Logit Choice Models for the Western Visayas Region, Philippines

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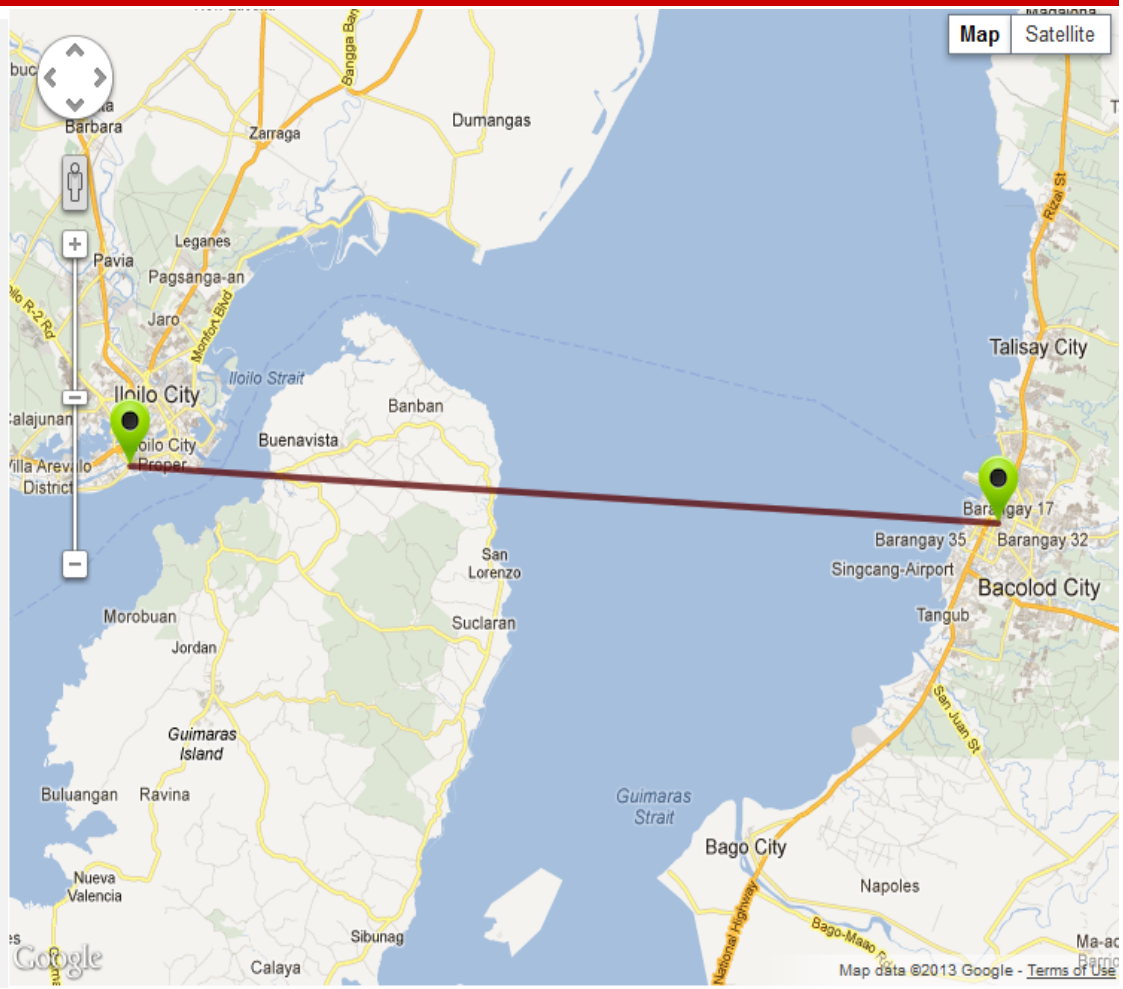
AYRF15-036

Introduction

- Philippines
  - Archipelago
- Western Visayas Region
  - Tourism
  - GDP
  - Economic growth
- Accessibility
  - Poverty incidence
  - Facilitates

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http://adventurephilippines.tripod.com/adm/interstitial/remote.jpg


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http://i69.photobucket.com/albums/i61/helengab11/kasadyahan.jpg

