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# A Study on the Efficiency Evaluation of the old Town Commercial Area Regeneration Project: Focusing on University and Tradition Market Project*

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## Abstract

**Purpose** - In this study, we try to measure the efficiency of the traditional market and university cooperation projects and present the direction of policy improvement for the near future by converging the system, which exerts to secure the competitiveness and revitalize its centered-city, and the recent policies that have new business and social

**Research Design, Data, and Methodology** - In order to improve this situation, this study uses Data Envelopment Analysis (DEA) to evaluate the effectiveness of the policy project and propose its evaluation results. Also, we want to derive the weight calculation for utilizing DEA by using AHP method.

**Results** - This study's results were derived from the input and output variables, so instead of qualitative analysis, the conclusion was drawn out from the quantitative analysis. Through this quantitative analysis method, we had an opportunity to identify the characteristics of each site by each year.

**Conclusions** - It is believed that the reliability of the results can be further improved if the qualitative part can be supplemented its unique characteristics of the model which only considers the simple quantitative aspect. Further studies should be undertaken as these sectors are expected to draw out fruitful research conclusion when these aspects were supplemented additionally, so continuous additional study is essential.

**Keywords:** Tradition Market, Business District, Efficiency Evaluation, Regeneration, Original City Center, DEA, AHP.

**JEL Classifications:** C52, C67, R15, R38.

## 1. Introduction

### 1.1. Research Background and Purpose

Industrialization and urbanization focused on growth development led to city expansion. As a result, industries and businesses become suburbanization which led to unbalanced city spatial structure change and this phenomenon caused declination of the center of the city. This kind of declination of the centered city is becoming social issue that affects not only local residents but also merchants and consumers.

The reality of the centered-city is that there are no conditions and groundwork for solving both internal and external problems in a situation where the declination rate is proportional from the weakened competitiveness due to external shocks and the impact of internal conditions. Also, the increment of the empty stores and deterioration of the buildings causes discontinuity of inflow of the customers within the commercial centered-city which leads to small enterprises continuously out of business.

On the other hand, the traditional market located within the centered-city commercial area, and the customer base has been decreasing day by day. Despite the fact that the function and roles need continuously maintained, lack of inflow of the young customers, the place perceived as deteriorated place and lose its competitiveness. The centered-city area is in the state of decline. In order to improve the situation and solve the problem, the administration and the local government have implemented various institutional support and also have invested a large portion of government budgets to vitalize its centered-cities. The government pursued cure-all policy while proceeding fragmentary first aid measures to respond to the declination of centered-cities. The traditional market is the representative example of this policy.

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There are diverse and complex problems can be raised in the traditional market support projects, the biggest problem is the absence of business continuity, and it rejects the freshness of the market. Looking back at the process of resolving the traditional market in the past projects, the recession of the traditional commercial area was the institutional aspects not considered, and this led to modernize facilities, which expanded the arcade business to nationwide. Even after this implementation to a certain extent, the competitiveness of the commercial area was not secured, management method considered as a problem, and started to consult on the marketing and customer inflow method by expanding the business of modernization of the management. However, the policy has not been considered regarding expandability of consumers which was not able to widen its consumers, future customers, and future merchants. Nonetheless, the government policies have begun to formulate focused on the keywords of youth for the past two or three years.

These policy attempts, such as the influx of young people, are considered as an innovative system that aims to create a new model by colliding social problems (Youth job, urban decline, alley economic recession, increase in small business), but there are also opinions that do not welcome the influx of people because of the insecurity and persistence.

However, while the policies and systems must continuously modify to meet the needs of the reality and the field, due to various reasons to proceed its policy or disappear within the system without further explanation. As the various policies continue to formulate and implement, it needs to minimize its raised problems. It is necessary to conduct a data study to evaluate the reflex level in order to become a long-term and sustainable policy and a policy which to solve the social problems.

In this study, we try to measure the efficiency of the traditional market and university cooperation projects and present the direction of policy improvement for the near future by converging the system, which exerts to secure the competitiveness and revitalize its centered-city, and the recent policies that have new business and social issues.

This study base on the scale and the results of the projects from 2015 to 2017, understand the overall situation and collect opinions from the experts to compute each factor's weight (AHP). The objective of this study is to provide baseline data for improving the direction and efficiency that can be generated at the primary stage of the business through objective and scientific analysis by conducting efficiency test based on the result value. Another objective is for young people in college and the centered-city commercial areas (traditional commercial areas) to provide primary data for achieving common goals and objectives. Finally, the government which is responsible and implementing its policy has difficulty in figuring out the effectiveness other than the satisfaction of the budget input, so that it is aimed to provide an opportunity to refine it with more developed policy rather than propose in quantitative ways. In order to accomplish the purpose of this study, it divides into empirical studies and analytical studies based on theoretical researches.

The theoretical study examines the previous researches on various concepts and analysis methods necessary for the thesis. In the empirical part, it analyzes the fine market, which has economic activities, and youth participation based on the effects and results that have been invested since 2015 to current years from the government expenditure to traditional market and universities. Last empirical analysis part is to present the result value of the budget investment effectiveness by applying analytical methods.

