Original Article

Considering people's hospitality toward others in urban and rural areas: An application of game theory

Masahide Yamamoto (Faculty of Foreign Studies, Nagoya Gakuin University, myama@ngu.ac.jp)

Abstract

This research applies game theory to explain how individuals in urban and rural society display hospitality toward others as a strategy. According to Sorokin and Zimmerman, rural communities are relatively small with low population density compared to urban communities. Furthermore, the social mobility of the population is comparatively less intensive in rural society; accordingly, there is a rather high possibility to encounter the same person on multiple occasions. Therefore, in rural areas where reunions are more likely, it is rational to exhibit hospitable and amicable behavior.

Keywords

hospitality, strategy, game theory, urban society, rural society

1. Introduction

It is sometimes said in Japan that upon meeting strangers, urban dwellers tend to be more aloof than rural residents. Jalan Research Center conducted a questionnaire survey to evaluate hospitality in rural areas of Japan (see Table 1). The percentage shows the rate that tourists "felt hospitality" from local people in each prefecture.

Table 1: Prefectural ranking of visitor evaluation on local people's hospitality

	2014			2015	
Rank	Prefecture	%	Rank	Prefecture	%
1	Okinawa	47.2	1	Okinawa	46.5
2	Kagoshima	34.3	2	Nagasaki	34.3
3	Iwate	31.6	3	Kochi	34.1
4	Miyazaki	30.8	4	Iwate	33.1
5	Aomori	30.6	5	Kagoshima	32.0
6	Nagasaki	30.2	6	Miyazaki	31.7
7	Fukushima	29.7	7	Yamagata	31.6
8	Kochi	29.0	8	Tokushima	30.7
9	Ehime	28.8	9	Kumamoto	30.5
9	Kumamoto	28.8	10	Hokkaido	30.3

Source: Jalan Research Center (2016), p.9.

This annual survey was conducted through the Internet and is intended for men and women from 20 to 79 years old. The number of respondents was 15,629 and the rate of the recovery was 55.0 %. Prefectures located in rural areas such as Kyushu, Okinawa, Shikoku and Tohoku region were highly ranked. On the other hand, prefectures with large cities such as Tokyo, Osaka, and Aichi have never ranked in the top 10 since the survey began in 2006.

What causes the difference in attitudes between urban and rural areas? There are several possibilities but probability of

reunion might be the key.

2. Method

First, I briefly survey previous relevant studies. So-called "hospitality studies" have been implemented in Japan but few have applied the game theory to individual tendencies in rural and urban areas. Therefore, I survey previous studies that not only analyze hospitality as a strategy but also consider hospitality from a strategic point of view.

I think it is possible to explain *hospitality* (i.e., friendly and generous behavior towards others) in terms of game theory because behavior could be influenced by others' behavior, as well as by a strategy. Thus, using a simple game theory model, it could be possible to consider the effectiveness of hospitality as a strategy.

Game theory is "the study of mathematical models of conflict and cooperation between intelligent rational decisionmakers" [Myerson, 1991]. The theory is utilized within the fields of economics, political science, psychology, computer science, biology, and so on. Thus, game theory is inimitably catholic, and might be a useful tool with which to consider the superiority and effectiveness of hospitality as a strategy within business and everyday life.

Next, I conduct a basic model simulation based on game theory, and then consider its applicability to hospitality research. The objective of this study is to examine whether game theory can be applied to hospitality studies. If this were possible, game theory would contribute significantly to the further development of such studies.

3. Previous Studies

While former studies on hospitality often refer to "strategy," most argued in the context of "management." Although there are many studies on game theory in various fields, I found it rather difficult to find existing research based on game theory in the field of hospitality.

3.1 Studies on hospitality and game theory

Previous studies that associate hospitality with game

theory include those of Yamamoto [2004] and Minamikawa and Akakabe [2006]. Yamamoto [2004] discusses self-organization within urban areas and urban growth management. However, that paper merely refers to game theory in the introduction.

On the other hand, Akakabe [2006] considers how businessto-business relationships and pricing policy influence price and service competition. The authors use game theory model to analyze competition in the hospitality industry from a marketing perspective.

Although these studies refer to both game theory and hospitality, they do not necessarily regard hospitality as a strategy.