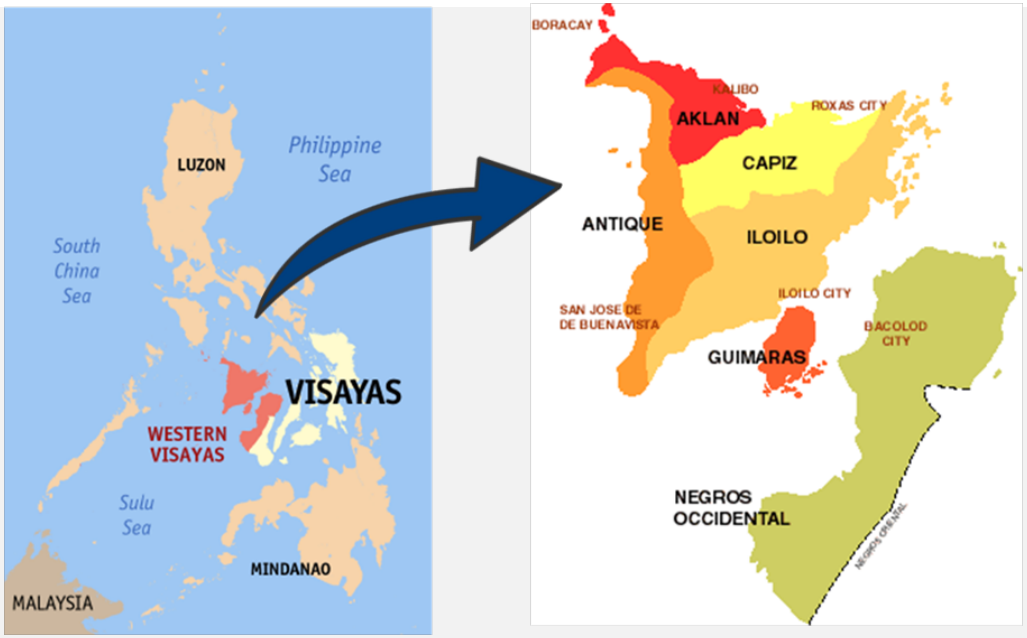
http://www.choosephilippines.com/go/islands-and-beaches/328/Guisi_Beach_Guimaras/


http://sutromedia.com/published/ipad-sized-photos/264739.jpg

http://www.balticmuse.com/wp-content/uploads/2014/04/IMG_0664_Size.jpg

Introduction

- Philippines
  - Archipelago
- Western Visayas Region
  - Tourism
  - GDP
  - Economic growth
- Inter-island passenger transportation
  - Formulate MNL and ML choice models
  - Look into factors affecting mode choice



Methodology

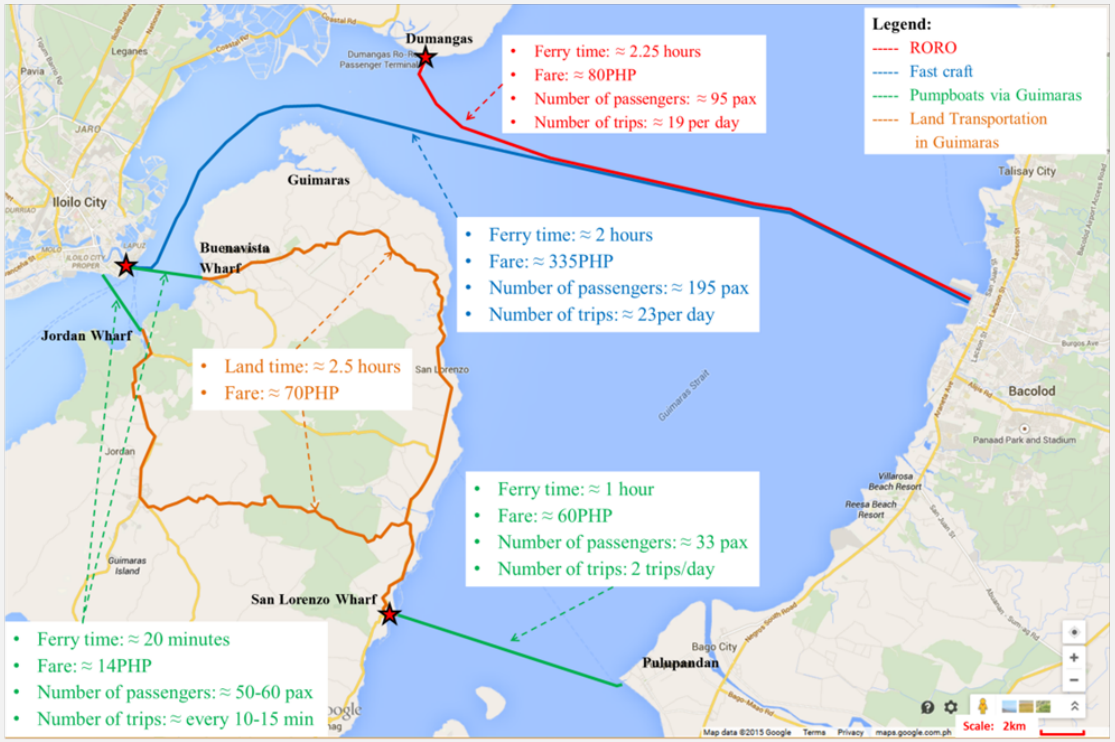
$$U_{jtn} = \sum_{k=1}^{K} \beta_{nk} x_{jtnk} + \varepsilon_{jtn} = \beta'_n x_{jtn} + \varepsilon_{jtn}$$

