Rika university in Tokyo, Japan, Kano Noriyaki and Takahashi. And, the base of the Kano model analogized from the Motivator-hygiene Theory of Herzberg (1966) and was published as the motivator-hygiene character of the property and based on this theory, Kano et al. (1984) has proposed the dualistic recognition method of the quality to supplement the limitations of the unitary recognition method of the quality.

To take an example of the theory of these people, when the character, A of a certain product is an important quality element, in the case of the unitary epistemology, if the character A is ample, the product is satisfied and if not, the product is not satisfied. However, in the dualistic recognition method point of view of the quality, if the character A is not ample, there is dissatisfaction, and even if the character A is ample, there is no satisfaction, but

only it is taken for granted. In order to classify the quality elements by way of the dualistic method of Kano et al. (1984), questionnaire method using two conflictory questions was proposed about one quality item. All the questions were composed of pairs of the items which can assess the quality effectively and were composed of pairs of the positive and negative questions. Specifically, the questioning method of Kano is to ask about the feelings about the positive and negative conflicting service attributes in hypothetical situations like 'how would you feel if the state is better than now?' and 'how would you feel if the situation is worse than now?' etc. about each item.



Note: Quoting the study of Kano et al. (1984)

Figure 1: Kano Model

In this paper, we cited Yang (2013) and Kim (2003)' analyzing process about Kano model, producer satisfaction factor and 6<sup>th</sup> industrial producer improvement index (SIPPI).

The Kano model places the physical satisfaction situation in the horizontal axis and the satisfaction in the vertical axis and is interpreting the concept of the quality in a dualistic way (see <Figure 1>). Especially, it is considering at the same time the subjective phase (satisfaction and dissatisfaction) and the objective phase (fulfillment and non-fulfillment) and is classifying into the three quality elements, the attractive quality element, one-dimensional quality element and the must-be quality element and the 2 elements which cause the dissatisfaction. The elements are as follows.

<Figure 1> shows a two-dimensional interpretation of the concept of quality with physical fulfillment on horizontal axis and satisfaction on longitudinal axis. In particular, subjective (satisfaction and dissatisfaction) and objective aspects (fulfillment and unfulfillment) are simultaneously considered for the quality which is divided into three main quality factors that bring about satisfaction and two factors that result in dissatisfaction. First, the attractive quality element refers to the attribute that if it is given to users, their satisfaction would be increased, while they would not be unsatisfied and they may not identify its absence because they have not known or expected its existence, even though it is not provided to them (Seo & Song, 2011). Such an attractive quality element becomes a source of the customer's delight, in that it fulfills something that customers have never expected, or it gives satisfaction much more than customers expect (Kano, 2001). Thus, the attractive quality item will be an important source for improvement of the 6th industry on the part of producers. Second, the one-dimensional quality element corresponds to a general quality element, in that it represents satisfaction if it is fulfilled according to level of performance, while it can also represent dissatisfaction if is not fulfilled. This quality element is always desired by customers for products or services: the higher the fulfillment of quality, the higher the satisfaction with products.

Thus, if it were not fulfilled, it would be difficult to achieve the successful 6th industry, as it is always required by customers. Third, the must-be quality element cannot clearly bring about customer's satisfaction and it cannot give satisfaction, since it's fulfillment is thought to be deserved one, but it also represents dissatisfaction, if it is not fulfilled. This element, as a basic one that is thought to be necessarily exist, can be also believed to prevent dissatisfaction, because it can cause dissatisfaction, if it is not fulfilled, while it is thought that it is deserved to be fulfilled, even if it is fulfilled. Kano (2001) argued that the must-be quality element is more important than any other elements, and that if it cannot have fulfilled, satisfaction with services would be drastically decreased, so recovery of

reliability would be seriously affected. From this view, it is an element that should be necessarily achieved for producers to succeed in the 6th industry. Fourth, the indifferent quality element does not bring about both satisfaction and dissatisfaction, regardless of whether it is fulfilled or not. Fifth, the reverse quality element induces dissatisfaction, though it is fulfilled, while it also causes satisfaction, even if it is not fulfilled. Finally, the skeptical quality element is a nonsense response, from the perspective of general evaluations, such a response may be provided, because of responders' poor understanding of the questionnaire or their lower understanding.

Although the Kano model is the measurement of the degree of recognition by the consumers about the quality, since this study is directly related to the 6th industry assessment index and the 6th industry achievement, and thus this study has intended to measure the degree to which the producers recognize. Six quality elements are evaluated by using the evaluation chart in which order pairs correspond to positive and negative attributes of responses and two-dimensional quality element are found by corresponding responses to the questionnaire to two-dimensional evaluation table of quality elements, and the results from such a table are collected by the tabulation of surveys in <Table 1> (Kim, 2003).