3.2 Studies on hospitality and strategy

Previous hospitality studies that examine a "strategic" approach include Demise [1996], Ozawa [2000], and Kotler, Bowen, and Makens [2006]. These studies evaluate hospitality from the strategic perspective of companies and organizations.

Demise [1996] discusses management strategies in the hospitality industry, enumerating expansion and diversification strategies in the domestic market and as an internationalization strategy (i.e., expansion into overseas markets). He also examines the effectiveness of Porter's competitive strategy (i.e., cost leadership strategy, differentiation strategy, and focus strategy), finding that the focus strategy and differentiation strategy are effective in the hospitality industry.

Ozawa [2000] attempted to clarify the characteristics of marketing and management strategies of companies within the hospitality industry, based on a case study of McDonald's, Japan.

Kotler, Bowen, and Makens [2006] cite six marketing strategies within the hospitality industry, stressing the importance of building good, long-term relationships with customers and suppliers.

These studies all examine marketing strategies within the hospitality industry. As stated above, few studies have analyzed hospitality as a "strategy."

Why can we not find research based on game theory in conventional hospitality studies? "Segregation" between economics and hospitality studies might be part of the answer to this question. Game theory has been used in a wide range of disciplines, and particularly in the field of microeconomics. If economists were more involved in hospitality research, analyses based on game theory would likely be more common.

4. The efficacy of game theory within hospitality research

Game theory assumes a situation in which parties (i.e., players) with different interests influence each other under certain conditions (i.e., the "game") and analyzes their behavior from a theoretical point of view. The game is normally represented as a matrix, which shows the players, strategies,

and payoffs.

I think it is possible to explain hospitality (i.e., friendly and generous behavior towards others) in terms of game theory because behavior could be influenced by others' behavior, as well as by a strategy. Using a simple game theory model, I consider the effectiveness of hospitality as a strategy. Players can select a strategy (selectable behaviors or attitudes in the game). Here, hospitality behavior is regarded as one possible strategy.

4.1 The Strategy in interpersonal communication

Here, I regard the interpersonal communication between individuals as a game. The strategy "high hospitality" represents a positive and friendly attitude towards others, whereas "low hospitality" represents a passive and aloof attitude.

I assume there are two players (A and B). If one player selects "high hospitality," the payoff for the other player is 2. When "low hospitality" is chosen, the payoff is 1. The payoffs are illustrated in Table 2. In this case, player A's payoff depends on player B's strategy, and vice versa. Therefore, there is no incentive for either of them to choose a particular strategy.

Table 2: Payoffs for two players

		Player B		
		High hospitality	Low hospitality	
Player A -	High hospitality	(2,2)	(1,2)	
	Low hospitality	(2,1)	(1,1)	

Note: The numbers on the left side in each cell denote the payoffs for player A. The numbers on the right side denote the payoffs for player B. Source: Produced by author.

Then, I assume that the probability of player A adopting the high hospitality strategy is p, while that of player B is q. Thus, the probability of player A adopting a low hospitality strategy is 1 - p, while that of player B is 1 - q. The expected payoffs can be expressed as follows:

a. Player A's Expected Payoff (Ua):

 $Ua = p \cdot q \cdot 2 + (1 - p) q \cdot 2 + p (1 - q) \cdot 1 + (1 - p) (1 - q) \cdot 1$ b. Player B's Expected Payoff (*Ub*):

$$Ub = p \cdot q \cdot 2 + (1-p) q \cdot 1 + p (1-q) \cdot 2 + (1-p) (1-q) \cdot 1$$

Thus, we have: Ua = 1 + qUb = 1 + p

As a result, each player's expected payoff depends on the probability of the other player adopting the high hospitality strategy.

4.2 The case of a possible reunion

If there is no possibility of a reunion with the other player, there would be no incentive to choose a high hospitality strategy. However, if the players frequently encounter one another, and determine their strategies based on the other player's previous strategy, the probability that both players will adopt a high hospitality strategy (p, q) is approximately equal. For example, if player B adopts the high hospitality strategy towards A, player A will choose the same strategy in the next round. In other words, "tit for tat" could be a rational strategy, as shown in Axelrod [1997]. The higher the probability becomes of a player adopting the high hospitality strategy, the greater his expected payoff in the next round will be.