### 1.2. Literature review

In this study, the central government is using a lot of budgets to induce young people's start-up businesses along with the revitalize the traditional commercial areas (markets) based on the local universities. However, there is lack of proper assessment tool to evaluate its outcome and efficiency of the policy, so there is a need to response preemptively with the betterment of its problem of the policies and decide its durability of the policy. In order to improve this situation, this study uses Data Envelopment Analysis (DEA) to evaluate the effectiveness of the policy project and propose its evaluation results. Also, we want to derive the weight calculation for utilizing DEA by using AHP method.

The scope of the study is to analyze the results of the traditional market-university cooperation project, which was submitted by the proceeded commercial areas and universities from 2015 to 2017. In order to derive the weight value for each factor for the efficiency evaluation, the opinions of the experts were collected, and the evaluation variables were set. The result of the evaluation index was derived based on the settings, and it draws out the efficiency analysis evaluation of the traditional market-university cooperation project.

## 2. Theoretical Study

Various studies have been conducted to recover and regenerate the commercial area of the declining centered-city. However, the research that measures or evaluates the efficiency of the policy is insignificant, so that understand the characteristics and the contents of the progressed studies is emphasized. The effectiveness and efficiency of the traditional commercial area studies have analyzed effectiveness after the modernization project, research on the efficiency of the traditional market business and support, and the influx of young people into commercial areas to revive its community.

**Table 1:** Research Review

| Sortation | | Researcher | Content | Other |
|---|---|---|---|---|
| Traditional Markets | modernization project Effectiveness analysis | Lee, Kim, and Kim (2015) | The urban renewal project was funded to revitalize the nation's major traditional markets. As a result of the year, consumers' visits and sales increased, but the growth rate was not high. Therefore, this study discussed ways to analyse the degree of regeneration to promote traditional markets more effectively than past projects. | Journal of korea Planners Association |
| | | Yoo(2018) | In order to analyze the financial support effect for the type of facility in the project to modernize traditional market facilities, the management plan of facility support project that maximizes management performance through analysis of existing literature and empirical analysis was proposed | A doctoral dissertation |
| | Efficiency | Ryu(2011) | The central government has put a lot of policies and budgets into the revitalization of traditional markets, but its effectiveness has not been evaluated. Therefore, in this study, the results of evaluation using DEA are presented in order to overcome the problems that have been put through the scientific method. The purpose of this study is to provide a basic DB that performs continuous government policy through efficient enforcement evaluation of business budget. | Journal of korea Planners Association |
| | | Kim and Yoo (2015) | In this study, the efficiency and efficiency of traditional market support policies for 16 metropolitan municipalities were analyzed through DEA analysis. The study found that it maximizes efficiency by providing attractive support factors for customer inflow rather than facility modernization projects and offering support for traditional markets. | korea Distribution Association |
| | | Kim(2015) | We have provided important basic data for improving the overall efficiency of the cultural tourism market project and conducted research to utilize it as a useful tool for policy decision of the culture tourism market project. | International Journal of Tourism and Hospitality Research |
| etc | | Xiaoyu and Keshen(2018) | The continued development of tourism was intended to increase the efficiency of tourism economics by reducing the inefficiency caused by the release of tourist carbon while taking into account all the economic, environmental and profit. | The East Asian Journal of Business Management |
| | | Saifullah and Ali (2017) | The study received about 400 surveys in six areas of Kuala Lumpur. Based on the literature review, three hypotheses were presented and the structural equations were used. The purpose of this study is to increase awareness of the environment by factors that affect Kuala Lumpur's public policy, eco-friendly products (technology). | The Journal of Asian Finance, Economics and Business |
| | | Phuong, Khuong, Phuc, and Dong(2014) | This study used 441 Vietnamese public servants' questionnaires and least squares structural equation modeling (PLS-SEM) to derive the hygienic results that directly affect the job satisfaction of public officials. The purpose of this study was to examine the effects of two-dimensional factors and hygiene on the job satisfaction of public officials | The Journal of Asian Finance, Economics and Business |

Source: Own Elaboration

The characteristics of the existing studies have analyzed the effect of the project by examining the major business effect within the specific traditional market area, and the results were deducted from the analysis of the surveys. Also, other research has been conducted to suggest alternatives to study and analyze the process of introducing young people to traditional markets.

The characteristics and differences of this study do not simply measure the efficiency through the surveys to measure

