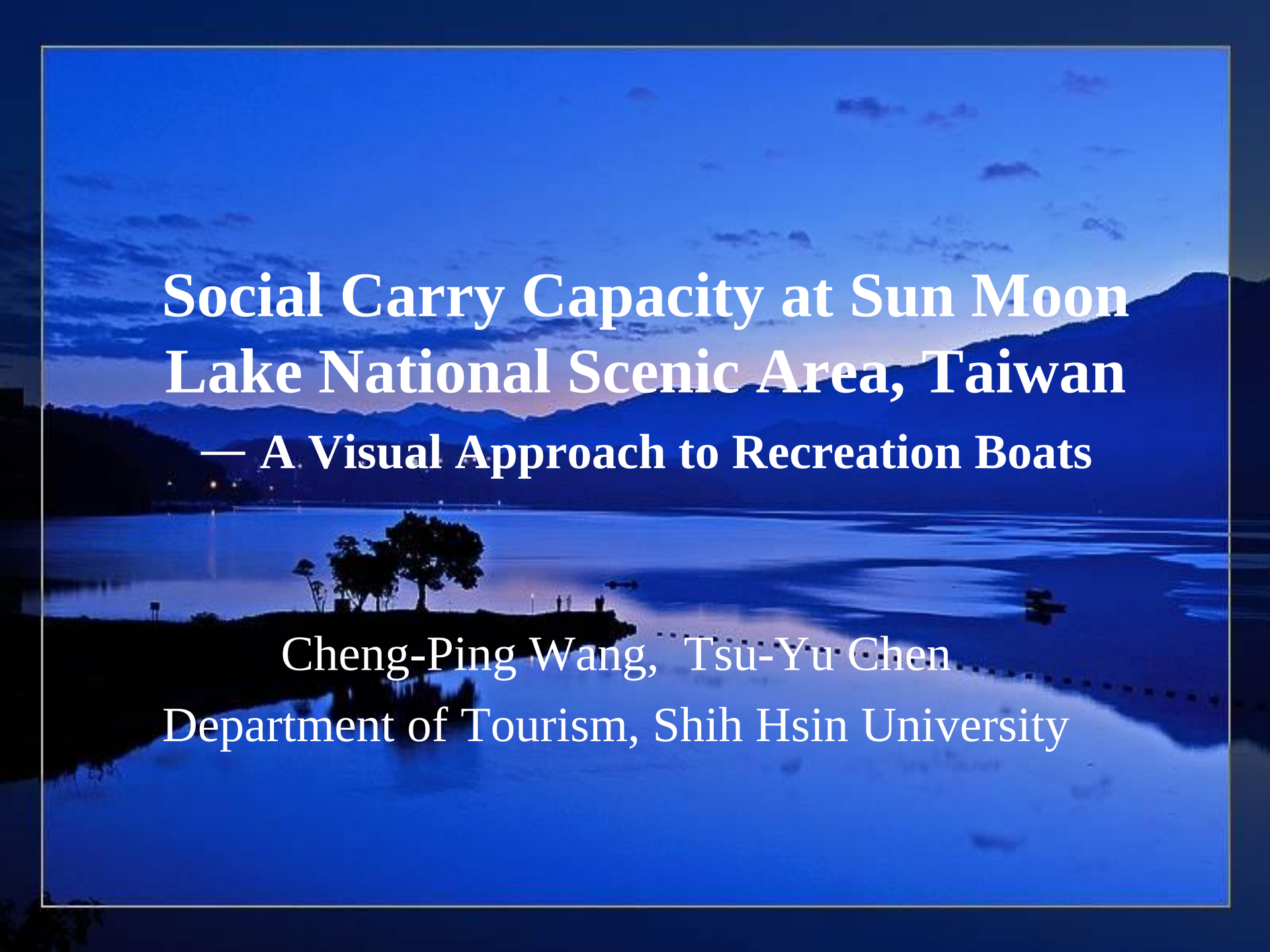

Social Carry Capacity at Sun Moon Lake National Scenic Area, Taiwan

— A Visual Approach to Recreation Boats

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Study Purposes

- Sun Moon Lake National Scenic Area is one of the best destination in Taiwan.
- Visitor number increased dramatically (from 0.6 million in 2004 to 1.3 million in 2008) , and the number will increase even more because people from Main Land China are allow to visit Taiwan.
- The purpose of this study is to survey visitors’social carrying capacity at Sun Moon Lake National Scenic Area, Taiwan through a visual approach.