**Table 1:** Quality factor evaluation table of Kano model

		Unsatisfied	Negative question				
			①	②	③	④	⑤
Positive question	① I like it	Q	A	A	A	O	
	② Of course	R	I	I	I	M	
	③ I have no feeling	R	I	I	I	M	
	④ I cannot tell	R	I	I	I	M	
	⑤ I don't like it	R	R	R	R	Q	
		A: Attractive M: Must-be R: Reverse	O: One-Dimension I: Indifferent Q: Questionable				

Note: Quoting the study of Walden (1993)

The evaluation chart in <Figure 1> presents the guidance for quality evaluation, by differentiating order pairs of (satisfaction and dissatisfaction) in the analysis of data. For example, where respondents make marks on ②, in response to the positive question, 'how do you feel if a strategy is proper?' and they make marks on ⑤, in response to the negative question, 'how do you feel if a strategy is not proper?' their intersection point can be evaluated as the 'must-be quality element'(M). Values required for producers, which are categorized for each item can be collected in following survey and analysis chart in <Table 2>.

**Table 2:** Kano's model of quality survey

Customer requirements	A	M	O	I	R	Q	Sum	Average
1								
2								
3								
:								

Note: Quoting the study of Kim (2003)

According to Kim (2003), the statistical value of each customer classified by the survey chart is not significantly different, and it is classified according to the following method.

- If,  $(A+M+O) > (R+Q+I)$  → Classified as the largest value among A, M, and O
- If,  $(A+M+O) < (R+Q+I)$  → Classified as the largest value among R, Q, and I

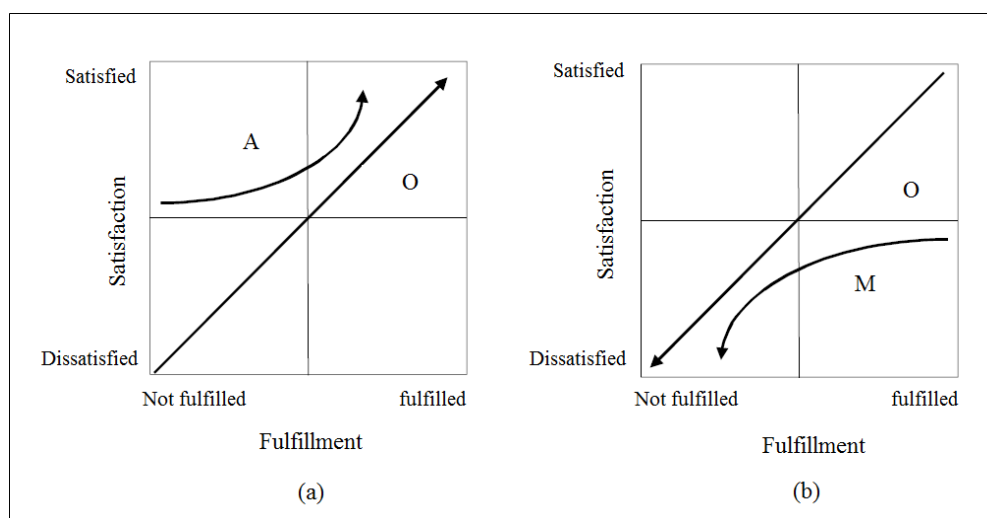
## 2.2. Producer Satisfaction Coefficient

In the characteristic classification method of quality according to the physical satisfaction level and fulfillment level using the Kano model, when the characteristic of the quality is decided, the response which has the mode is assessed as the specific quality element and thus the relative difference between the elements with relatively strong quality characteristics and elements with weak quality characteristics in terms of the characteristics of the quality is ignored (Kim, 2003; Yang, 2013). In order to supplement the problems which characterizes representatively these mode values only, Timko (1993) has calculated the degree of effect of the customers' satisfaction and dissatisfaction using the customer satisfaction coefficient (CS-Coefficient: Customer Satisfaction Coefficient). In this study, we suggest that the customer satisfaction coefficient should be revised to be used as the 6<sup>th</sup> industrial producers Improvement Index(SIPPI).

The customer satisfaction coefficient is the coefficient which comprehends how much the degree of the customer's satisfaction can rise when he uses the product or the service and how much it can drop when dissatisfied and is using the two indexes, Better index and Worse index to assume the average of the individual product element (Timko, 1993).

The Better index is the expected level of the satisfaction improvement effect which can increase the customer satisfaction when a specific product or service satisfies the desires of the customer and refers to the potentiality or the expected level which can increase the customer satisfaction when a specific service satisfies the demands of the customer and can be the element which regulates the importance in the service quality element see as shown in <Figure 2> (a). Accordingly, from the producer's point of view, the assessment about the 6th industry can be called the expected level of the producer's satisfaction improvement effect and is the element which regulates the importance for the success of the Sextic industry.

The Worse index represents the expected level of the dissatisfaction decrease effect which can decrease the customer's dissatisfaction when specific product or service does not satisfy the customer's desire and means the potentiality or the expected level which can decrease the customer's dissatisfaction when a specific service satisfies the demands of the customer (Matzler et al., 2004) as shown in <figure 2> (b).