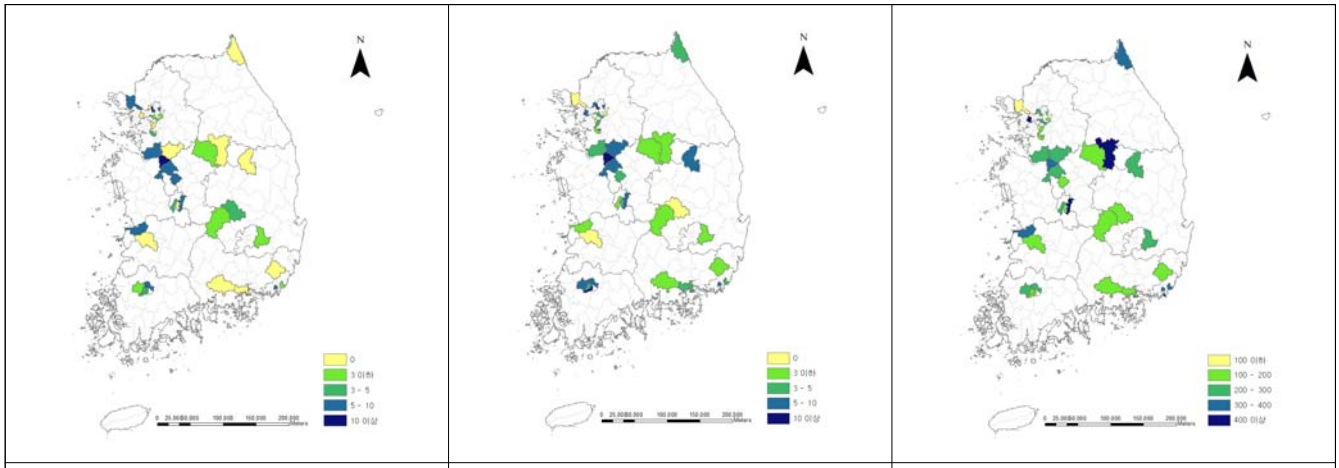
the efficiency, but through a quantitative database, it measures the efficiency of the business. This suggests a policy alternative to contemplate the models that can develop new integrated business in the traditional market. In order to further improve the efficiency analysis method, this study chooses scientific approach through two steps of analyzation. Furthermore, there are suggested alternatives to ensure stable settlement and expansion of the business and efficiency.

## 3. Data, and methodology

The subject of this study is the participants of the 22 universities and traditional market with the first traditional market-university cooperation project which was held in June 2015. This project emphasized the expansion of the customer base by participating local college students to widen their awareness of young entrepreneurs and traditional

markets. This project proceeded with the universities and traditional markets to conduct programs such as the development of specialized products and cultural events. Despite the limit of being the first project, around 3,800 students and 6,000 merchants participated to find out the problems of the traditional commercial area and to provide fresh ideas from college students, start to bring energy to the depressed commercial area. University-traditional market cooperation project is conducted as a one-year duration, which gets evaluated whether it is possible to extend the program or not for another year. In the case that has satisfactory outcomes, they can get one more extended year to continue to run its business and guarantee its continuity to proceed with the results. An annual average of 246 students participated and tried to provide new ideas, and an annual budget of 170 million won was invested. Although there is an insufficient part since the youth (university) and traditional market cooperation project was the first time, it developed a variety of products and ideas, such as developing market brands and specialized products, discovering storytelling, finding market-specific elements, developing foods, and providing idea space for communication. At the beginning of 2015, 22 universities and traditional markets have participated.

In 2016, considering business effectiveness, poor business performance was selected to restrict their participation in the project. They have selected new universities and traditional markets to participate in the project to maintain 22 businesses. In 2017, in order to improve the quality of business, the number of participating universities and traditional markets decreased to 17 participants.



| Number of intellectual property applications | Number of development cases | Number of students participating |
|---|---|---|

Source: own elaboration

**Figure 1:** Project Status

**Table 2:** Technical statistical value by variable selection

| Division | Input Variables | | | | | | | | | Output variable | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1) | 2) | participant | | | | 7) | 8) | 9) | 10) | 11) | 12) | 13) | 14) | 15) |
| | | | 3) | 4) | 5) | 6) | | | | | | | | | |
| Average | 417 | 175 | 16 | 12.8 | 246 | 1.1 | 0.29 | 1.5 | 8.52 | 96,876 | 460,580 | 6 | 3.7 | 0.4 | 0.05 |
| standard deviation | 467.7 | 56.0 | 7.7 | 9.9 | 180.0 | 1.3 | 0.45 | 0.5 | 5.12 | 1,328 | 1,069,544 | 3.4 | 4.2 | 0.5 | 0.22 |
| ceiling value | 2,500 | 275 | 35 | 51 | 1,096 | 5 | 1 | 2 | 24 | 6,684 | 5,287,709 | 16 | 24 | 1 | 1 |
| minimum value | 52 | 50 | 4 | 2 | 50 | 0 | 0 | 1 | 0 | -2,933 | -1,428,409 | 1 | 3 | 0 | 0 |

Note: 1) Participation retail dealer, 2) National cost(One million won), 3) Number of teachers, 4) Department, 5) Number of students participating, 6) Capstone solution classes, 7) Local Government(Related institutions Participation), 8) Business period, 9) Number of Student participation programs, 10) Annual take Difference, 11) Number of customers per year Difference, 12) Number of development cases, 13) Number of Intellectual property applications, 14) Link to another business, 15) Expansion of prototype products

Source: own elaboration

The results of the empirical analysis of the input variables on analysis sites were 417 trade participants and the average number of 12.8 schools. The average number of business development is 6, the number of intellectual property applications is around 3.7, and the number of linkages with other businesses was around 0.4. In the case of average business expense, it was around 175milion won, the numberof teachers was 16, and an average number of students participating was 128. Also, the highest number of applicants in the intellectual property application field is 24, which is considered to be a result of joint efforts of universities and traditional markets in order to attract enthusiastic and fine results.