Social Carrying Capacity

- Recreation carrying capacity
- Four types: ecological, physical, facility, and social carrying capacity.
- Norm theory

Visual Approach

- Computer simulation
- Proper for relative crowded area (e.g. front country)
- Method issues: indicators, locations of objects, starting point and interval issues…etc.

How to see?

View Position

- Viewer inferior： Viewer’s position lower than that of the object.
- Viewer normal： Viewer’s position same as that of the object.
- Viewer superior：Viewer’s position higher than that of the object.

Distance

- Fore ground：0~400 meter(s); see the detail of the object.
- Middle ground ：400~5000 meters; simplify the object.
- Back ground：more than 5000 meters; only see the shape.

Research Hypotheses

- **Hypothesis 1**：People have different acceptances when they look at the same water area from different locations.

- **Hypothesis 2**：The locations of boats simulated in the photos affect respondents' acceptances of boat numbers.

日月潭悠遊地圖

Research Method

- Visual approach was adopted.
- Photos were simulated based on the visitors who enjoy the lake scenery from the major view points (Shui-She and Yi-Da-Shao marinas).
- Simulate various sets of photos with various boat numbers in foreground and middle ground.
- Through convenient sampling method, respondents were selected at the two major marinas.

- Took the picture without any boat by a digital camera with 610 million pixels and 150cm high from the ground.
- Photos were made through “PhotoImpact 12.0”.
- Consider the navigating directions based on the navigating line.
- Simulate the photo with maximum boat number (foreground 12 boats, middle ground 20 boats). Then delete boats randomly when simulating other photos.

Background of Respondents

Sex: Male (55.5%); Female (44.5%)

Age: 21~30 years (28%)

Education: College (37.5%)

Vocation: Student (25%)

Resident: Taipei region (25%)

Visiting Experience: First time (37.5%)

Comparisons of Acceptances

(Shui-She→Yi-Da-Shao) — (Yi-Da-Shao→Shui-She)

	成對變數差異		t值	顯著性
	平均數	標準差		
Lac 近 0 中 0	0.130	0.766	2.402	0.017(*)
Lac 近 3 中 0	0.490	1.220	5.682	0.000(*)
Lac 近 0 中 5	0.415	1.029	5.706	0.000(*)
Lac 近 6 中 0	-0.045	1.354	-0.470	0.639
Lac 近 3 中 5	0.025	1.184	0.299	0.766
Lac 近 9 中 0	0.930	1.105	11.902	0.000(*)
Lac 近 0 中 10	0.535	1.156	6.547	0.000(*)
Lac 近 6 中 5	0.260	1.447	2.542	0.012(*)
Lac 近 12 中 0	0.310	1.091	4.019	0.000(*)
Lac 近 3 中 10	0.050	1.417	0.499	0.618
Lac 近 9 中 5	0.915	1.146	11.287	0.000(*)
Lac 近 0 中 15	0.080	1.440	0.786	0.433
Lac 近 6 中 10	0.135	1.348	1.417	0.158
Lac 近 12 中 5	0.315	0.975	4.569	0.000(*)
Lac 近 3 中 15	-0.495	1.371	-5.106	0.000(*)
Lac 近 9 中 10	0.795	1.090	10.311	0.000(*)
Lac 近 0 中 20	-0.715	1.567	-6.452	0.000(*)
Lac 近 6 中 15	-0.100	1.428	-0.990	0.323
Lac 近 12 中 10	0.020	0.750	0.377	0.706
Lac 近 3 中 20	-1.360	1.638	-11.740	0.000(*)
Lac 近 9 中 15	-0.225	1.086	-2.929	0.004(*)
Lac 近 6 中 20	-0.130	1.327	-1.385	0.168
Lac 近 12 中 15	-0.065	0.962	-0.956	0.340
Lac 近 9 中 20	-0.240	0.915	-3.711	0.000(*)
Lac 近 12 中 20	-0.225	0.905	-3.517	0.001(*)