$$\beta_{nk} = \beta_k + \delta'_k z_n + \eta_{nk}$$

may assume various distributions such as normal, lognormal, uniform, or triangular

Methodology

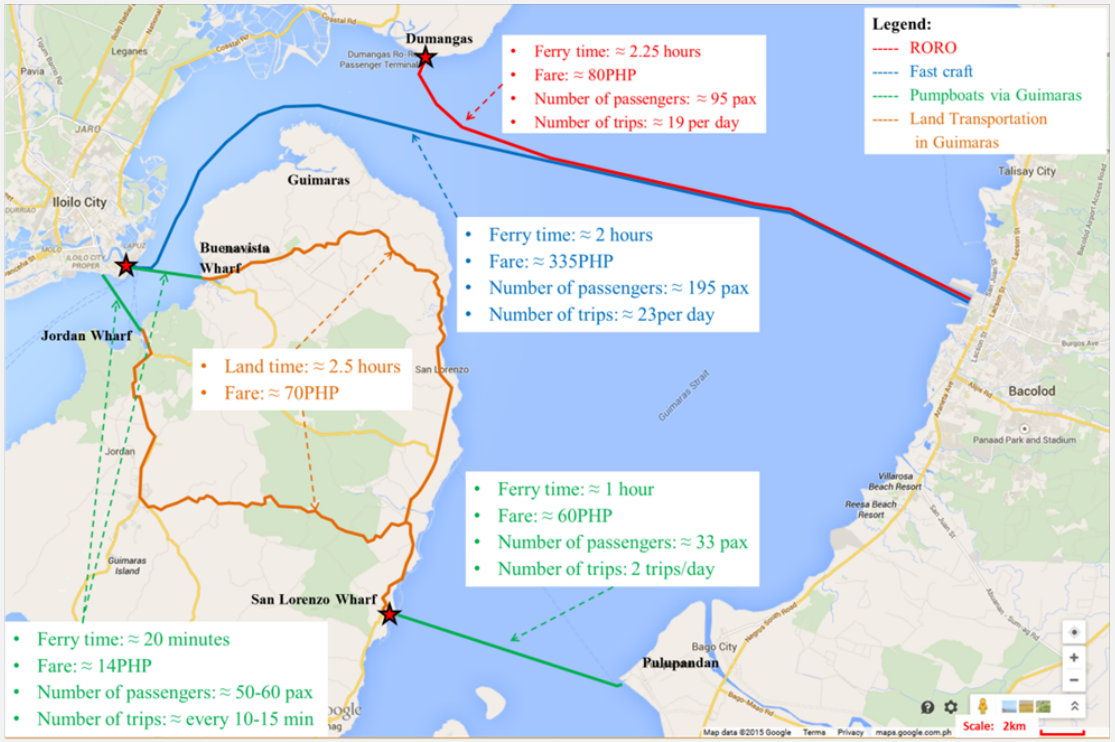
- Revealed preference (RP) survey questionnaire
  - February to July 2014