## 4. Outline of the analysis method and the selection of indicators

The analysis method in this study is to evaluate the eff iciency of the DEA model after calculating the weight of the variable evaluation using AHP which is one of the decision methods.

### 4.1. Analytical Hierarchy Process (AHP)

AHP is 'when there is numerous evaluation standards or objectives of decision making exists and is complicated, its hierarchy the major factors and dismember those major factors and it calculates the importance of these factors through pairwise comparison.' Intuitively, it can be defined as 'a technique for selecting an optimal alternative by hierarchically classifying multiple attributes and understand the importance of each attribute.*** The Analytic Hierarchy Process (AHP) was developed by Thomas L. Saaty in the early 1970s to solve the problem of limited resource allocation. AHP is applied to various fields that have been difficult to solve by the conventional Operational Research (OR) technique. As A (analytic), H (hierarchy), P (process) term implies, AHP prioritize the problem analysis, distinguishes stages and factors, and establishes their concept. This is done through a step-by-step process of analyzing complex decision-making problems, identifying relevant evaluation factors, and assessing the preference of the alternatives by aggregating the evaluation of each factor.

The AHP is mainly used in the strategic decision making or locating public and industrial facilities, which affects many stakeholders, and in particular, it is effectively used to analyze intricate and complicated decision-making process. The significance is assessed by T. L. Saaty using an experimentally validated 9-point scale, with significance in the range of 1-9 with an integer or its inverse number of 9. The binary comparison matrix $a_{ij}$ is completed by performing relative comparisons $n(n-1)/2$ times in total, with the significance of the relative comparison of two of the n factors as $A=a_{ij}$. This matrix A has properties such as $a_{ij}=1,\ a_{ji}=1/a_{ij}$ and so on.

### 4.2. Data Envelopment Analysis (DEA) Method

DEA is becoming popular as an alternative to overcome the limitations of traditional efficiency measurement methods. The DEA model was studied by Charnes, Cooper, and Rhodes (1978) in the late 1970s and is based on Linear Programming (LP), which uses decision-making units (DMUs) with inputs and outputs of various factors and it uses a non-parametric method to measure relative efficiency.**** It is also called the CCR modelafterthe researcher'sinitials.

Data Envelopment Analysis (DEA)***** has a long history and is widely used both domestically and internationally due to its ease of use, high persuasiveness of its results, and the availability of affordable related solutions. In particular, the Steering Committee for the Review of Commonwealth/ State Service Provision of the Australian Government has already stated in 1997 that 'the DEA is useful for enhancing the understanding of key efficiency agents and improving the performance of government service delivery by drawing examples of how to do fine work' and much effort to use this method*

The DEA(Data Envelopment Analysis) method is a technique for evaluating the relative efficiency of the evaluation units by comparing and analyzing various places where having similar functions. The DEA model applied in various fields proves the superiority and broad applicability of this model.

The DEA model has a methodology for empirical analysis, which has superior in modeling the management efficiency

*** http://lans.tistory.com/867 [Build your B(ody)M(ind)K(nowledge)]

**** It is a linear programming technique developed to evaluate the relative efficiency of decision units. It is a linear programming technique that constitutes a relatively efficient production aspect based on the most efficient decision makers in the comparison group

***** The advantages of the DEA can be easily described in a number of situations, and it is not necessary to make statistical distribution assumptions about residuals because production relationships are estimated by a given data alone and production relationships are assumed by a non-parametric approach that does not assume the required functional form of a parametric approach, so there is no need to make any prior assumptions about functions. In addition, the units of the actual observed data can be analyzed without being unified or processed and, unlike traditional methods, no hypothesis for verification is necessary.

* Steering Committee for the Review of Commonwealth/State Service Provision 1997, Data Envelopment Analysis: A technique for measuring the efficiency of government service delivery, AGPS, Canberra.

process and is also a notable aspect that it requires very few assumptions required in advance. Therefore, the DEA model is widely applied in both public and private sector.

The CCR is a hypothesized model of a Constant Returns to Scale (CRS). In the CCR model, the ratio of the weighted sum of the output variables to the weighted sum of the inputs of DMUS should not exceed the 1, and a model that determines the weight for each variable that maximizes the input and output ratio under the constraints that the weight of each input and output variable is greater than zero. The CCR models are divided into Ratio Mode, Multiplier Model, and Envelopment Model depending on the structure.

$$\theta_i = \frac{\sum_r u_r y_{ir}}{\sum_j u_j x_{ij}},\ Max\theta_i = \frac{\sum_r u_r y_{ir}}{\sum_j u_j x_{ij}}$$

s.t

$$\frac{\sum_r u_r y_{ir}}{\sum_j u_j x_{ij}} \leq 1,\ \text{for all I = 1, 2, 3, ... I}$$

= i the output of the rth output factor of decision-making
= i the output of the jth input of decision-marking
= rth output factor weight
= jth input factor weight

$$u_j\ u_r \geq 0$$

$$Max\theta_i = \sum_r u_r y_{ir}$$

s.t

$$\sum_j u_j x_{ij} = 1$$

$$\sum_r u_r y_{ir} - \sum_j u_j x_{ij} \leq 0,\ \text{for all I = 1, 2, ... I}$$

$$u_j\ u_r \geq 0$$

## 4.3. Selection of indicators for Analysis

The selection of the indicators was conducted through questionnaires by a total of 35 people, including traditional commercial area (market_ specialists and business-related professors (10), public officials (10), researchers (7), related organizations (3) and the rest (5). Experts' opinions and surveys were conducted from August 20th to September 20th, 2018.