註1：平均數（I-J）為水社碼頭→伊達邵碼頭方向-伊達邵碼頭→水社碼頭方向

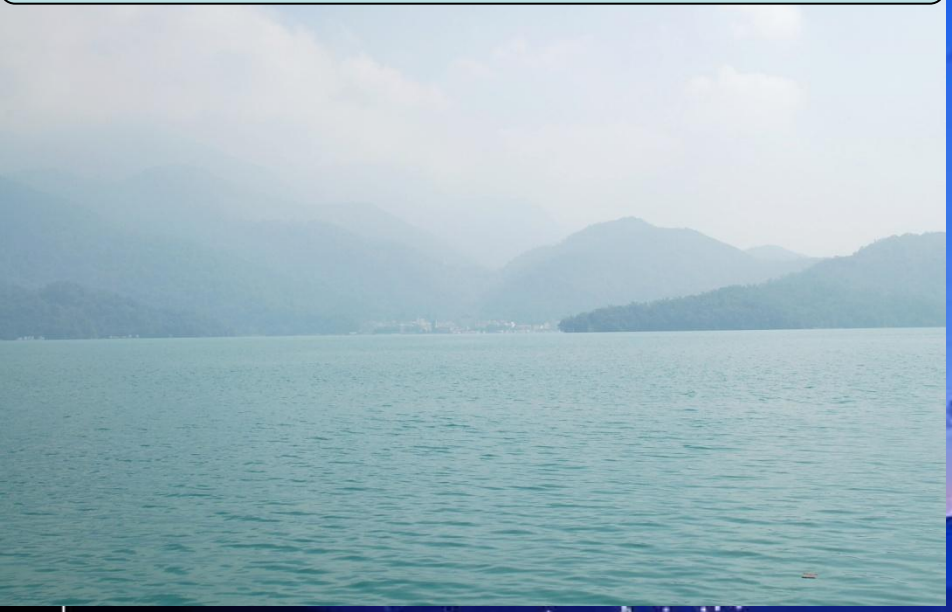
註2：可接受程度為九點尺度；1為極不能接受，5為普通，9為極可接受

- When fewer boat numbers, the acceptances of Shui-She are higher than those of Yi-Da-Shao; when higher boat numbers, the acceptances of Yi-Da-Shao are higher than those of Shui-She.

Possible reasons:

- Facility at the fore ground.
- Navigation line and directions.

Shui-She→Yi-Da-Shao (for-0; mid-0)



