Decision Support Systems 47 (2009) 105–114

Contents lists available at ScienceDirect

Decision Support Systems

journal homepage: www.elsevier.com/locate/dss

The sustainability of B2B e-marketplaces: Ownership structure, market competition, and prior buyer–seller connections

Kexin Zhao [a], Mu Xia [b,*], Michael J. Shaw [b], Chandrasekar Subramaniam [a]

[a] Department of Business Information Systems and Operations Management, Belk College of Business, University of North Carolina at Charlotte, 9201 University City Boulevard, Charlotte, NC 28223, USA
[b] Department of Business Administration, College of Business, University of Illinois at Urbana–Champaign, 350 Wohlers Hall, MC-706, Champaign, IL 61820, USA

ARTICLE INFO

Article history:
Received 12 May 2008
Received in revised form 24 October 2008
Accepted 27 January 2009
Available online 5 February 2009

Keywords:
B2B e-marketplaces sustainability
Ownership structure
Market competition

ABSTRACT

B2B e-marketplaces alter the structure of buyer–seller trading networks. To study the network-level structural changes caused by the emergence of e-marketplaces, we develop a multiple-player noncooperative game, where rational firms select optimal interfirm connections and the network is endogenously formed and evolved. We examine the conditions under which both neutral and biased B2B e-markets will sustain, when previous buyer–seller connections exist. We test our model in both the oligopoly market and the oligopsony market. Our analysis explains how ownership structures and market competition interact with each other to affect e-market sustainability. We also identify other critical factors for sustainable e-markets and their social welfare implications.

1. Introduction

B2B e-marketplaces match buyers and sellers with automated transactions, lower search costs, and increased process effectiveness and efficiency [5,6,18]. The emergence of such e-marketplaces represents one of the major market transformations brought about by the proliferation of information technologies [14,24]. However, despite firms' enthusiasm in Internet-based B2B e-marketplaces, the growth of B2B transactions has fallen short of earlier expectations [10]. Most notably, the shakeout of B2B e-markets[1] during the late 1990s and early 2000s has spurred skepticism about the earlier high expectations about the role of these e-markets. A large number of B2B e-markets, such as Chemdex and Adauction, went out of business, while others, including e-Steel and Covisint, changed their business model from e-market operators to technology service providers. Nevertheless, there are still hundreds of B2B e-markets, such as World Wide Retail Exchange and SciQuest, that have survived and thrived [22]. It is thus intriguing why some e-marketplaces have survived while others have failed and what key factors lead to a sustainable e-marketplace.

In this paper, we try to answer the question by focusing on the structural dimension of e-markets [12], which refers to the overall pattern of connections between firms. The structural perspective provides us insights into network stability, when individual firms strategically establish interfirm links. The resulting network and the firms' relative positions in the network determine their bargaining power and performance. When equilibrium is reached, both participating firms and the market operator are willing to keep their existing connections. This implies the emergence of a sustainable B2B e-market. Otherwise, the e-market will fall apart and evolve into other business models or exit the market.

We develop a multiple-player non-cooperative game to simulate the endogenous formation of public B2B e-marketplaces (many-to-many connections). In the model, we describe the overall network structure as a graph, in which rational and self-interested firms are nodes and their business relationships are the edges between corresponding nodes. Buyers and sellers select individual connections in the game, and their payoffs are determined by the overall network structure and their relative positions in the network. We focus on three major factors that affect the endogenous formation of B2B e-markets (Table 1). The first factor is the ownership structure of the e-market. An e-market can be either neutral or biased [30]. A neutral e-marketplace, such as EC21 and Alibaba, is owned by an independent intermediary, while a biased one is operated by a group of buyers (e.g., World Wide Retailer) or sellers (e.g., iSteelAsia) [30]. For the biased type, we focus on buyer-biased e-marketplaces and then show that seller-biased e-marketplaces demonstrate similar properties.[2] Since previous studies suggest that neutral and biased e-markets have difference properties [30], we also examine whether the ownership structure will affect e-market sustainability. The second factor is the type of market competition faced by both participating firms and the market operator. An e-market can be established in either an oligopoly market or an oligopsony market. In an oligopoly market, there are