In selecting the first indicator, we refer to the reference materials and existing research. In the primary stage, there were four major resource elements as participation resource, support types, performance and collaboration performance factors. Based on this, we gathered opinions of experts and selected them as final indicators with participation resources, support scale, and implementation performance.

In the primary stage, the participation support indicators among subclasses selects the number of participating merchants, merchant association business, street vendors, merchant organization, present condition of management, market position, market and commercial area size, store formation, accessibility (transportation), business hours, form of a market, number of participated teachers, number of participated majors, number of student participation program, capstone design class, and the number of major class participation as the primary indicators, and collect experts' opinions and finally the subclass indicators in participation support were selected.

Subject indicators were the number of participating merchants, number of participated teachers, number of participated majors, number of student participation program, capstone design class, and the number of participating students were finalized as the subclass index. As the indicators of the support type sector, government support, the number of participating local government or related organizations, the university's self-support, and the merchants (market) support were selected as the primary indicators based on various literature and field data. Based on gathered opinions from the experts, government expenditure support, the number of the local governments or related organization and the project period finalize as indicators.

The indicators of implementation performance selected with annual sales increase, and decrease amount, annual customer variation, number of business development, number of intellectual property application, other business linkages after closing, verification, and expansion of prototype products, and

number of students' start-up business were chosen in the primary stage. After the expert's opinion, annual sales increase and decrease amount, annual customer variation, number of business development, number of intellectual property application, other business linkages after closing, and verification and expansion of prototype products were finalized as indicators. Finally, the DB was constructed by finally adjusting it into three major categories and 13 sub-categories.

**Table 3:** Electing metrics for measuring efficiency

| Division | Indicator | Indicator Description | Selection |
|---|---|---|---|
| Followed by participation resource (0.192) | Participation resources | An in-market component responsible for the act of selling goods as basic element of the market. | ◎ |
| | A Market Group Joint business | Whether or not joint projects are carried out in order to revitalize traditional markets | |
| | Merchant association | An organization formed by itself to strengthen the solidarity of individual members in a traditional market. | |
| | Market and commercial area size | Identify the characteristics and form of the where traditional markets are located | |
| | Traditional Mack formation | The size of the stores in the market (1,000 or more) and the size of the local (national, metropolitan, regional, and suburban) merchant business district | |
| | Accessibility (transportation) | The degree of accessibility (public transportation) in traditional markets | |
| | Business hours | The degree to which the market type is divided according to the commercial building type, long-roof type, commercial housing complex type, street stall type, etc. | |
| | Number of participated teachers | Number of participation by various professional teachers from participating universities | ◎ |
| | Number of participating majors | The degree of participation of the department (the convergence and expertise among the various departments) | ◎ |
| | Number of Student participation programs | Number of student programs participating directly | ◎ |
| | Capstone design class | Number of classes conducted with Capstone design | ◎ |
| | Number of Student participation Students | Number of students taking part in this business | ◎ |
| | Number of Participated Major | Number of Classes Participating in Major | |
| Support type (0.131) | Government expenditure support | The degree of support budget provided by the central government for the revitalization of traditional markets | ◎ |
| | Local government or relevant organization participation | The amount of budget provided by local organizations for local tradition market activation | ◎ |
| | University Self Support | Budget that extra expenses in addition to various facilities or equipment owned by the university. | |
| | Business period | A measure of whether an annual extension can be pursued by performing an annual evaluation | ◎ |
| | Market Group Support | The number of times the committee, which is a member, sponsored a separate budget or item (amount) | |
| Performance sector (0.677) | Value of the annual sales increase, and decrease | Sales before and after business increase / decrease rate | ◎ |
| | Annual customer variation | Degree of increase / decrease in number of customers before and after business | ◎ |
| | Number of business development | Number of business development developed in target market | ◎ |
| | Number of intellectual property application | Number of intellectual property rights filed through business | ◎ |
| | Other business linkages | Examples of expansion or linkage to other businesses based on results after 1-2 years of business | ◎ |
| | Expansion of prototype products | Example of producing a product having it verified by other agencies | ◎ |
| | student start-up | Number of times this program has led to start-ups | |