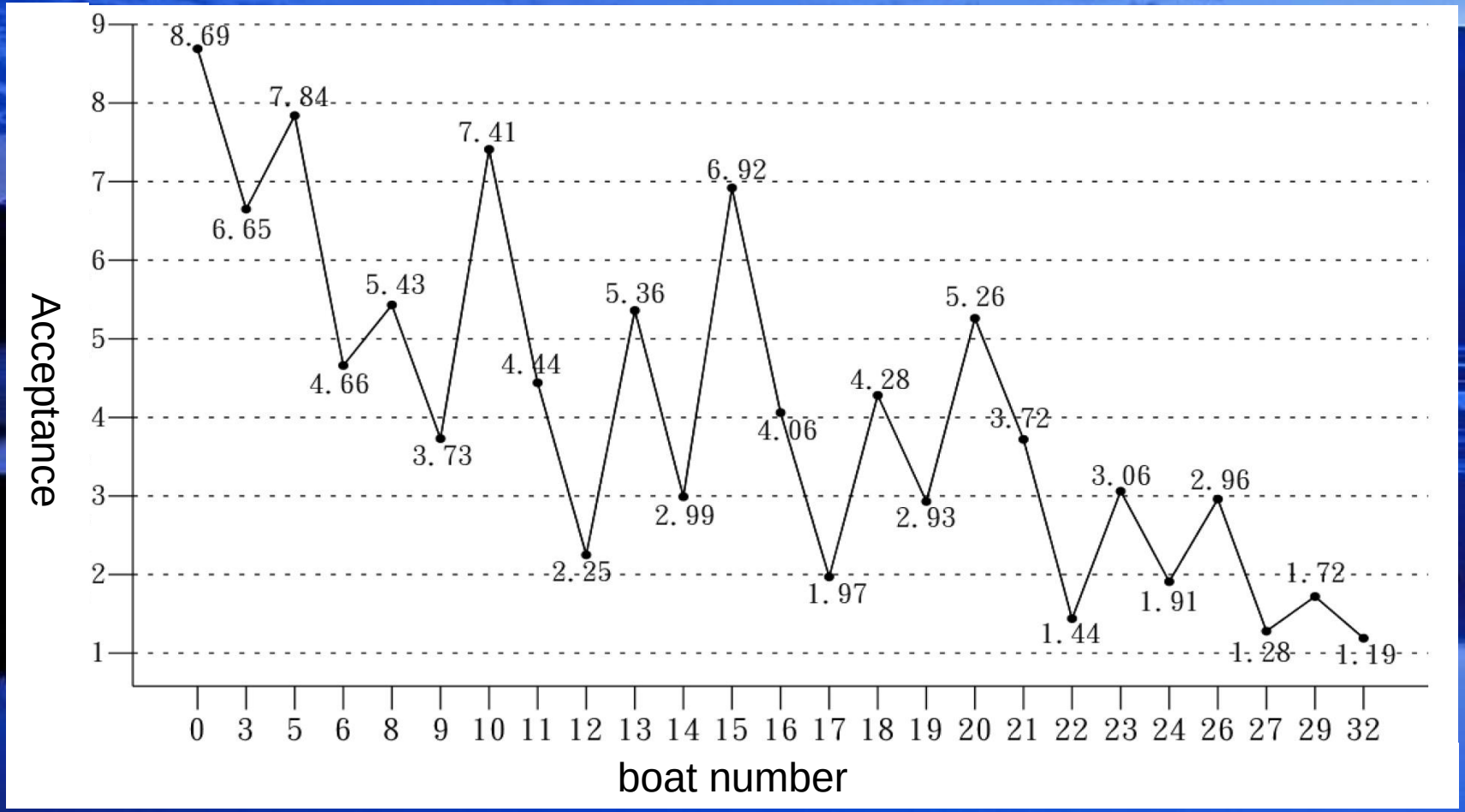
Yi-Da-Shao→Shui-She (for-0; mid-0)

Shui-She→Yi-Da-Shao (for-12; mid-20)