Dumangas RORO Port

Methodology

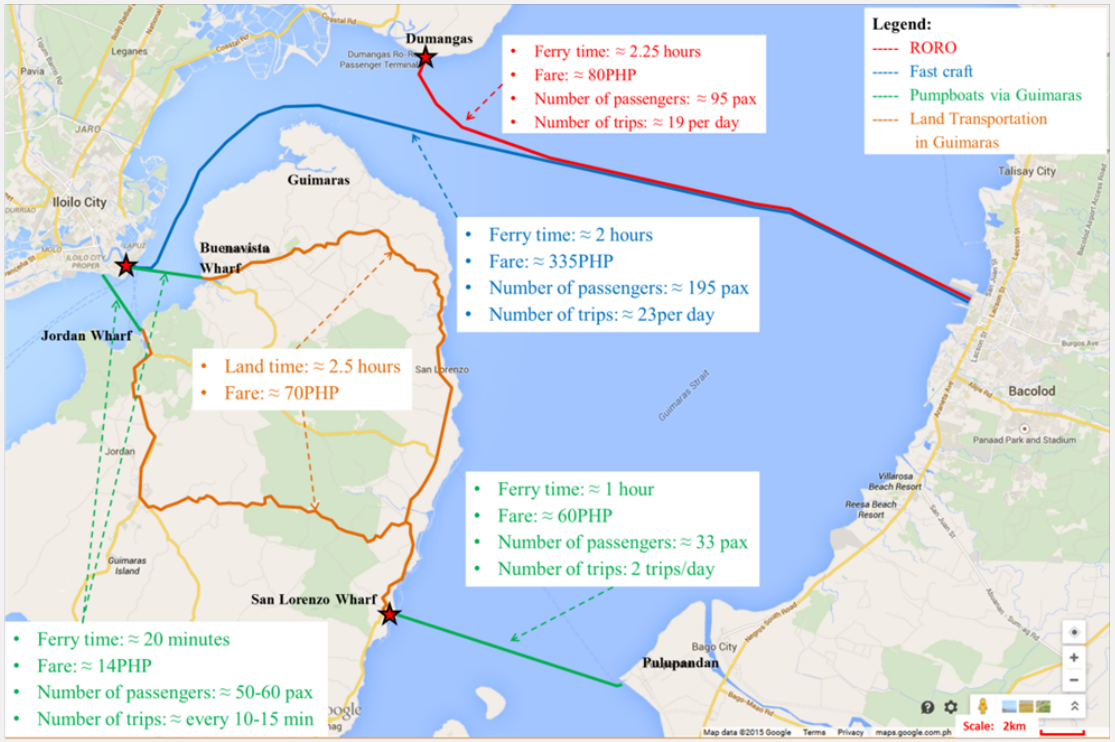
- Revealed preference (RP) survey questionnaire
  - February to July 2014



Iloilo Fastcraft Ferry Port

Methodology

- Revealed preference (RP) survey questionnaire
  - February to July 2014

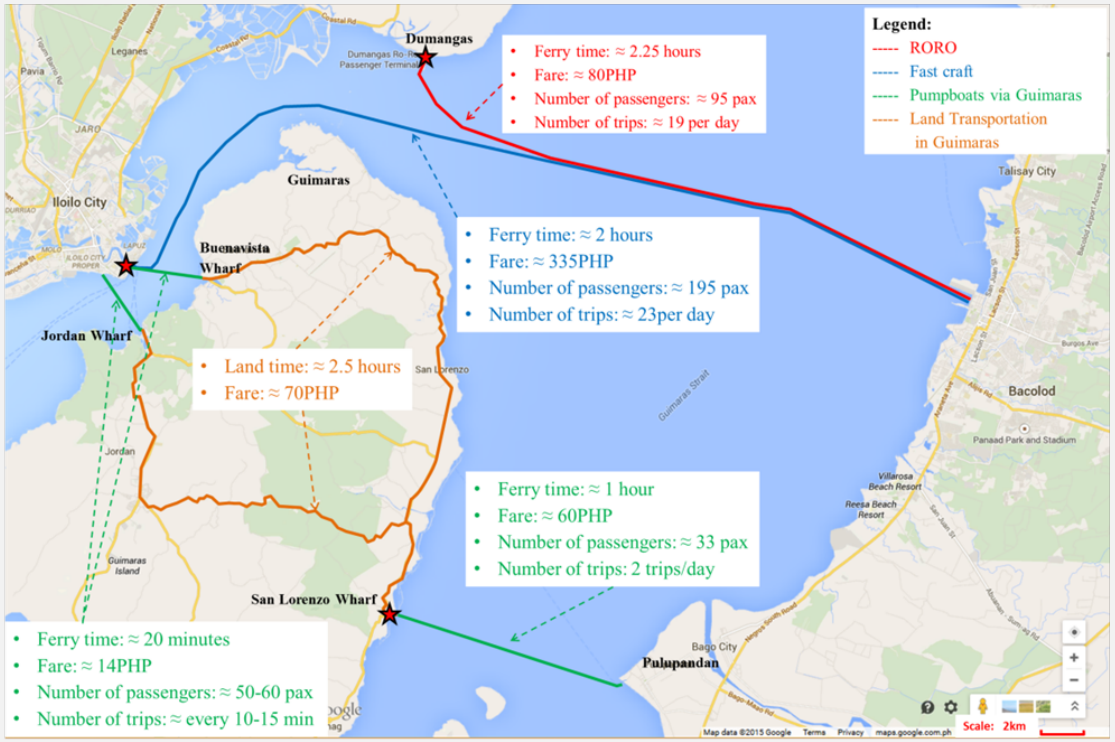


Parola Wharf (*left*) and Buenavista Wharf (*right*)

http://www.filipinobackpacker.com/2013/04/how-to-get-to-guimaras-island-from.html

