

# **Managing Service Systems in the Presence of Social Networks**

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The concepts of service level differentiation and priorities existed from the early days of service provision and shared resources, with evidence dating back to the dawn of civilizations. Similarly, social networks always existed, and played an important role in how people share experiences, and learn about new individuals, ideas, products and services. However, with advancements in information technology and mobile computing, the connection between these two seemingly unrelated concepts becomes a crucial part of the operations of any service.

While social networks (such as reading club, classrooms and religious institutions) always existed, the recent growth of online social networks such as Facebook, Twitter and Ello made it much easier for individuals and groups to create large and diverse connections; therefore, these social networks play an important role in how people form opinions on any concept related to ideas, products or services. With the ease of access to these networks, more customers tend to report their service experiences to online social networks and consult their friends' (as well as strangers') reviews before they seek a service. For example, a recent Nielsen survey confirms that roughly 78% of customers visit their social networks to decide which local service to seek<sup>1</sup>.

At the intersection between social networks and service quality differentiation lies the idea that higher quality of service to customers could spread the word faster to their followers or friends. One of the most important effects of online social networks, is that these online social networks blur the boundary between influencers and influencees in a society, and in turn make it much more important to carefully analyze each customer's social influences in offering differentiated service qualities. In the past, people who had access to mass information distribution channels were often journalists (such as reporters and restaurant or wine critics) who were easy to identify and could be offered preferential treatment without any detailed information about social networks. However, with online social networks, more and more people have access to information distribution channels

<sup>1</sup> <http://www.yelpblog.com/.a/6a00d83452b44469e201a73de98db6970d-pi>

and can reach as well as influence a large number of audiences. For instance, on Twitter, more than 10,000 users have one thousand followers or above<sup>2</sup>.

As social networks become more critical in how customers form beliefs about the service providers and how firms should offer differentiated services, several natural research questions arise: with limited resources, how does a firm optimally offer differentiated service qualities to each individual customer based, not only on the economic value this customer brings, but also on his ability to influence others? Furthermore, what is the value of knowing and acquiring customers' social influences for a specific firm?

In practice, there are many firms that try to answer these questions by measuring customers' social influences and prioritizing customers based on that. For example, Klout, an information technology firm, measures each individual's social influence and assigns "Klout score" to them by monitoring their activities on various social networks. As Klout documents, the Klout score of a person is his 'ability to drive action' of other people. Recently, Klout has integrated its scoring system with the routing system of Genesys, one of the largest call centers software providers in the world. In other words, Genesys is now offering different priorities to customers in call centers based on their social influences measured by Klout<sup>3</sup>.

Despite the growing popularity of integrating social networks with micro-level service quality differentiation among practitioners, there is little research about this combination in the service operations literature. This paper addresses this absence by developing a framework that builds on both the traditional service operations literature and the social network literature in economics and computer science. This framework focuses on customers' belief evolution and the service provider's reaction to it, where customers are influenced by their friends and influence their friends about the expected service quality levels through social networks.

We study a multi-period model, in which heterogeneous customers have needs for a service in each period. At the beginning of each period, customers decide whether to seek service or not based on whether their expectations regarding the service quality are higher or lower than their reservations values. In trying to assess the anticipated service quality, customers may consult their social networks. We base our study on a simple, tractable, and well-established model of network influence in economics (DeMarzo et al. 2003 and Golub and Jackson 2010), the DeGroot model. At the end of each period, customers who seek the service will later report their experiences back to the social network. In our analysis, we characterize and focus on the convergent belief of such system.

<sup>2</sup> <http://www.entrepreneur.com/article/230487>

<sup>3</sup> <http://www.forbes.com/sites/alexknapp/2012/06/12/a-high-klout-score-can-lead-to-better-customer-service/>

Based on the above social network and service system model, we first compute the optimal service quality differentiation policy and demonstrate how it depends on the social influence and economic value of each customer. We then provide insights into what determines the value of knowing the structure of the social network. Finally, we apply our models to a novel dataset containing more than 4,000 service providers and 200,000 reviews from one of the leading online social network communities. We use the empirical data to emphasize the importance of our theoretical insights. Our main contributions are:

1. We construct a new framework that builds on the service operations literature and the social network literature. We demonstrate that this new framework helps explain the belief process of customers, which is often overlooked by the traditional service operations literature. Specifically, our model explains how customers affect and bias each others' beliefs on the quality provided by the service system through social networks.

2. We introduce a new measure of customer importance, denoted as *economically adjusted degree centrality*, to describe each customer's value to the service provider under the presence of social network. We show that this measure is instrumental in prioritizing customers and allocating service levels. We show that customers should get high quality levels if they have many friends, if they have few very economically valuable friends, or if they are very economically valuable themselves (but they are not easily influenced by others). Surprisingly, this new measure only depends on the first-order friendship while the traditional centrality measure often needs the knowledge of the whole network. We provide a simple explanation to this phenomenon.

3. We define and compute the value of acquiring additional social and economic information of customers for a firm. We show that acquiring social or economic information and differentiating based on these information is not always beneficial. More importantly, we illustrate that the main driver of the value of social network information is the correlation between the economic values of the firm's customers and their social influences.

4. Finally, we empirically illustrate that firms, even if similar in their types and locations, can have drastically different correlations between their customers' economic values and social influences in a social network. Surprisingly, most firms face negative correlations and in turn have high value of social network information. We empirically identify that the discrepancy in correlations among firms is mainly driven by their targeted markets.

## References

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