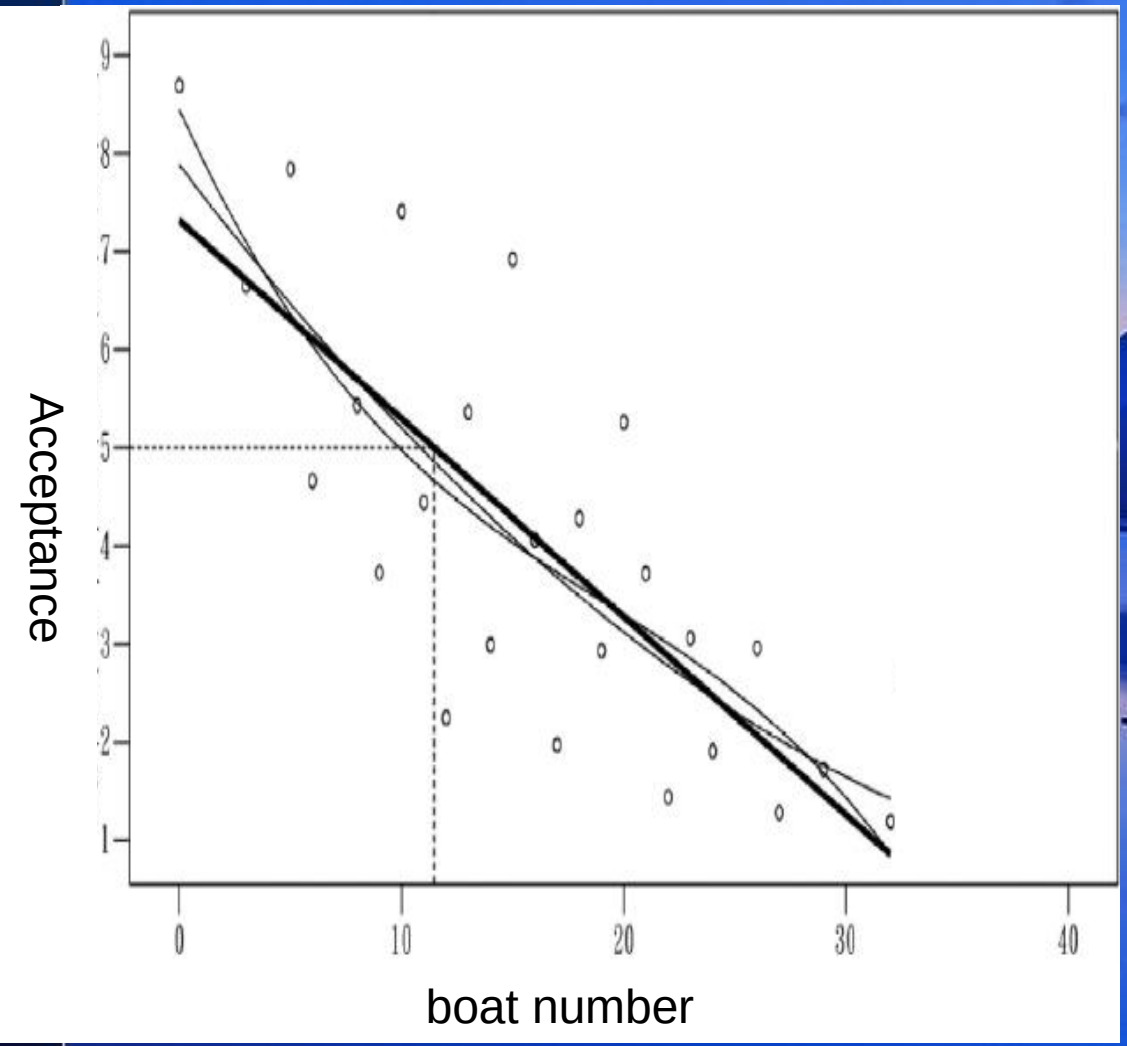
Yi-Da-Shao→Shui-She (for-12; mid-20)

Plot of boat number and acceptance

(Shui-She→Yi-Da-Shao)



(Shui-She→Yi-Da-Shao)