4.3 The case considering the players' mental costs

Next, I suppose that the high hospitality strategy would exhaust a player (i.e., there is a mental cost). In this case, the player's own payoff decreases by 1, while that of the other player increases (see Table 3).

Table 3: Payoffs considering the mental cost

		Player B		
		High hospitality	Low hospitality	
Player A -	High hospitality	(3,3)	(1,4)	
	Low hospitality	(4,1)	(2,2)	

Note: The numbers on the left side in each cell denote the payoffs for player A. The numbers on the right side denote the payoffs for player B. Source: Produced by author.

In this case, each player's expected payoff can be illustrated as follows:

- a. Player A's Expected Payoff (Ua) :
- $Ua = p \cdot q \cdot 3 + (1 p) q \cdot 4 + p (1 q) \cdot 1 + (1 p) (1 q) \cdot 2$ = - p + 2q + 2
- b. Player B's Expected Payoff (*Ub*):

 $Ub = p \cdot q \cdot 3 + (1 - p) q \cdot 1 + p (1 - q) \cdot 4 + (1 - p) (1 - q) \cdot 2$ = 2 p - q + 2

For each player, the higher the probability that the player will adopt the high hospitality strategy, the higher the other player's expected payoff will be. Conversely, the lower the probability that the player will adopt the high hospitality strategy, the higher his own expected payoff will be.

The higher the possibility of a reunion, the more likely that p and q will be the same. As a result, they increase p (or q) in order to increase the possibility of the other player selecting the high hospitality strategy (p and q).

If the possibility of a reunion is 100 % and the other player repeats his strategy, p would ultimately approximate q, in the long run ($p \doteq q$). Then, we obtain the following formulae:

 $Ua \rightleftharpoons p+2$ $Ub \rightleftharpoons q+2$

From these formulae, we can deduce that the higher the

probability of a player adopting the high hospitality strategy, the higher the player's expected payoff will be.

Suppose the possibility of a reunion is r and the possibility of meeting a stranger is 1 - r (the possibility that strangers are likely to adopt the high hospitality strategy is η). Then, the possibility that player A can expect the stranger to adopt the high hospitality strategy (q) is expressed as follows:

$$q = rP + (1 - r)\eta$$

Assigning this formula to player A's expected payoff (Ua), we obtain the following equation:

$$Ua = 2(r-1)p + 2(1-r)\eta + 2$$

If r is larger than 0.5 (the possibility of a reunion is relatively high), the player can enjoy a better payoff by increasing p. That is, a hospitality effort would pay off.

Conversely, when r is smaller than 0.5, the player will attain a smaller payoff by increasing the value of p.

4.4 Hospitality in sightseeing destinations

Based on game theory, it was suggested that the possibility of reunion affects people's hospitality. I would like to confirm whether this hypothesis is true by examining actual data. Data in Table 4 is based on the "Regional Survey Results on Tourist Satisfaction" conducted by Japan Tourism Agency in 50 regions from the beginning of January to February 16 in 2010.

As for the method, survey forms were distributed in designated areas (tourist facilities and accommodation facilities located in each tourist destination) through mail, the Internet, or in person. Of 130,000 forms distributed, 11,626 were collected for a recovery rate of 8.9 %.

Hospitality was evaluated on accommodation, sightseeing, restaurants, shopping, and interaction with residents. According to the results, tourists who visited four large cities (i.e. Sapporo, Yokohama, Nagoya, and Kyoto) gave an evaluation of 5.36 for accommodation, 5.37 for sightseeing, and 5.43 and 5.27 for restaurants and shopping, respectively. Local residents' hospitality toward tourists received an evaluation score of 5.18. The maximum value for this survey is 7. Its value can never be underestimated considering the fact that the overall average is 5.05.

Considering the likelihood of reunion with respect to each item (accommodation, sightseeing, restaurant, shopping, and residents) in the table, the longer the tourist stays in the community, the higher the possibility of a reunion. Among the five categories, accommodation should have the longest expected duration and the highest likelihood of reunion during the tourist's stay, thus increasing the pay-off for hospitality efforts. Therefore, the hospitality evaluation by tourists could be expected to be relatively high. The table also indicates that the value for "Accommodation" for all the tourist destinations was 5.65, which exceeded all other categories. Additionally, accommodation received the highest value in each destination with the exception of large cities.