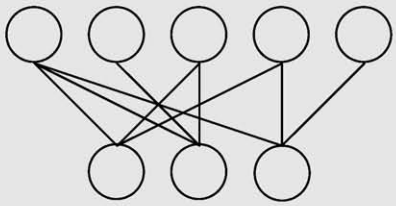
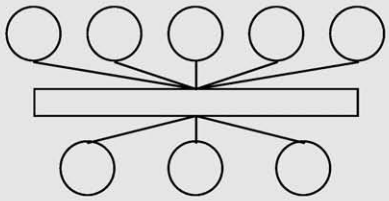
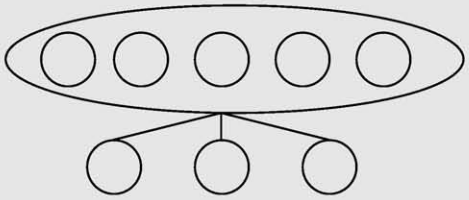
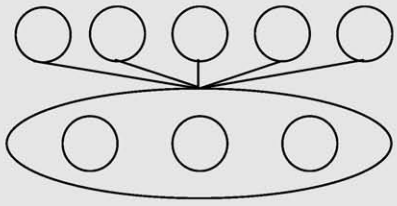
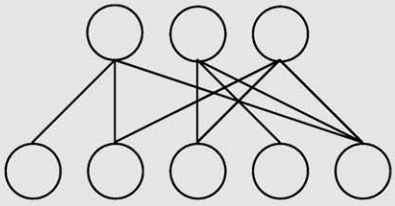
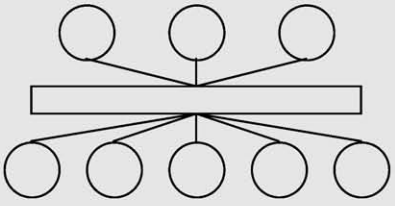
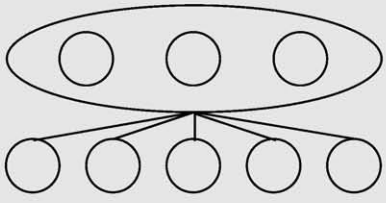
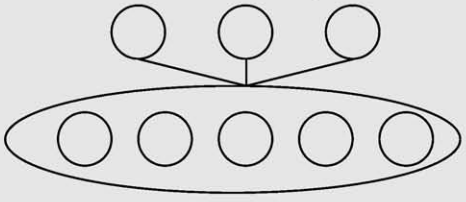
* Corresponding author. Tel.: +1 704 687 7637 (K. Zhao), +1 217 333 2878 (M. Xia), +1 217 333 5159 (M.J. Shaw), +1 704 687 7604 (C. Subramaniam).
E-mail addresses: kzhao2@uncc.edu (K. Zhao), mxia@uiuc.edu (M. Xia), mjshaw@uiuc.edu (M.J. Shaw), csubrama@uncc.edu (C. Subramaniam).

[1] In this paper, we use the terms e-marketplaces and e-markets interchangeably.

[2] Yoo et al. [30] also find that biased marketplaces, no matter whether buyer-biased or seller-biased ones, have similar economic properties.

0167-9236/$ – see front matter © 2009 Elsevier B.V. All rights reserved.
doi:10.1016/j.dss.2009.01.005

Table 1
The endogenous formation of B2B e-marketplaces.

	Network Structures prior to the Emergence of E-markets	Network Structures after the Emergence of E-markets
The Oligopoly Market	Buyers Sellers 	A Neutral B2B e-Marketplace  *Example: GHX*
		A Buyer-Biased B2B e-Marketplace  *Example: FOB (discussed in [18], failed)* A Seller-Biased B2B e-Marketplace  *Example: iSteelAisa*
The Oligopsony Market	Buyers Sellers 	A Neutral B2B e-Marketplace  *Example: EC21*
		A Buyer-Biased B2B e-Marketplace  *Example: Worldwide Retail Exchange* A Seller-Biased B2B e-Marketplace  *Example: SupplyOn*