Methodology

- Revealed preference (RP) survey questionnaire
  - February to July 2014

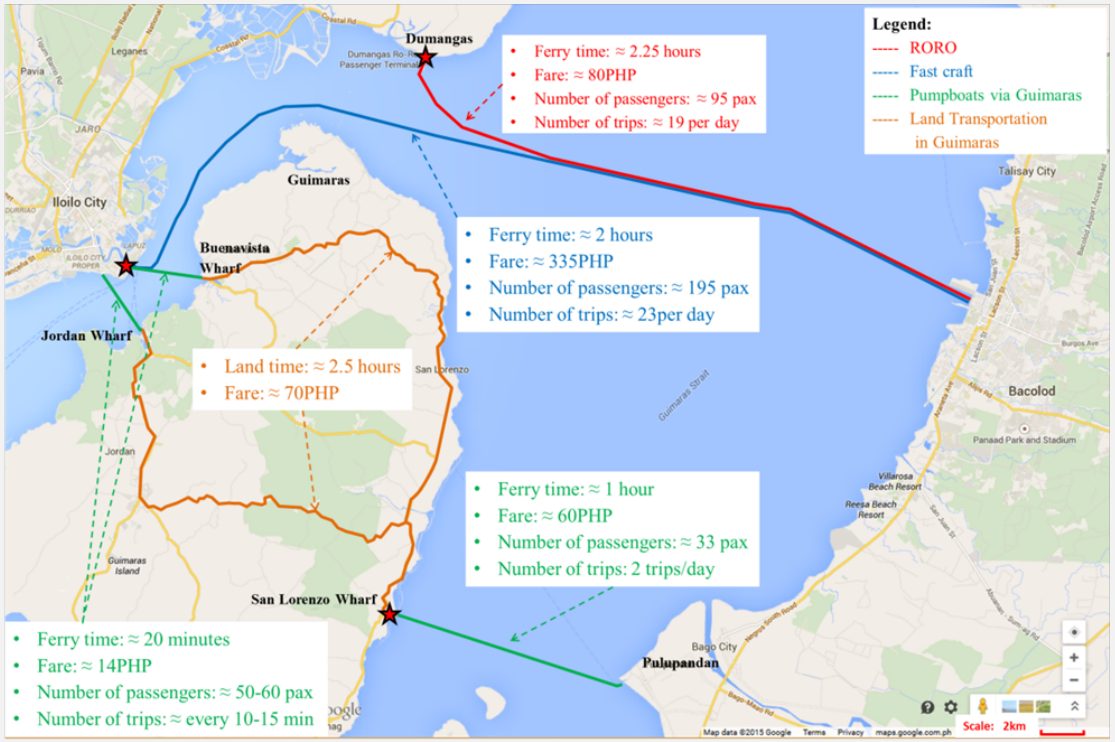


Ortiz Wharf (*left*) and Jordan Wharf (*right*)