Source: Own Elaboration

## 5. Analysis Result

### 5.1. Weighted Value Analysis Result

According to the selection of the indicators, the indicator values were determined through the three major categories and each subcategorization. In the major classification, the result is divided into participating resources, support type, and performance. Among the three major categories, performance sector showed the most significant value of (0.667), followed by participation resource (0.192) and support type (0.131). The consistency of the major classification was ensured with CI/RI of 0.082 which was smaller than 0.1. Looking at each sector weighted values, participation resources (0.251), the number of participating teachers (0.239) and the number of participating students (0.222) were found. Next, the number of Student participation programs (0.127), capstone design class (0.099), the number of participating majors (0.062) were analyzed based on the model. In the form of the support sector, government expenditure support (0.608), business period (0.272), and local government or relevant organization participation (0.120) was found. Lastly, in the implement result sector, number of intellectual property application (0.309), value of the annual sales increase, and decrease (0.271), other business linkages (0.130), annual customer variation (0.117), expansion of prototype products (0.110), and number of business development (0.064) were analyzed.

In the consistency measure for each sector, consistency was secured with CI/RI=0.0973<0.1 in the participation support area, and the support type sector, the consistency was secured with CI/IR=0.0739<0.1. Finally, consistency was achieved with CI/RI=0.0999<0.1 in the implementation outcome.

### 5.2. DEA Analysis Result

In order to increase the reliability of the data, the DEA analysis was conducted based on the opinions of the experts on the weighted value of each index. Prior to the DEA analysis, each university and market name were marked separately to minimize any misleading possibilities. As a result, if the efficiency index of the university and the traditional market has is less than 1, it is inefficient compared to other universities and markets. A total of 42 universities and traditional market index were analyzed. As a result, about 17 were proven highly efficient and the reset was proven as inefficient projects. Based on each variables' characteristics, it was classified into input and output variables. Input variables chose the number of business development and the total sales, the increment of the number of customers and business linkages as the index. In addition, input variables selected the number of merchants, number of students and number of teachers as indicators. The DEA analysis was conducted considering the characteristics of variables in each area.

**Table 4:** Variable weight value for efficiency measurement

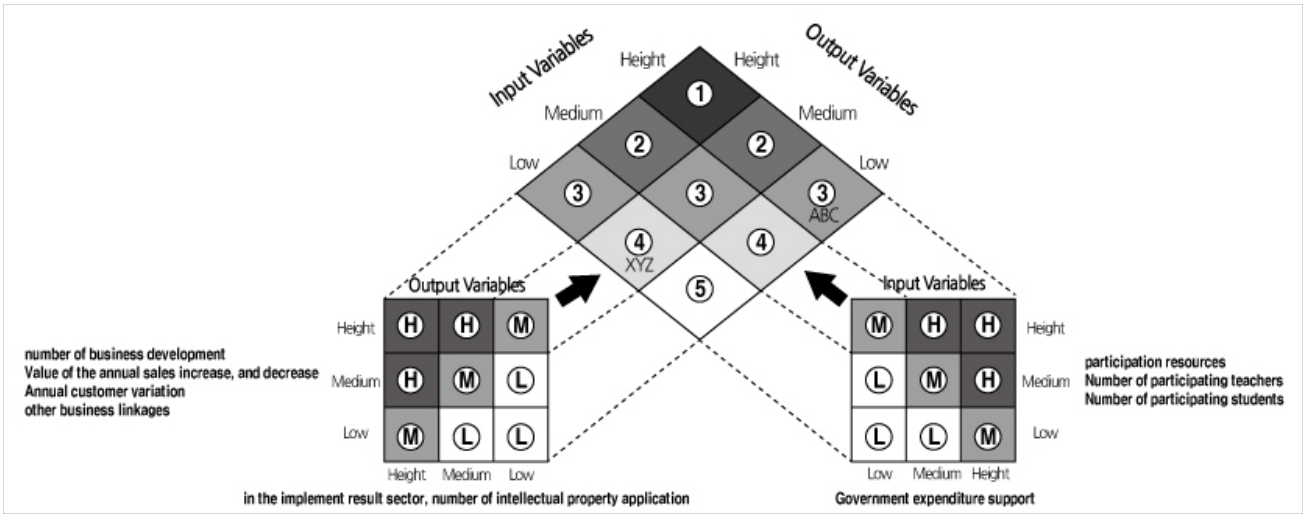
| Division | Indicator |
|---|---|
| Ffollowed by participation resource (0.192) | Number of participating teachers(0.240) |
| | Number of participating students(0.222) |
| | number of participating majors(0.062) |
| | Participation resources (0.251) |
| | Number of Student participation programs(0.127) |
| | Capstone design class(0.099) |
| | CI/RI=0.0973 |

| Division | Indicator |
|---|---|
| Support type (0.131) | Government expenditure support(0.608) |
| | Local government or relevant organization participation(0.120) |
| | Business period(0.272) |
| | CI/RI=0.0639 |

| Division | Indicator |
|---|---|
| Performance sector (0.667) | Value of the annual sales increase, and decrease(0.271) |
| | Annual customer variation(0.117) |
| | Number of business development(0.064) |
| | In the implement result sector, number of intellectual property application(0.309) |
| | Annual customer variation (0.110) |
| | Other business linkages (0.130) |
| | CI/RI=0.0999 |

