Winter 12-8-2014

Investigating Online Service Alliance in A Signaling Game

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ABSTRACT

This research uses the concept of service blueprinting to separate the online platform into several individual services. This research uses signaling game theory to investigate if service providers should cooperate with Yahoo according to information asymmetry. By using the concept of game theory, service providers can judge the decision of cooperation. This research uses signaling game theory to investigate the interaction of online service providers and decide if the cooperation is the best strategy. In particular, the payoffs under cooperation will be further evaluated by Shapley value. Shapley value is used to measure the fairness of profit after cooperation.

Keywords: Alliance, service, signaling game, shapley value.

INTRODUCTION

Recently, the popularity of Internet changes industries. Taking service industry as the example, traditional mindset of service industry is to interact with customers but Internet somehow disrupted it. In particular, the concept of service blueprint was also proposed by Bitner [1] to separate process of hotel services. However, Internet enables variety of online services such as shopping, auction, and fortune telling on either traditional portal (e.g., Yahoo) or social media portal (e.g., Facebook). New online services are furnished to increase the time to stay on the website that may enhance the benefits of portal and service providers. In a changing environment of Internet, the relationship between service providers and portal owner has become extremely significant. This research investigates the strategic alliance (cooperation) between service providers and portal by discovering the incentives to form alliance and discusses the appropriateness of resources allocation of alliance.

The online portal such as Yahoo is a special example that provides different types of services such as weather, stock, auction, fortune telling, etc. Those services are furnished by independent service providers but cooperate each other based on joint purpose. This research uses the concept of service blueprinting [2-4] to separate the online platform (e.g., Yahoo) into several individual services. We consider all service providers are in a constructed ecosystem. Owing to limited resources of each service provider, providing best service to customers not only can maximize profits but also construct joint belief of collaboration to create superior service value.

RESEARCH METHODOLOGY

This research uses signaling game theory to investigate if service providers should cooperate with Yahoo according to information asymmetry. The strategic cooperation of those service providers is a type of alliance. By using the concept of game theory, service providers can judge the decision of cooperation. Online portal also takes into account online traffic, service features, and service quality to make decisions for cooperation. After identifying the decision of cooperation, we discuss the payoffs of cooperation to help company make best move. Finally, we use Shapley value to investigate the fairness of cooperation by estimating the fair payoffs under cooperation. Three research questions will be discussed: (a) how online portal selects service providers to cooperate as form an alliance?, (b) what are the payoffs after cooperation or no cooperation?, and (c) how to achieve fairness of payoffs under cooperation?.

This research uses signaling game theory to investigate the interaction of online service providers and decide if the cooperation is the best strategy. Meanwhile, the payoffs can be estimated by literature and observed data. Four situations will be discussed between portal and service providers (2 X 2): separating equilibrium and pooling equilibrium. Service providers also can choose best partner to cooperate after evaluation. In particular, the payoffs under cooperation will be further evaluated by Shapley value. Shapley value is used to measure the fairness of profit after cooperation. Hence, this study aims to examine the fairness of profit after alliance and attract service providers to provide core services with efficient strategic movement. The goal is to construct a concept of cooperative service alliance.

This research assumes two players in the signaling game. P1 (online service provider) has private information which means only P1 knows the quality of furnished service but P2 (portal) does not know the truth. The probability of high or low quality of service from P1 is given as p. The action of P1 is sending signal S=(fee, free). While P2 receives signal S, the probability of true type of P1 is q' and will take actions A=(alliance, no alliance). According to signaling game theory, we aim to know (a) what will be the type of signal should send for different service provider?, (b) what will be the probability of q' (type of P1 | S) that P2 thinks the probability of S for P1?, and (c) what will be the action for P2 when receiving the signal S?.

