

# The Study and Analysis on the Reuse and Transformation Strategy of Tile Kiln Space – Taking of San-He Tile Kiln as Example

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## Abstract

Due to the reduction of brick demand, Taiwan traditional brick kiln is declined gradually. The policy for preservation of local cultural and spatial utilization, it is successfully transformed the traditional kiln into the business model. This research selects San-He tile kiln as the case study, through the interview with the kiln owner, experts, and tourists, and made the questionnaire to perform the statistical analysis to find out the common demand and expectation of business model. It could provide the analysis to the kiln owner as the reference for operational strategy.

*Key words:* Brick Kiln, Spatial Reuse, One-Way Analysis of Variance (ANOVA), Factor Analysis

## 1. Foreword

During the year of 1895 and 1945, Taiwan traditional brick kiln, due to the public construction and proceeding the large-scale urban planning, the demand of red brick was significantly increased, that caused the brick kiln industry entering into the industrialization and possessed different types and forms of old kiln plants. However, after the year of 1970, due to the introduction of new technology and change of building mode, extensive use of concrete and rebar plus steel reinforced, that caused the brick kiln industry declined gradually. Most of the brick kiln industry requires the vast space, when the industrial recession would cause idled or abandoned. This paper tries to explore the declined traditional brick kiln plant and consolidate

culture & creation, tourism and preservation viewpoint of cultural assets, make detailed case study to the spatial reuse of kiln industry.

The reuse of abandoned industrial culture assets is the important strategy to strengthen industrial culture preservation, if the cultural assets preservation and spatial reuse are able to combine with the local cultural memory, it will definitely generate multiplying effect. This research selects San-He tile kiln, in Kaohsiung City, since the kiln owner recognizes the importance of industrial and cultural assets preservation, preserves the old kiln plant and utilizes the landscape with local cultural memory, successfully reuses the vacant space and transforms into the business model of cultural & creative industry, successfully continues the old kiln plant and activates the business industry.

This research goes through the advanced interview with the kiln owner, experts, local tourists, after organizing the interview information systematically, then design the questionnaire, makes the investigation with focusing on the different demanding for the business model of brick kiln industry from the tourists. From the view point of experts, artists and tourists to verify the analysis results, provide the different level of thinking to the civil owners with respect to the preservation and reuse strategy.

## 2. Literatures

After the industrial revolution in 18<sup>th</sup> century, the industry was rapidly developed, however, followed the industrial transformation in 20<sup>th</sup> century which caused part of the traditional industries declined, started in the year of 1960, European and America enthusiastic research the topics of industrial archaeology, industrial assets preservation and reuse, industrial culture tourism, becomes the city planning and development trend [1]. Taiwan government started to promote the industrial culture assets regeneration project in the year of 2006, supports the industries to evaluate the cultural assets by themselves, the concept and actions of industrial culture assets reuse are gradually valued [2]. It created many sightseeing landscapes such as railways/station, docks & warehouses, rice granary, old plant areas of Taiwan Sugar Corporation, traditional brick & tile kilns., these vacant space were reused and combined with the creative industries successfully develop as the new tourism landscapes.

The vacant space may be the abandoned public quarters, administrative offices, military facilities, religious facilities, educational facilities. It may also be the 「Dissimilation Space」 during the connecting process of new metropolitan space, especially the transportation facilities. The historical buildings shall have the continuation and regeneration value, it shall contain the historical facts, culture and emotion, and the major consideration of historical facts is the features of original style. The cultural value is the special group perception or behavior action, and the emotional value is the support exists in the memory and spirit. The expected regeneration value of historical buildings includes use, economics and education, the major consideration of abandoned space reutilize is the new function of building, and the economic value is the basic source of continuous survival, and the educational value is to inherit the historical culture [3].

The basic theory and technology of monument preservation and historical space preservation/reuse are close, if the value of preserved object is not high in terms of science, memorial or other academic value, and has less relationship with historical event or person but only presents the architectural style, settlement context, or localism, make flexible use of the historical space preservation is the effective method not only able to preserve the monument but also able to protect the rights of residents [4].

For Taiwan experience, the vacant space is not only a new space utilize mode or concept, but also the handling memories of city sentimental [5]. In the form of city space with the rapid development of real estate, lack of an emotion link with the emotional memories to land, consequently, form a kind of the 「New/Old Street Bloc Mode」 to segment the significant urban space [6]. After many years of experience in promoting the reuse of vacant space by the government and scholars, most of the vacant space in these years have the aesthetics and tourism effect; create very unique spatial reuse culture.

## 3. Research Method & Application

This article takes the methods of literature review, questionnaire survey and expert interview, organize the questionnaire data, use the independent sample T test/inspect the independent samples or group of two unrelated groups to determine if the average at a certain variable reaches the significant difference. Use one-way analysis of variance (ANOVA) to understand if there is significant difference between the questionnaire data with various different conditions, if the significant difference exists, then proceed the post hoc comparisons with Scheffe method [7], simplify the questionnaire opinion variable to the constructs through the principle component analysis, explore the strategy of reuse brick/tile kiln space and the satisfactory condition of kiln industry business model from the tourists.