http://www.zemkampschalet.com/zemkamps-photo-gallery.php

Methodology

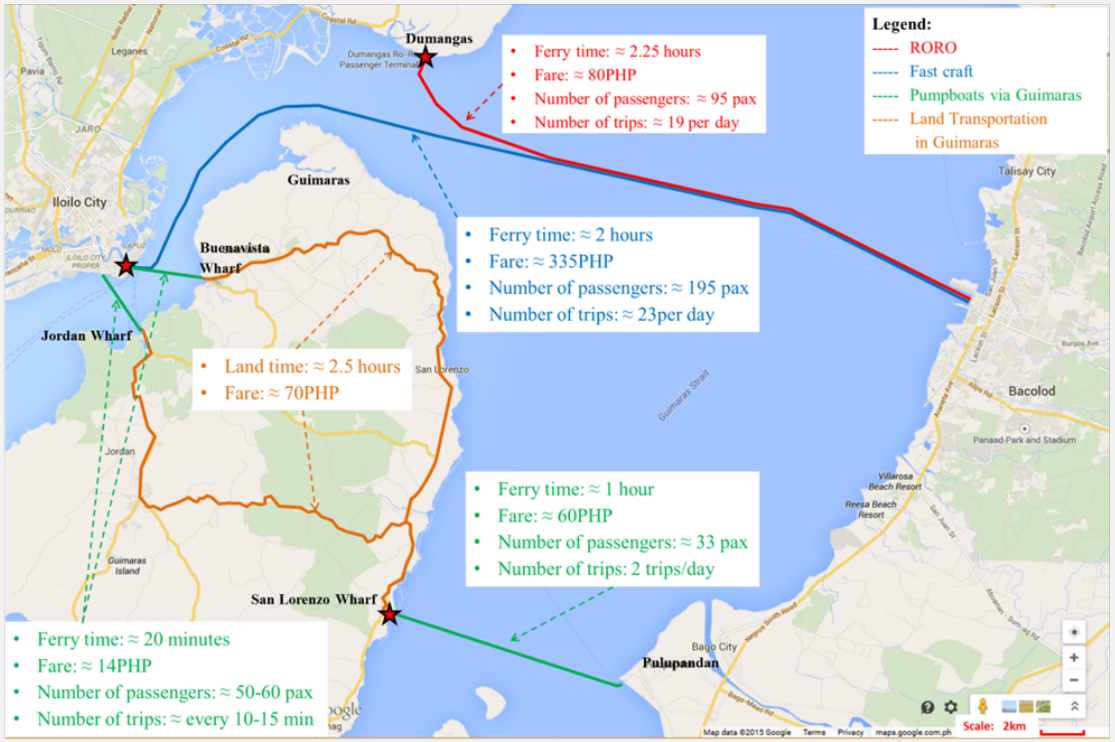
- Revealed preference (RP) survey questionnaire
  - February to July 2014



San Lorenzo Wharf

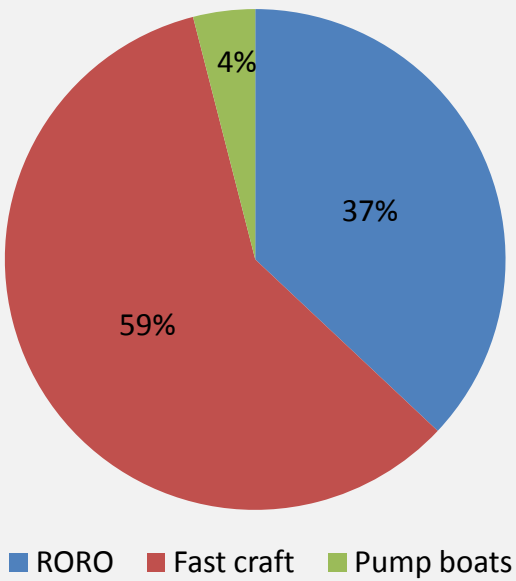
Methodology

- Revealed preference (RP) survey questionnaire
  - February to July 2014
  - Socio-demographic characteristics
  - Trip characteristics
  - Time and cost
    - Access, main, egress



Results and Discussion

- 1813 observations



Percentage Distribution of Trip Purpose According to Travel Mode

	RORO	Fast craft	Pumpboats via Guimaras	Overall
Work	8.33	15.33	2.56	12.19
Vacation/leisure	50.00	24.18	34.62	34.20
School	2.38	3.57	1.28	3.03
Business	9.82	6.49	1.28	7.50
Home	23.21	43.93	58.97	36.90
Others	6.25	6.49	1.28	6.18
Number of observations	672	1063	78	1813

Results and Discussion

		A (RORO)		B (Fast craft)		C (Via Guimaras)		TOTAL	
Characteristic		Count	%	Count	%	Count	%	Count	%
Gender	**Male**	372	55.36	498	46.85	48	61.54	918	50.63
	Female	300	44.64	565	53.15	30	38.46	895	49.37
	Total	672	100.00	1063	100.00	78	100.00	1813	100.00
Civil Status	**Single**	338	50.30	592	55.69	12	15.38	942	51.96
	Married/widow	334	49.70	471	44.31	66	84.62	871	48.04
	Total	672	100.00	1063	100.00	78	100.00	1813	100.00
Trip Purpose	**Work**	56	8.33	163	15.33	2	2.56	221	12.19
	Vacation	336	50.00	257	24.18	27	34.62	620	34.20
	School	16	2.38	38	3.57	1	1.28	55	3.03
	Business	66	9.82	69	6.49	1	1.28	136	7.50
	Home	156	23.21	467	43.93	46	58.97	669	36.90
	Others	42	6.25	69	6.49	1	1.28	112	6.18
	Total	672	100	1063	100	78	100	1813	100
Travel Frequency	**At least once a year**	262	38.99	292	27.47	16	20.51	570	31.44
	At least every 6 months	194	28.87	295	27.75	31	39.74	520	28.68
	At least monthly	146	21.73	308	28.97	25	32.05	479	26.42
	At least weekly	60	8.93	123	11.57	4	5.13	187	10.31
	Daily	1	0.15	9	0.85	0	0.00	10	0.55
	First time	9	1.34	36	3.39	2	2.56	47	2.59
	Total	672	100	1063	100	78	100	1813	100