Table 1 Definitions of variables in signaling game

Payoff of service provider		Payoff of portal	
X	fees that customer pays for the service	Rc	benefit that charge service providers
C	reqauired cost on portal	RTcp	benefit from click rate
T	the benefit of exposure on portal	ER	the external benefit from increased number of customers by cooperating with service providers
Tcp	cost of click rate	Oc	the maintenance cost of alliance
R	the benefit of customer to reuse the service		

Table 2 Payoff in signaling game

Payoff	Payoff of service provider and portal	Elements of payoff
A_C^H	PA_C^H	Rc+RTcp+ER-Oc
	SA_C^H	X-C+T-Tcp+R
NA_C^H	PNA_C^H	RTcp
	SNA_C^H	X+R
A_F^H	PA_F^H	Rc+RTcp+ER-Oc
	SA_F^H	-C+T-Tcp+R
NA_F^H	PNA_F^H	RTcp
	SNA_F^H	R
A_C^L	PA_C^L	Rc+RTcp+ER-Oc
	SA_C^L	X-C+T-Tcp+R
NA_C^L	PNA_C^L	RTcp
	SNA_C^L	X+R
A_F^L	PA_F^L	Rc+RTcp+ER-Oc
	SA_F^L	-C+T-Tcp+R
NA_F^L	PNA_F^L	RTcp
	SNA_F^L	R

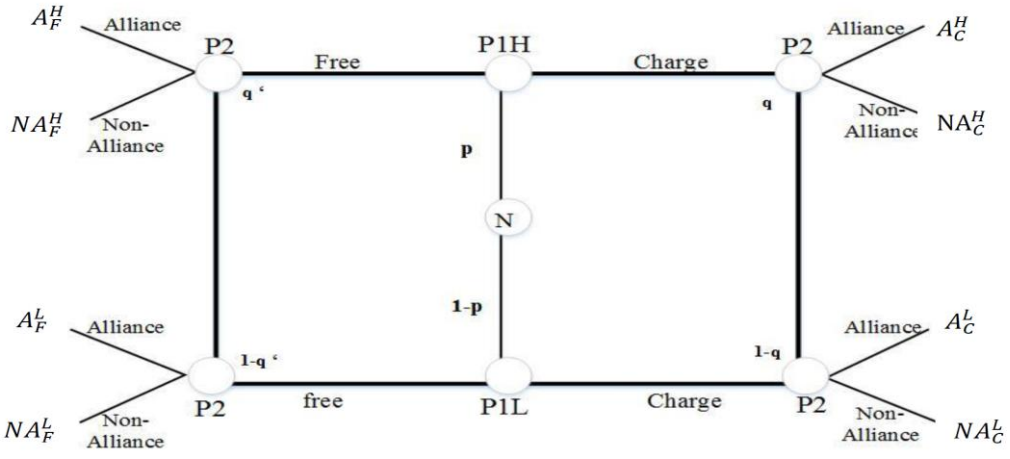

Figure 1 The signaling game of portal and service provider

In the separating equilibrium, there are two situations as follows:

(a) High quality service provider sends charge (fee) signal and cooperates with portal. In the condition of $SA_C^H > SNA_C^H$, high quality service provider may help enhance both reputations by furnishing good services and attract customers. This indicates payoff of cooperation is greater than payoff of non-cooperation. In other words, portal may cooperate with service provider. Because of high quality service from service provider, the network effect increases the payoff of cooperation for portal. That is, $PA_C^H > PNA_C^H$.

(b) Low quality service provider sends free signal and portal decides not to ally (cooperate). In the condition of $SNA_F^L > SA_F^L$, the payoff of service provider for non-cooperation is greater than cooperation. The reason is payoff may be damaged owing to cooperating with portal without furnishing high quality service. That is, service provider decides not to cooperate. To portal, because cooperating with low quality service provider may damage own payoff and reputation, we infer $PNA_F^L > PA_F^L$.

In summary, this research aims to investigate the strategic movements between online portal and service providers. By using Shapley value, the distribution of profit can be fairly reallocate under cooperation. Moreover, a new concept of service alliance can be constructed by our model with verification.

CONTRIBUTION

This research uses signaling game theory to discover the way of service alliance based on information asymmetry between service provider and portal. We also use Shapley value to examine the fairness of payoff for alliance. The major contribution is to discover a online service alliance with fair payoff for both service provider and portal.

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