This paper research surveys scene first, collect data and after interviewing by experts, design the pretest questionnaire items, adopt the closed questionnaire which will allow the participants answering fully in accordance with the options provided by the researcher. The questionnaire adopts five-level of Likert scale, after performing the statistical analysis to the pretest questionnaire, proceed the items, validity and reliability analysis inspection, and then determine based on the test results, and re-establish the formal questionnaire

items, and issue the questionnaire at San-He tile kiln, let the tourists personally fill the questionnaire.

This research uses T test to analyze the different gender (male, female) with regard to if there is significant difference between the satisfactory degree variables of the various reuse and transformation strategy. The one-way analysis of variance (ANOVA) analyzes if there is significant difference between the variables of different tourist background and the variables of satisfactory degree and the various reuse and transformation strategy. The main purpose of principle component analysis is to simplify the questionnaire variables, simplify the designed variables to factor constructs. Before performing the principle component analysis, the statistics test of KMO and Bartlett shall be performed, it is applicable for performing the principle component analysis when KMO value is over 0.8; the larger value acquired by Bartlett sphericity test, the more suitable for analysis.

After determining the data suitable for the principle component analysis, select suitable factor constructs in accordance with the eigenvalue, select eigenvalue large than 1 or the factor selecting point when the slope of scree plot starts to downward, the factor with small eigenvalue does not have the explained variable difference which can be discarded, and the selected cumulative explained variance percent shall reach 70%. The principle component analysis is to show the correlation between the measurement variable and extracted component through the eigenvalue, if the difference of component loading is not too large, the rotation may be used to change the factor loading of

Table 1. After Varimax Rotation

Factor	Eigenvalue	Explained Variance %	Accumulated Variance %
Factor 1	4.874	24.368	24.368
Factor 2	4.026	20.131	44.499
Factor 3	3.144	15.719	60.219
Factor 4	1.999	9.994	70.213

Use the principle component analysis to integrate the data and perform the statistical result analysis, obtain the common needs tendency and expectation of kiln industry business model from the tourists and categorize into 4 dimensions: 1. Cultural creation marketing dimension. 2. Environmental space planning 3. Service quality 4. Visit willing. After analyzing the questionnaire, interview with the experts, cultural & creative dealers, art workers for cross-comparison, the

each component, after the rotation, the variance of new component become the largest, this research uses the Varimax rotation.

#### 4. Research Results & Analysis

This case locates at San-He tile kiln, Kaohsiung City, after the tile kiln industry of Kaohsiung area declined, only San-He tile kiln continues the production. In 2004, it was registered by the government as the historical building and able to continue the traditional tile kiln culture, and forms the monument preservation district together with the surrounding the Kaohsiung-Pingtung old iron bridge and water intake station.

This research issues 350 copies of questionnaire, retrieves 331 copies, screen the answering, if there is missing item, the questionnaire is invalid, therefore, invalid questionnaire has 11 copies, valid questionnaire has 320 copies, the retrieving rate of valid sample is 91.43%. After the formal questionnaire items through the validity analysis, KMO = 0.929, it indicates that it is applicable for proceeding the principle component analysis [6.7]. After processing through the principle component analysis and the maximum variance rotation, its component eigenvalues are shown as Table 1, take the components with eigenvalue large than 1 and simplify to 4 dimensions, 4 main components are named respectively as 1. Cultural creation marketing 2. Environmental space planning. 3. Service quality. 4. Willing for re-visit.

business ideas of kiln owner, tourist view are close to the cultural & creative dealers, this is able to verify that this reuse of brick/tile kiln space and transformation strategy is a successful case.

#### 5. Conclusion

This article explores the historical meaning of brick/tile kiln industrial culture assets in Taiwan,

according to the results of literature review, personal experience of participating the visiting activity in the brick/tile kiln, questionnaire survey and expert interview, organize and analyze/investigate the satisfactory degree of brick-tile kiln reuse strategy from the tourists. Data integration, statistical analysis, result analysis, reduce questionnaire variables, simplify to obtain the common needs tendency and expectation of kiln industry business model from the tourists, categorize into 4 major dimensions, add with expert interview, interview with the operator of brick-tile kiln, cultural & creative dealers, art workers for comparison, verify that this reuse of brick/tile kiln space and transformation is a successful business strategy.

The summarized research conclusions are described as follows:

- i. Diversified business model of San-He tile kiln: Operate the traditional making of brick/tile in parallel with the cultural & creative merchandises, and link with Kaohsiung-Pingtung old iron bridge landscape, old kiln culture combines with leisure tourism, provide the feasible strategy for the old industry and spatial reuse.
- ii. San-He tile kiln takes the traditional craft combined with the young craftsmen, participant the craft design exhibition regularly, establish diversified marketing channels, cultural & creative products adopting together with LOGO recognition, establish the new thinking with both of product practicality and artistry.
- iii. San-He tile kiln is able to coordinate with the overall community creation, cultivates the local new craftsmen, explore the pass, present and future of kiln industry from the history, geography, culture, economy, arts etc., in order to extend education to help the next generation paying more attention to the preservation of traditional technology & culture.
- iv. The overall environment, Exhibits and exhibition space of brick/tile kiln allow the visitors enjoying cultural and spiritual relaxation, cultural products and art space environment, attract the re-visit willing of tourists.

As shown from the research survey, San-He tile kiln shall combine with the government entity power in the aspect of environmental space planning, improve the tourism road signs and marks, and the river sewage water in front of its entrance, and then be able to completely enhance the comfortable level of overall environment.

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