		A (RORO)		B (Fast craft)		C (Via Guimaras)		TOTAL	
Characteristic		Count	%	Count	%	Count	%	Count	%
Age	**< 21**	111	16.52	228	21.45	7	8.97	346	19.08
	22-30	275	40.92	363	34.15	16	20.51	654	36.07
	31-40	146	21.73	228	21.45	23	29.49	397	21.90
	41-50	93	13.84	129	12.14	15	19.23	237	13.07
	51-60	39	5.80	77	7.24	9	11.54	125	6.89
	61-70	7	1.04	31	2.92	7	8.97	45	2.48
	71-80	1	0.15	6	0.56	1	1.28	8	0.44
	More	0	0.00	1	0.09	0	0.00	1	0.06
	Total	672	100	1063	100	78	100	1813	100
Income Class	**1**	52	7.74	120	11.29	6	7.69	178	9.82
	2	128	19.05	164	15.43	27	34.62	319	17.60
	3	145	21.58	198	18.63	27	34.62	370	20.41
	4	225	33.48	300	28.22	18	23.08	543	29.95
	5	122	18.15	281	26.43	0	0.00	403	22.23
	Total	672	100	1063	100	78	100	1813	100

Results and Discussion

Travel Frequency Distribution of Respondents According to Travel Mode

	RORO	Fast craft	Pumpboats	Total
Once a year	262	292	16	570
Twice a year	194	295	31	520
Monthly	146	308	25	479
Weekly	60	123	4	187
Daily	1	9	0	10
First time	9	36	2	47
Total	672	1063	78	1813

Results and Discussion

Travel Time According to Travel Mode

Inter-island modes		In-vehicle time (min)	Waiting (min)	Access time (min)	Egress time (min)	Total time (min)
RORO	$\bar{x}$	120.18	49.03	69.29	41.42	279.91
	σ	*(4.56)*	*(28.56)*	*(39.24)*	*(36.78)*	*(60.12)*
Fast craft	$\bar{x}$	71.64	46.48	37.42	50.33	205.87
	σ	*(17.58)*	*(32.28)*	*(34.38)*	*(43.56)*	*(71.1)*
Pump boat via Guimaras	$\bar{x}$	282.30	97.02	46.06	40.77	466.15
	σ	*(43.62)*	*(44.46)*	*(35.64)*	*(35.7)*	*(80.64)*

Results and Discussion

Travel Cost According to Travel Mode

Inter-island modes		In-vehicle cost (PHP)	Access cost (PHP)	Egress cost (PHP)	Mean total cost (PHP)
RORO	$\bar{x}$	70.98	88.78	49.46	209.22
	σ	*(10.84)*	*(51.73)*	*(54.14)*	*(78.55)*
Fast craft	$\bar{x}$	323.66	49.36	63.22	436.24
	σ	*(79.34)*	*(56.7)*	*(60.11)*	*(117.65)*
Pump boat via Guimaras	$\bar{x}$	193.04	33.65	39.62	266.31
	σ	*(33.92)*	*(35.94)*	*(46.6)*	*(89.54)*

Results and Discussion

RP MNL Models for the Whole and Income Segregated Sample

Variable	All		Low Income		High Income	
	Coeff	*P*-val	Coeff	*P*-val	Coeff	*P*-val
Generic						
CST	-0.009	*0.000*	-0.013	*0.000*	-0.006	*0.000*
CST2	0.000	*0.000*	0.000	*0.000*	0.000	*0.013*
TIME	-0.454	*0.000*	-0.314	*0.000*	-0.582	*0.000*
Specific to RORO						
ASCA	0.454	*0.005*	0.201	*0.332*	1.019	*0.001*
NUM	0.052	*0.004*	0.055	*0.042*	0.051	*0.032*
Specific to Fast craft						
ASCB	1.273	*0.000*	1.468	*0.000*	1.463	*0.000*
FREQ	0.007	*0.004*	0.005	*0.222*	0.008	*0.018*
R-sqrd	0.331		0.277		0.400	
Log-likelihood	-1332.410		-688.859		-623.800	
n	1813		867		946	
Chi-square	294.898		146.514		157.518	
p	0.000		0.000		0.000	