CI/RI=0.082

Source: Own Elaboration




Source: own elaboration

**Figure 2:** Process for eliciting analysis results

**Table 5:** Efficiency measurement result value

| Division | University | Traditional market | Value | Division | University | Traditional market | Value |
|---|---|---|---|---|---|---|---|
| 1 | A | A-1 | 0.134039 | 22 | V | V-1 | 0.056519 |
| 2 | B | B-1 | 0.622801 | 23 | W | W-1 | 0.000298 |
| 3 | C | C-1 | 0.329091 | 24 | X | X-1 | 0.290714 |
| 4 | D | D-1 | 0.970281 | 25 | Y | Y-1 | 0.962036 |
| 5 | E | E-1 | 1.900942 | 26 | Z | Z-1 | 0.578335 |
| 6 | F | F-1 | 0.331148 | 27 | AA | AA-1 | 0.14163 |
| 7 | G | G-1 | 0.94572 | 28 | AB | AB-1 | 0.190109 |
| 8 | H | H-1 | 0.568965 | 29 | AC | AC-1 | 0.352704 |
| 9 | I | I-1 | 0.130063 | 30 | AD | AD-1 | 0.454781 |
| 10 | J | J-1 | 0.675584 | 31 | AE | AE-1 | 2.100016 |
| 11 | K | K-1 | 0.310695 | 32 | AF | AF-1 | 0.159934 |
| 12 | L | L-1 | 0.524651 | 33 | AG | AG-1 | 0.158138 |
| 13 | N | N-1 | 0.057925 | 34 | AH | AH-1 | 0.385535 |
| 14 | M | M-1 | 1.513552 | 35 | AI | AI-1 | 0.053794 |
| 15 | O | O-1 | 0.304053 | 36 | AJ | AJ-1 | 0.586886 |
| 16 | P | P-1 | 0.038622 | 37 | AK | AK-1 | 0.907547 |
| 17 | Q | Q-1 | 0.050996 | 38 | AL | AL-1 | 0.319449 |
| 18 | R | R-1 | 2.225222 | 39 | AN | AN-1 | 0.840783 |
| 19 | S | S-1 | 0.056668 | 40 | AM | AM-1 | 0.27636 |
| 20 | T | T-1 | 0.402828 | 41 | AO | AO-1 | 0.002051 |
| 21 | U | U-1 | 0.013246 | 42 | AP | AP-1 | 0.375005 |

Source: Own Elaboration

The result of the final analysis showed that the best result regarding efficiency was from the R university (traditional market) with the 2.22 value and next, AE university (traditional market) was analyzed as 2.10. The third is the result of 1.90 for E University (traditional market) and 1.51 for M university (M). On the other hand, the inefficiency analysis results showed that W (W-1) was the lowest with 0.000298, followed by AO (AO-1) 0.002051, V (V-1) 0.056519, S (S-1) 0.056668 respectively. In terms of geographical area, some universities and traditional markets in the metropolitan area, Chungchung region, and part of the Yeongnam region showed good efficiency results.

On the contrary, the rest of the universities and traditional markets in metropolitan areas were analyzed as inefficient projects.

The results of this analysis are drawn out that the market size and the economic power of the consumers using the market are relatively weak, and the project was held without a proper understanding of true purpose and objectives of the business.

## 6. Discussion and Conclusions

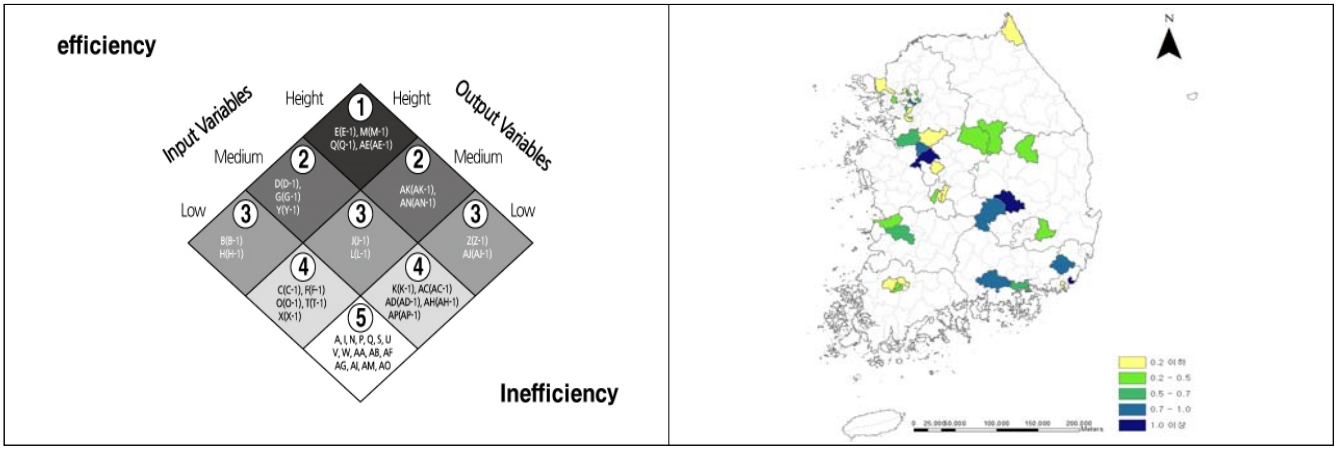
Policy and efficiency were measured to continued management of its relevant policies and declining commercial areas. Various OR models were used to derive scientific and quantified results through various variables.