I suppose there might be several reasons why hospitality evaluation for accommodation in larger cities scored lower than expected. First of all, in tourist destinations such as "resort" and "others," tourists tend to stay longer than in cities, increasing the possibility of reunion. Furthermore, popular restaurants and shops that attract tourists in large cities tend to see a greater number of repeat visitors, not only from local areas but also from out of town. Therefore, the staff is more likely to behave friendly because their efforts could be rewarded.

The item "residents" should be expected to be the lowest in the possibility of reunion, because no one would try to meet the resident unless there is particular reason to do so. Actually, the value of the "residents" resulted in the smallest of all the items in each area.

5. Conclusion

From the above discussion, whether our hospitality effort

	Truce of		Number of visits (%)				Evaluation of hospitality			
	destina- tion	n	First time	Twice to four times	Five times or more	Accom- modation	Sightseeing	Restaurants	Shopping	Residents
Cities	Large cities	1118	16.7	35.2	48.1	5.36	5.37	5.43	5.27	5.18
	Smaller cities	3079	37.1	34.5	28.5	5.52	5.33	5.38	5.27	5.15
Resorts	Beaches	1255	34.4	35.7	30.0	5.49	5.2	5.25	5.11	5.00
	Moun- tains	534	20.5	26.2	53.4	5.83	5.48	5.48	5.23	5.08
	Hot springs	3492	29.4	31.2	39.4	5.87	5.28	5.4	5.17	4.86
Others	Nature/ culture	1733	45.6	34.5	19.9	5.59	5.45	5.37	5.22	5.19
	Villages	415	33.2	31.8	35.1	5.49	5.28	5.18	5.11	5.08
Т	otal	11626	32.5	32.8	34.8	5.65	5.33	5.37	5.20	5.05

Table 4: Survey results on hospitality in sightseeing destinations

Source: Produced by author based on Japan Tourism Agency (2010), pp.3-102.

Note: Each numerical value is not a weighted average but an average of the values of each tourist destinations.

Table 5: Differences in population and society in rural world and urban world (Sorokin and Zimmerman)

	Rural world	Urban world
Size of community	Open farms or small communities, "agriculturalism" and size of community are negatively correlated.	The size of urban community is much larger than the rural community. In other words, urbanity and size of community are positively correlated.
Density of population	The density is lower than in urban community. Gen- erally density and rurality are negatively correlated.	Greater than in rural communities. Urbanity and density are positively correlated.
Heterogeneity and homogene- ity of the population	The populations of rural communities are more ho- mogeneous in racial and psychosocial traits. (Nega- tive correlation with heterogeneity.)	More heterogeneous than rural communities (in the same country and at the same time). Urbanity and heteregeneity are positively correlated.
Social differentiation and Stratification	Rural differentiation and stratification less than urban.	Differentiation and stratification show positive cor- relation with urbanity.
Mobility	Territorial, occupational, and other forms of social mobility of the population are comparatively less intensive. Normally the migration current carries more individuals from the country to the city.	More intensive. Urbanity and mobility correlated. Only in the periods of social catastrophy is the migration from the city to the country greater than from country to the city.
System of interaction	Less numerous contacts per man. Narrower area of the interaction system of its members and the whole aggregate. More prominent part is occupied by pri- mary contacts. Predominance of personal and rela- tively durable relations. Comparative simplicity and sincerity of relations. "Man is interacted as a human person."	More numerous contacts. Wider area of interaction system per man and per aggregate. Predominance of secondary contacts. Predominance of impersonal casual and short-lived relations. Greater complexity, manifoldedness, superficiality, and standardized for- mality of relations. Man is interacted as a "number" and "address."

Source: Produced by author based on Sorokin, P and Zimmerman, C, C (1969), pp.56-57.

towards others is rewarded depends on the possibility of a reunion with the other parties (given "*tit for tat*" by the other parties). Furthermore, game theory is useful when examining the strategic effectiveness of the hospitality.