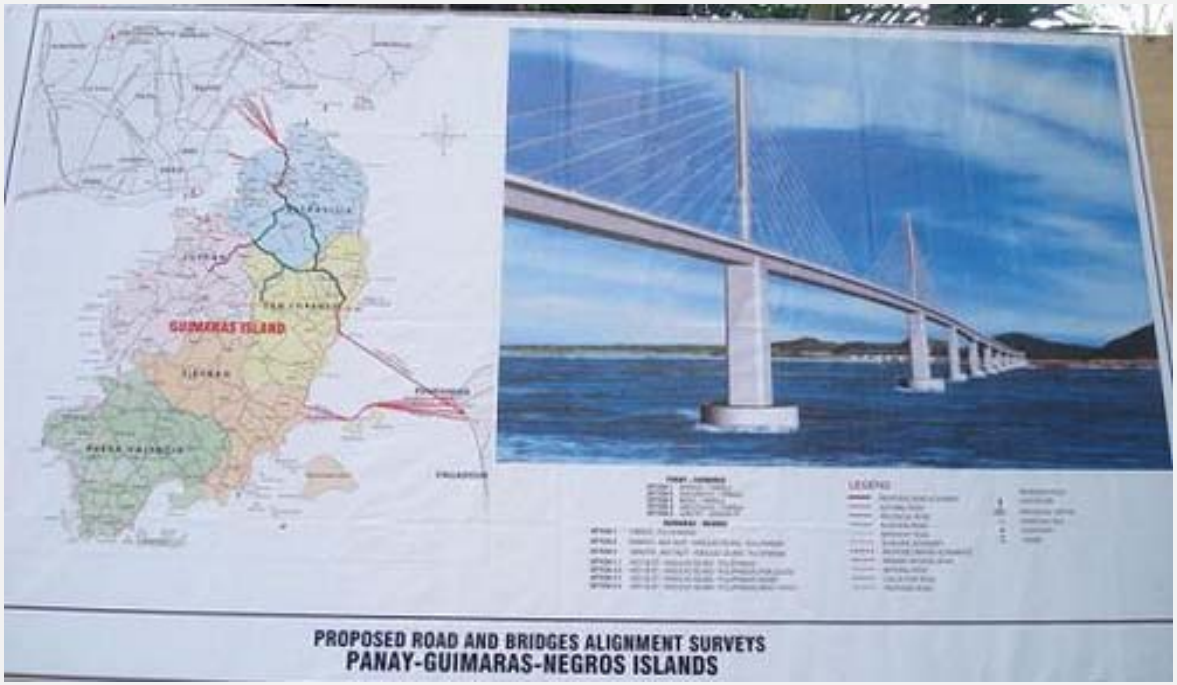
Results and Discussion

Mixed Logit Model with Constrained TIME Random Parameter and Interaction Terms

	Coefficient	t-ratio	P-value
Generic			
TIME	-0.5068	-4.7259	0.0000
CST	-0.0094	-8.1153	0.0000
CST2	0.0000	6.2832	0.0000
Specific to RORO			
ASCA	0.4504	2.6678	0.0076
TOBUSI	0.7023	3.3119	0.0009
NUM	0.0579	4.5332	0.0000
Specific to Fast craft			
ASCB	1.3035	4.9073	0.0000
TOWORK	0.6869	3.9252	0.0001
FREQ	0.0059	2.3081	0.0210
TIME:GEN	0.1714	3.6227	0.0003
TIME:INC	-0.1009	-5.1613	0.0000
TIME:AGE	0.0081	4.4329	0.0000
TsTIME	0.2534	4.7259	0.0000
R squared	0.3518		
Adjusted R squared	0.3496		
% Correct	0.5494		
Log likelihood	-1291.1660		
Chi squared	1401.2360		
N	1813.0000		
# of draws	1000 (Halton)		

Conclusion

- MNL model
  - CST, CST2, TIME, NUM
  - Income effect
- ML model
  - TIME (triangular) TsTIME
  - Interaction terms
    (Gender, Income class, age)
- Reliable models
- Results of this study are valuable to planners
  - PGN Proposal



Thank you very much for listening

The end