The decline of traditional commercial area is caused by the abandonment and economic function loss of the city. In order to overcome this situation, various approaches and prescription have to exist concurrently, but the policies were continuously aimed to patching up the problems. If this process is sustained, it will be a crisis of the centered-city and a crisis of modern capitalism at the same time. However, in order to secure continuity and sustainability of the policy, it is necessary to have a mean to flow back to its mid-process, but these steps were usually missing in the formation of its policies. Among the related policies to vitalize declined traditional commercial areas which were the subject areas of this study, and the urban regeneration projects from the Ministry of Land and the commercial revitalization areas project (linking local universities and traditional markets project) from the Ministry of SMEs and Startups are a representative example. This study, which analyzes the policy efficiency for revitalizing a declined traditional commercial area, suggested the efficiency of policy through quantitative results to access easily.

This study's results were derived from the input and output variables, so instead of qualitative analysis, the conclusion was drawn out from the quantitative analysis. Through this quantitative analysis method, we had an opportunity to identify the characteristics of each site by each year. In the first year of this project, despite the weak understanding of the purpose of the project, the result of its project was highly evaluated. In the following year, as the type and method of business changed, they have used several innovative policies to use a soft landing of its project. These new trials expanded its opportunities to universities and traditional market where have started its business for the second time. However, there was a strategic limitation to those universities and traditional markets that this project became a one-time event due to the failure of grafting its reality and university education to first time participants. The role of the government which emphasizes good results in this situation can be understandable, but it is not possible to derived policy outcomes within one to two years. That is why through the efficiency evaluation of the policy, it needs to have the procedures to raise its perfection of the policy. To sum up, the results of this study suggest that about 17% of the participating universities and traditional markets shows the effectiveness and if they are established based on constant interest and sets roles, it is possible to create a perfect policy.

In addition, through this process, the university and the traditional market have the opportunity to grow through the learning of the business, but in order to grow and expand the business, some additional aspects should be added.

First, due to the short period of the project, universities where they have to carry out education as well, so for the students, it is very burdensome to pursue in a short amount of time. That is why a short range of period acts as its limitation in this project, so it needs to have a minimum three years guaranteed business period. Second, even though it is a business that provides a base for substantial budget opportunities, a 1.4 billion won government budget project needs to show immediate business performances. The project structure itself demand a short-term achievement such as sales and customer numbers and It needs to be improved urgently. It is challenging to increase the sale and the number of customers in the traditional market even in large-scale projects where a large amount of budget and time is generally required but demanding the same concluding with this kind of small budget size implies the person did not comprehend the purpose of this project.




Source: own elaboration

**Figure 3:** Analysis result

Third, if the performance indicators for presenting the purpose and the outcome of the project are announced or presented in advance, the university and the national market should be able to carry out the program according to their performances, but the limitation is that its progress is focused on execution of the budget. This is the part where needs to be improved in order to have a better system.

Fourth, similar projects are currently making its progress, and despite the need for a coordinated business system, but still, it proceeds as a fragmentary project. The current business is to spread the understanding of the traditional market to the young customers, and it can be reorganized as a customer of a traditional market or a start-up founders of the traditional market at the stage of starting social activities after graduating from the colleges. The current system is the process to spread and commercialize their ideas.

For example, in a situation whether the Ministry of SMEs and startups project called youth mall project is very negatively mentioned, it is considered as a mistake to create start-up businesses from gathering uneducated entrepreneurs to induce to open their business in the back warded places is the mistake from the beginning. Also, unsupervised young people are not aware of the phasing out problems which start from the socially vulnerable spaces, and it is believed that these aspects get connected to these two policies would guarantee its flexibilities and sustainability.

Lastly, traditional market needs to avoid its fixed idea that the government support budget guarantees a large amount of government budget and the traditional market merchants should have owner spirit to secure its development and competitiveness in the circumstances given from the external effect.

On the other hand, in the context of numerous policies and projects for the revitalization of the original centered-cities commercial areas, the discussion which combines rising social problem such as the youth employment problems and firm resettlement of the original centered-city commercial area needs to be continued for healthy policy efficiency. Also, expand its influence to the beneficiaries, and provide opportunities to identify the problematic situations from small businesses which are considered as a weak group in the community.

### 6.1. Limitation of Research

This study measures the efficiency of business conducted for three years. If the variables that can measure efficiency are diversified, the result of its efficiency analysis can be more satisfied, so more data and statistics will need to be accumulated or secured from the near future. It is believed that the reliability of the results can be further improved if the qualitative part can be supplemented its unique characteristics of the model which only considers the simple quantitative aspect. Further studies should be undertaken as these sectors are expected to draw out fruitful research conclusion when these aspects were supplemented additionally, so continuous additional study is essential.

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