R^2 (Linear)=0.614

R^2 (Quadratic)=0.625

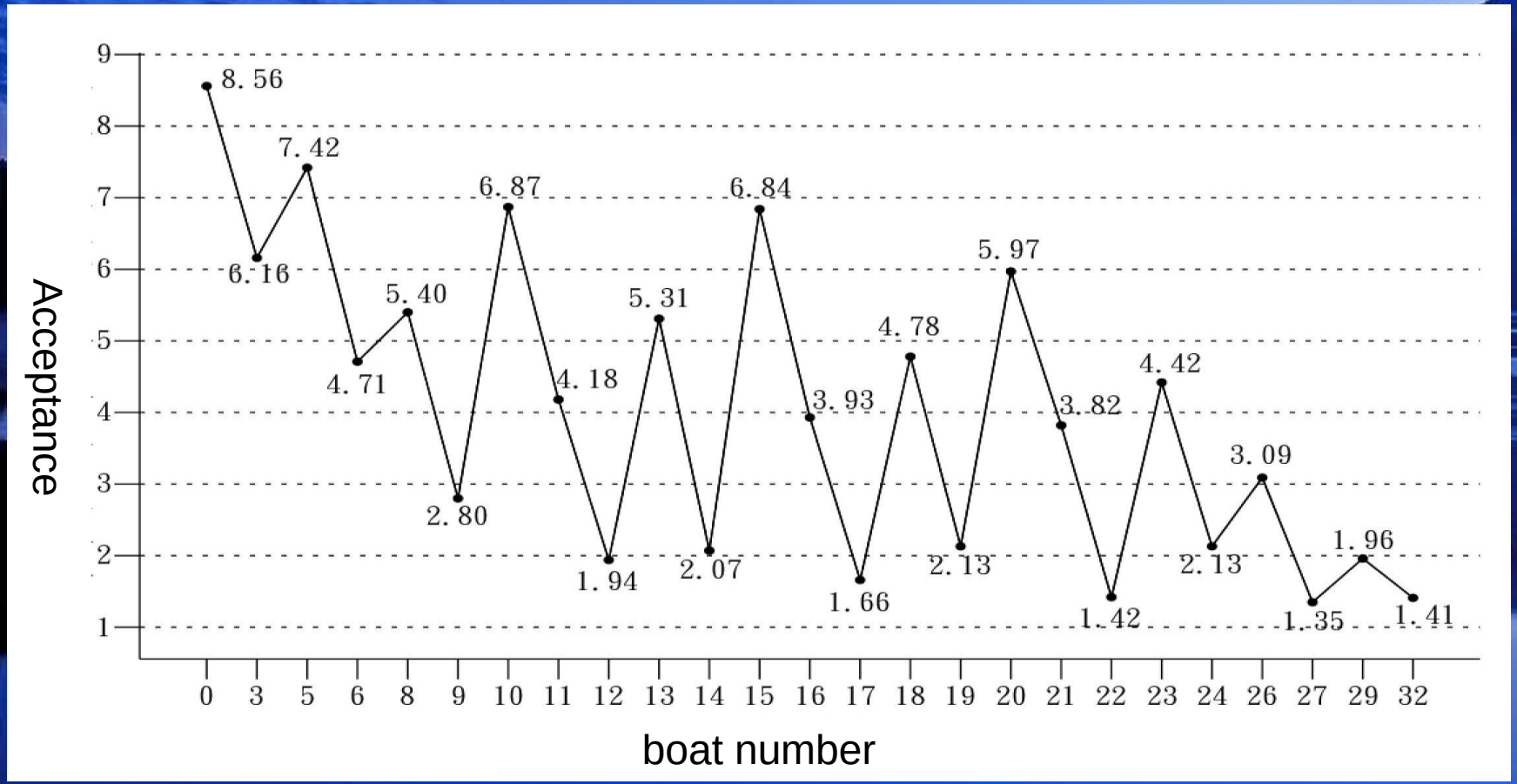
R^2 (Cubic)=0.636

Regression Model

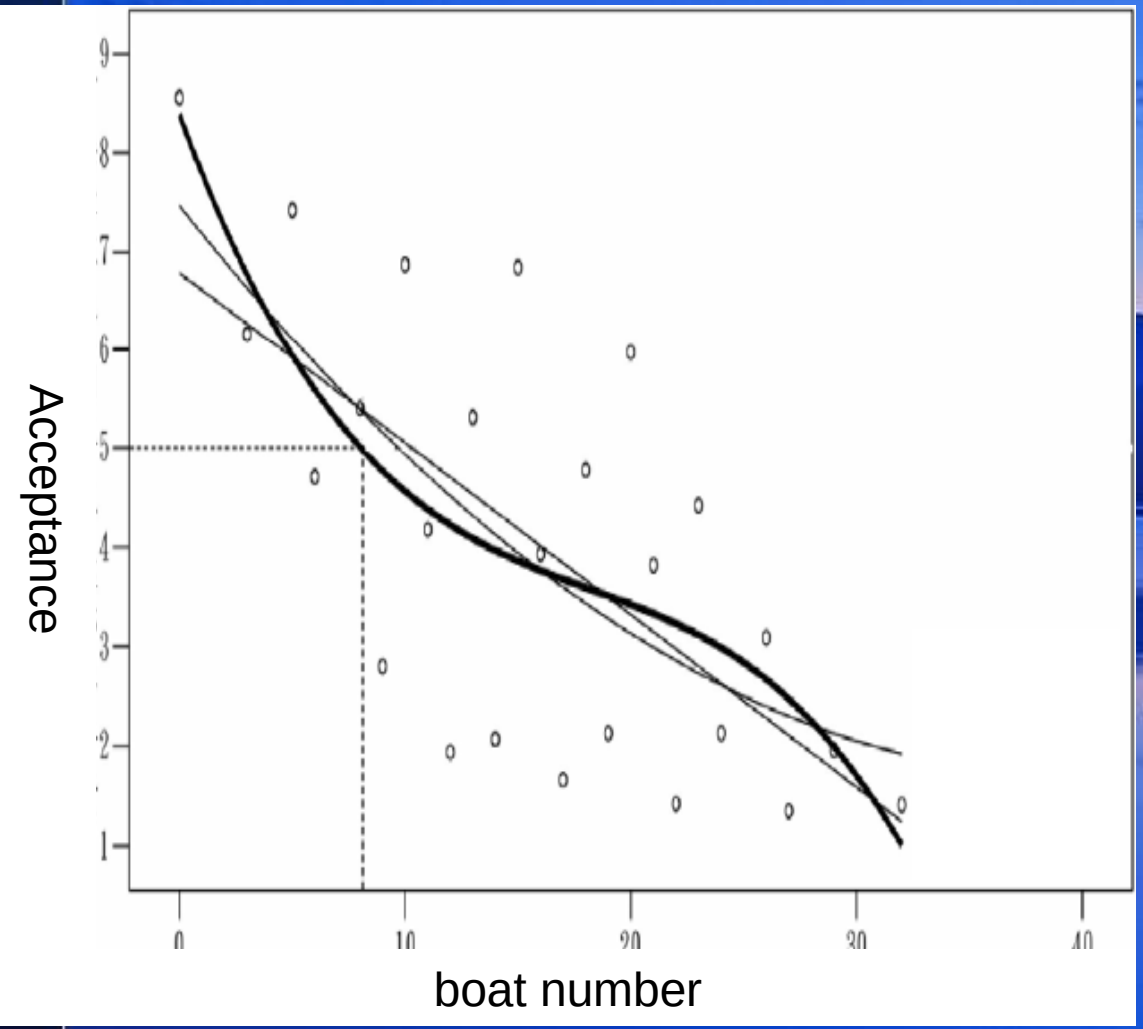
(Shui-She→Yi-Da-Shao)

	B	Beta	t	P-value
(Constant)	7.911		34.162	0.000
Fore ground	-0.450	-0.899	-18.430	0.000
Middle ground	-0.113	-0.375	-7.686	0.000
R＝0.974； R-square＝0.948； Adjusted R-square＝0.943				

Plot of boat number and acceptance
(Yi-Da-Shao→Shui-She)



(Yi-Da-Shao→Shui-She)



R^2 (Linear)=0.465

R^2 (Quadratic)=0.482

R^2 (Cubic)=0.513

Regression Model
(Yi-Da-Shao→Shui-She)

	B	Beta	t	P-value
(Constant)	7.501		38.715	0.000
Fore ground	-0.472	-0.955	-23.093	0.000
Middle ground	-0.066	-0.222	-5.370	0.000
R＝0.981； R-square＝0.962； Adjusted R-square＝0.959				

Social Carrying Capacity

(Shui-She→Yi-Da-Shao)			(Yi-Da-Shao→Shui-She)		
Fore ground	Middle ground	Total	Fore ground	Middle ground	Total
6	2	8	5	2	7
5	6	11	4	9	13
4	10	14	3	16	19
3	14	17	2	24	26
2	18	20	1	31	32
1	22	23	0	38	38
0	26	26			

Conclusion

- People have different capacities when they look at the same water area from different locations.

  Factors: facilities, navigation direction, view shed.

- The locations of boats simulated in the photos affect respondents' acceptances of boat numbers. Therefore, boats at foreground or middle ground affect visitors' acceptances.

Implication

- Managing the BAOT (boat at one time) through navigating schedule.
- Considering visitors' locations and boat navigating directions.
- Considering the locations of facilities on the lack.