

LANDSCAPE PREFERENCE EVALUATION TO THE BREAKWATERS OF FISHING HARBORS IN TAIWAN

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ABSTRACT : The aim of this study is to evaluate the public preference to the breakwaters of fishing harbors in Taiwan, so that the results could be applied to the successive study of breakwater landscape improvement. Among the breakwaters' photographs those took on the fishing harbors, this study picked up 4 photos for demonstration and 60 for questionnaire according to their spatial types configured with crest of breakwater, crown wall, and armoring blocks) and other landscape factors. The preference evaluation was conducted by questionnaire to the public, 385 effective questionnaires were taken into analysis. Results reveals: (1) the open, colorful, recreational and water-intimate breakwaters are preferred. (2) The combination types and visual elements (shapes, colors, textures, lines and scales) of breakwaters are also influence the public preference.

Keywords : *fishing harbors, breakwaters, landscape preference*

1. INTRODUCTION

The construction of the fishing harbors in Taiwan was mainly depended upon cost and safety. The functions of ecology, recreation and esthetics were not the design considerations. Now, the whole fishery environment of Taiwan is changed. As the coastal fishery resource declines, the development of traditional fishery is limited. On the contrary, the entertainment fishery and the ocean recreation are flourished. The functions of fishing harbors should be modified for the transition to leisure and recreation.

Recently, the breakwater is becoming one of the most favorite spaces for the visitors to fishing harbors. Since the main purpose of a breakwater is to protect the harbors from waves, the visual impacts caused by its massive structure and concrete armoring blocks are often criticized. So, it is the important issue to provide better visual experience for the visitors to fishing harbors by improving the landscape of the breakwaters without influencing their original protection function.

In order to improve the fishing harbor breakwater landscape, we should find out what the public preference is. Many approaches to public landscape preference evaluation use photographs and questionnaire. This method had been applied on many landscape types, for example forest, river, highway, but never on the harbor breakwater. This study tries to develop the evaluation procedures and analysis the

factors influent the public preference to the harbor breakwater landscape so that could be applied to the successive study of breakwater landscape improvement.

2. METHOD

2.1 Secondary Information Collection

There are many different types of breakwater when considering the detailed components. In generic terms they may classified as : rubble mound breakwaters; caisson breakwaters; and composite breakwaters[1] or just classified as rubble mound breakwaters and vertical breakwaters[2]. With reference to the official reports from the FA (Fisheries Agency of the Council of Agriculture), including the fishing harbors' aerial photographs, layout plans, and section drawings, this study separates the breakwater into 3 components (fig 1) : crest of breakwater, crown wall ,and armoring blocks.

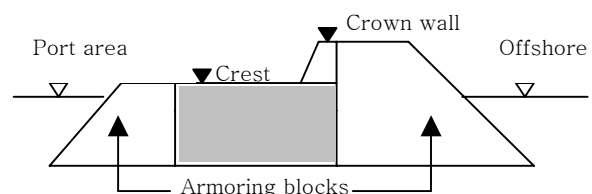


Fig 1. components of breakwater

These 3 components could configure the different spatial types (table 1) when the pedestrian walk along the crest of breakwaters. Those types are classified by (1) crown wall - present or absent and (2) the relative position between crest and armoring blocks (3) material of the crest - rubble mound or paved. This study checked all breakwaters in the official reports from the FA and confirmed there are 13 spatial types of breakwaters in Taiwan (colored in table 1) .

2.2 Field Investigation

There are 239 fishing harbors in Taiwan. In order to save time and money, this study tries to use photos to conduct the landscape preference evaluation to the breakwaters. First, this study chose harbors where could

take the photos for above 13 spatial types of breakwaters. There are 15 harbors chosen. The photos were taken using Nikon COOLPIX880 on clear day from am10:00 to pm14:00. The photos were taken from the pedestrian viewpoint and on the pedestrian access on crest and crown wall. There are 4 photos been taken on the same location, there are forward, backward, seaward, and port-ward.

2.3 Landscape Factors Selection

After field investigation, this study finds out other factors of the breakwater landscape except spatial types. There are : (1) surface material on the crest of breakwater, (2) surface treatment of crown wall, (3) types of armoring blocks.

Table 1. Spatial types of breakwaters

	1 without crown wall	2 vertical crown wall	3 sloping crown wall	4 recurred crown wall	5 crown wall with stairs	6 decking on crown wall
A Without Arming blocks	A1	A2	A3	A3X	A4	A5
B Arming blocks higher than crest	B1	B2	B3	B3X	B4	B5
C Arming blocks even with crest	C1	C2	C3	C3X	C4	C5
D Arming blocks lower than crest	D1	D2	D3	D3X	D4	D5
E Rubble mound breakwaters	E1					

2.4 Questionnaire

More than 400 photos were taken in 15 fishing harbors between April and May 2004, with the aim of capturing the above features of the breakwaters. This study picked up 4 photos for demonstration and 60 for questionnaire according to their spatial types and landscape factors. The photo should be rejected if it could be recognized which harbor is by observers.

Before the formal questionnaire, 4 photos were demonstrated so that the respondents could familiar with

the projecting tempo at the intervals of 8 seconds and the regular position for the sequence numbers. The respondents were asked to evaluate the 60 photos on a five-step rating scale, from “strongly dislike” (1) to “strongly like” (5). The photos were arranged in a random order.

The aim of this study is to evaluate the public preference, so the respondents to the questionnaire should be the public. Since many researches had verified that the students’ preference could represent the public preference [3,4], so

for the sake of money and time, this survey was conducted using the sample of students. There were 385 effective questionnaires are received, 218 majoring in landscape architecture and 167 majoring in ocean engineering.