In general, it is said that rural people are more kind-hearted than are urban people. Although I do not entirely agree with this idea, it might be true that rural people sometimes display a relatively intimate attitude towards others. Sorokin and Zimmerman (1969) point out the following eight differences between urban and rural worlds (see Table 5):

- Occupation
- Environment
- Size of community
- Density of population
- Heterogeneity and homogeneity of the population
- Social differentiation and stratification
- Mobility
- System of interaction

In rural areas, the mobility of people and the population density are relatively low. Thus, the possibility of a reunion can be considered larger than in urban areas. Those who live in rural areas, where reunions are more likely, should be more

Table 6: The number of emergence in prefectural ranking ofvisitors' evaluation on local people's hospitality

	Prefecture	Number of emergence
1	Okinawa	11
2	Kagoshima	10
3	Miyazaki	9
	Aomori	8
4	Yamagata	8
4	Akita	8
	Kumamoto	8
8	Kochi	7
	Iwate	6
9	Kyoto	6
11	Nagasaki	5
11	Ehime	5
12	Nara	4
15	Fukushima	4
15	Ooita	3
15	Miyagi	3
17	Tokushima	2
	Niigata	1
10	Shimane	1
18	Hokkaido	1
	Gifu	1

Source: Produced by author based on Jalan Research Center (2016), p.9.

hospitable and amicable. This can be said to be a rational choice.

I counted the number of emergence since 2006 in prefectural ranking of visitors' evaluation on local people's hospitality as shown in Table 1. Table 6 shows that hospitality in rural areas is more highly evaluated by tourists than that in urban areas such as Tokyo and Osaka. I suppose that is why *hospitality strategy* is more likely to be adopted in rural areas.

This study examined the possible effectiveness of applying game theory to hospitality studies. Future research should examine this possibility further.

Finally, future research needs to clarify the difference between a "high hospitality" strategy and a so-called "cooperative strategy," as well as to evaluate "mental costs" appropriately.

References

- Axelrod, R. (1997). *The complexity of cooperation: Agentbased models of competition and collaboration*. Princeton University Press.
- Demise, N. (1996). "Keiei-senryaku" [Management strategy], Hospitality sangyo ron [Studies on the hospitality industry], Chuuou Keizai Sha.
- Jalan Research Center (2016). *Jalan shukuhaku ryokou chousa* [Accommodation travel survey], Jalan Research Center. Retrieved May 10, 2017, from http://jrc.jalan.net/jrc/files/ research/jalasyuku_20160726.pdf.
- Japan Tourism Agency (2010). Kankoukyaku manzokudo chousa chiikibetu shuukei kekka [Regional survey results on tourist satisfaction], Japan Tourism Agency. Retrieved May 10, 2017, from https://www.mlit.go.jp/common/000118453. pdf.
- Kotler, P., Bowen, J., and Makens, J. (2006). *Marketing for Hospitality and Tourism*. Prentice Hall.
- Myerson, R. B. (1991). *Game theory: Analysis of conflict.* Harvard University Press.
- Minamikawa, K. and Akakabe, H. (2006). Hakushoku-bunri no keizai bunseki [Economic analysis on the separation of accommodation and meal at hotels]. *Journal of Tourism Research*, No. 47, 43-56.
- Ozawa, M. (2000). Hospitality sangyo no marketing oyobi keiei-senryaku [Marketing and management strategy in the hospitality industry: The case of McDonald's Japan]. *The Ritsumeikan Business Review*, Vol. 39, No. 3, 175-194.
- Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors*. The Free Press.
- Yamamoto, H. (2004). Toshi no jiko-soshikika to toshi seichokanri [The self-organization of the urban area and urban growth management]. *Chiiki Seisaku Kenkyu*, Vol. 7, No. 1, 13-21.
- Yamamoto, H. (2012). Proposing an analytical theory of local revitalization based on culture strategy and hospitality management. *International Journal of Japan Academic Society* of Hospitality Management, Vol. 1, No. 1, 3-9.

Yamamoto, H. and Shirase, T. (2012). Analysis of local revitalization in Las Vegas based on culture strategy and hospitality management. *International Journal of Japan Academic Society of Hospitality Management*, Vol. 1, No. 1, 13-21.

(Received May 12, 2017; accepted June 7, 2017)