Note: Quoting the study of Timko (1993), A: attractive, O: One-dimensional, M: Must-be

**Figure 2:** Influence factors of satisfaction and dissatisfaction

The calculation formula of better and worse index is exhibited in <Figure 3>. In specific, better index could be calculated: attractive quality element was added to one-dimensional quality element, both of which affect the satisfaction when physical ones are fulfilled, and then they were divided by sum of attractive, one-dimensional, must-be and indifferent quality element, which have effects on quality forms of customers; worse indexes were measured as negative numbers, by using the same denominator as satisfaction coefficients and sum of one-

dimensional and must-be quality that affect dissatisfaction, as the numerator (Timko, 1993; Yang, 2013 requoted). This study attempted to schematize Timko's customer satisfaction coefficients in the same way.

<p><b>Better Index</b> (Satisfaction coefficient: Satisfaction improvement effect)</p> $\frac{A + O}{A + O + M + I}$	<p><b>Worse Index</b> (Dissatisfaction coefficient: Dissatisfaction reduction effect)</p> $\frac{M + O}{A + O + M + I} \quad (-1)$
<p>A: Number of respondents with attractive quality      O: Number of respondents with One-Dimension quality  M: Number of respondents with Must-be quality      I: Number of respondents with Indifferent quality</p>	

**Figure 3:** Timko (1993)'s Customer Satisfaction Coefficient

### 3. Proposal of the 6<sup>th</sup> Industrial Producers Improvement Index(SIPPI)

In order to calculate the producer improvement index in the 6th industry, Kano theory and potential customer satisfaction improvement index model were used as above.

$$P = \frac{(S - D) \times (Max - L)}{Max - Min} + D \quad \text{-----} \quad (1)$$

$$SIPP \text{ Index} = S - P \quad \text{-----} \quad (2)$$

P : current satisfaction position  
S : Timko's Better coefficient  
D : Timko's Worse coefficient  
L : current level scale of satisfaction  
Max : The maximum value of the current satisfaction level scale  
Min : The minimum value of the current satisfaction level scale

**Figure 4:** SIPPI Calculation Formula

However, there is the same limit that it is impossible to understand how much producers' satisfaction can be enhanced, if the fulfillment is really achieved, since it is difficult to verify each attribute is evaluated for producers, even though each type of factors is identified. In other words, although the values of better indexes are close to 1, there is a limit, in that it is impossible to evaluate whether current satisfaction is high or it is lower though better indexes have relatively lower values, which should be more focused on. Thus, deciding the range that can be

improved at the current satisfaction is very important as much as the potential customer satisfaction index (PCSI) (Lim & Park, 2010).

This study produced the producer improvement index in the 6th industry by applying the formula to produce PCSI Index. In particular, it was expected that the producer improvement index could be used to understand how much the improvement can be achieved from the view of producers, when requirements of producers were fulfilled, by examining current conditions of producers, in order to understand the improvement range of satisfaction. The producer improvement index was produced through the process of <Figure 4>. Lim & Park (2010) noted that the value representing the distance from the producer's current satisfaction position (P) to other satisfaction position (S), as the potential customer satisfaction improvement index, ranges from 0 to 2, with the minimum value (0) which indicates the state where current producers are fully satisfied, so it is difficult to increase their satisfaction further. In addition, the maximum value (2) means the case where all producers perceive dissatisfaction, so improvement of the satisfaction is urgently required. Therefore, although the Kano theory regards attractive elements as targets to be primarily improved, it can be found that even elements with attractive characteristics may not be prioritized as the targets to be improved, based on SIPPI index. Thus, SIPPI index were expected to contribute to not only the classification of factors, but also the prioritization of each factor, given the current producers' satisfaction, because SIPPI indexes are quantitative.

#### 4. Expected Implications

This study will provide the following suggestions by proposing the producer's improvement index for the development of the Sextic industry utilizing the Kano model. First, many researchers are expecting that this study will support so that more systemized studies will be possible. Second, the base for the success of the 6<sup>th</sup> industry will be arranged from the 1<sup>st</sup> industry point of view. Thus, the improvement related with production of agribusiness producers, the 1<sup>th</sup> industry workers, for the agribusiness-based 6<sup>th</sup> industry. From the perspective, SIPPI is expected to not only help producers enhance their production at various levels, but also support them to sincerely serve as the first gate to the 6<sup>th</sup> industry. Third, it will be able to provide many clues for successes of the agriculture and livestock industry based Sextic industry which the government is pursuing by pursuing the producer's satisfaction and when the producers voluntarily produce high quality products through the item-specific assessment about the elements to be improved from the producer's point of view. Thus, some efforts through longitudinal management and development of indexes may lead to advancement initiated by producers, and scientific researches will have synergistic effects on development of the 6<sup>th</sup> industry. Hence, this study suggests the development of SIPPI and empirical studies to which SIPPI is applied will be required in the future.

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