3. RESULTS & DISCUSSION

According to the result of questionnaire, this study arranged the photos' sequence by their average preference values from the highest to the lowest (see appendix) and divided the 60 photos into 4 groups by 3 values Q1, Q2 & Q3. Q1 (=2.43) is the low mean value for the last 30 photos, Q3 (=3.17) is the high mean value for the first 30 photos, and Q2(=2.75) is mean value for the total 60 photos. Group 1 (n=12) is the most favorite to the public and group 4 (n=15) is the least. Group 2(n=15) & Group3 (n=16) are the middles.

Followings are 4 kinds of analysis conducted and confirmed by the experts from the fields of landscape architecture and ocean engineering.

3.1 The Whole Landscape On Breakwater

The whole landscape in photos had been compared between group 1 and group 4 in the expert meeting and got some observation about the public preference to the breakwaters. The group 1 has the distinctive features of opening, colorfulness, recreation, water-intimacy and harmonization with environment is preferred to the public. On the contrary, the group 4 has the opposite features is disliked by the public.

Since the breakwater had be separated into 3 components, crest of breakwater, crown wall, and armoring blocks, this study also divided the photos into these 3 groups and had a further discussion on their visual elements include shape, texture, color and line.

3.2 Crest Of Breakwater

1. shape :
 - Non-stereotyped breakwater is most preferred.
 - Rubble mound breakwater covered with artificial concrete armoring blocks is the most disliked one.
 - Rubble mound breakwater covered with natural rocks is more preferred than that of artificial concrete armoring blocks.
2. texture :
 - Fine texture is better than rough texture.
 - Crest of breakwater paved with deck, concrete block, or asphalt concrete is preferred than plain concrete or oyster shells.
3. color :
 - Colorful is preferred than monotonous color of plain concrete
 - Pavement's color in harmony with nature is preferred than in contrast.
4. line :
 - Curve line is preferred than straight line

3.3 Crown Wall

1. shape :
 - Low wall is preferred than high wall
 - Sloped wall is preferred than vertical wall
2. texture :
 - Well-treated wall is preferred than untreated plain concrete.
 - Fine texture is better than rough texture.
 - Crown wall treated with relief is preferred than color painted or covered with plants.
3. color :
 - Colorful is preferred than monotonous color of plain concrete
 - Walls' color in harmony with nature is preferred than in contrast.

3.4 armoring blocks

1. shape :
 - Artificial concrete armoring blocks aren't preferred to public no matter what kinds.
2. texture :
 - Natural rock is preferred than artificial concrete armoring block
3. color :
 - Artificial concrete armoring blocks covered with vegetation is preferred than monotonous color of plain concrete
4. line :
 - Curve line is preferred than straight line

5. CONCLUSION

In conclusion, the conventional breakwaters are not preferred to the public and the well-designed non-stereotyped breakwater is most preferred. If the breakwater could be modified to be more open, colorful, recreational, water-intimate and harmony with environment, it will be more preferred to the public. The crest of breakwater could be paved with deck, concrete block, asphalt concrete or something with fine texture to raise the preference. The crown wall could be reduced the oppression by low down its height and treated with relief, color painting or covered with plants. The color in harmony with nature is preferred than in contrast both for the crest and crown wall. The artificial armoring blocks are disgusted no matter what kinds.

Generally speaking, the average preference values of the breakwater are not high (2.75). It is very important to conduct the successive research of breakwater landscape improvement.

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APPENDIX :

Group 1 : mean value > Q3=3.17 (12 photos)



4.00/1.035 【55】 3.79/0.99 【45】 3.523/1.15 【57】 3.42/1.05 【23】



3.41/1.07 【49】 3.36/0.99 【13】 3.35/1.14 【29】 3.30/0.94 【07】



4.29/1.07 【48】 3.24/0.99 【22】 3.22/0.98 【09】 3.22/0.92 【08】

Group 2 : mean value = Q3~Q2=2.76~3.16 (15 photos)



3.15/1.09 【19】 3.14/0.95 【14】 3.10/0.95 【35】 3.04/1.17 【33】



3.02/0.90 【46】 2.97/0.99 【12】 2.96/1.11 【36】 2.95/1.13 【16】



2.95/1.06 【10】 2.93/0.97 【47】 2.92/0.93 【04】 2.90/0.92 【42】



2.81/0.98 【58】 2.80/0.95 【18】 2.77/0.94 【17】

Group 3 : mean value = $Q3 \sim Q2 = 2.43 \sim 2.75$ (16 photos)



2.75/0.94 【05】 2.70/1.01 【34】 2.69/0.92 【51】 2.67/0.82 【37】



2.66/0.84 【15】 2.65/0.87 【50】 2.64/0.89 【27】 2.61/1.03 【38】



2.59/0.88 【26】 2.58/1.01 【60】 2.54/0.89 【11】 2.50/0.87 【53】



2.50/1.07 【20】 2.48/0.83 【02】 2.44/0.89 【25】 2.43/0.85 【39】

Group 4 : mean value < $Q1 = 2.43$ (17 photos)



2.37/1.09 【06】 2.72/0.94 【44】 2.36/0.94 【43】 2.36/0.87 【31】



2.34/0.86 【41】 2.33/0.91 【40】 2.33/1.02 【28】 2.32/0.98 【01】



2.30/0.89 【52】 2.30/0.85 【30】 2.27/0.92 【03】 2.24/1.08 【59】



2.21/0.86 【24】 2.16/0.92 【32】 2.14/0.88 【21】 2.07/0.92 【56】



2.03/0.94 【54】

note : mean value/standard deviation 【projection sequence no.】

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