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Purchasing as market-shaping: The case of component-based software engineering☆

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ABSTRACT

The efforts to address markets as socio-technical orders have hitherto focused on the role of marketing in shaping demand. However, in many markets the role of purchasing is just as important. This paper uses a case study to examine how a single buying company can attempt to shape an emerging market through its purchasing practices. As a result, the study identifies five types of market-shaping actions. Within each action type, the market-shaping behavior of a buyer in an emerging market can be very diverse and include internal actions as well as actions aimed at influencing other market actors. While agency on the purchasing side is often associated with large size organizations, namely government and public sector agencies, our case study shows that agencies on the purchasing sides can be deployed in a variety of ways rather than merely through raw bargaining power. The findings indicate that buying firms do not simply adjust their own purchasing processes according to existing offerings, but actively attempt to drive market evolution in particular directions.

1. Introduction

Marketing scholars have started addressing the nature of markets as socio-technical constructions (Araujo, 2007; Kjellberg & Helgesson, 2007a). The shift of focus from marketing to markets stresses that many and varied efforts are required for markets to operate. Marketing is seen to play an essential role, but many other forms of expertise partake in this effort. Most definitions of markets place the emphasis on their institutional, recurring character and the role of competition between autonomous and independent agents (Slater & Tonkiss, 2001). Market actors (e.g. buyers, sellers) have differing interests leading them to struggles resolved through transactions with agreed prices. Market actors enter and leave transactions as strangers, with prices sealing the attachment and re-attachment of goods to owners with well-defined property rights. Hence, markets are organized spaces of confrontation where valuations of goods are contested. More importantly, these power struggles are not exhausted by price negotiations. The very infrastructure on which markets rest (e.g. rules and conventions, metrological systems) are also objects of contestation and struggle. In short, economic actors do not take markets as they find them; instead, they actively attempt to shape the socio-material arrangements that constitute markets.

Within marketing, the study of market-shaping efforts has so far focused almost exclusively on the supply side and the role of marketing activities, leaving the role of purchasing under-researched. Nevertheless, in many markets the role of purchasing is just as important. For example, mass retailers are, more often than not, powerful actors on the demand side, seeking to shape the structure of supply markets to their advantage (Azimont & Araujo, 2007). The Industrial Marketing and Purchasing (IMP) research tradition has, from its early days, emphasized marketing and purchasing as equally active participants in shaping the structure of business markets (Håkansson, 1982). Leenders and Blenkhorn (1988) went as far as using the term "reverse marketing" to denote purchasing's active role in achieving supply objectives. Reverse marketing has increasingly been understood as buyers marketing themselves to suppliers, seeking to achieve preferred customer status, obtaining privileged access to suppliers' resources, instigating supplier development programs and so on (Hüttinger et al., 2012).

Public procurement policies are often intended to shape supply structures and supplier behavior. Dalpé (1994), Edler and Georghiou (2007), Aschhoff and Sofka (2009) and Edquist and Zabala-Iturriagagoitia (2012) discuss how public procurement can drive the development and diffusion of innovations to the wider economy. McCrudden (2004) argues that whereas we are used to think of government's interventions in markets as essentially one of regulation (e.g. competition law), we tend to neglect the role of the government as an active participant in markets, as a purchaser of large public works, supplies and

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services. Through its purchasing power, governments and their agencies can advance policy goals such as sustainable procurement and promote social goals like workers' rights or fighting discrimination (see e.g. Oruezabala & Rico, 2012; Snider, Halpern, Rendon, & Kidalov, 2013).

Caldwell et al. (2005) explicitly focus on the role of government in actively promoting a competitive set of supply alternatives. They identify a series of such mechanisms; namely changes in public procurement contracts to incentivize supplier excellence, creating portfolios of suppliers and encouraging professional purchasers to look beyond the contract award phase and to promote supplier competitiveness. Uyarra and Flanagan (2010) argue that the longer term effects of public procurement can bring about changes in market structure by changing incentive structures for investment and innovation. Public procurement can, for example, influence the number of suppliers in a market by focusing purchases in a few suppliers and threatening the viability of other firms that may depend on winning public contracts for their survival. By bundling requirements or looking for turnkey systems, the public sector can affect the vertical organization of supply by favoring integrated suppliers or prime contractors who can perform large systems integration (Prencipe, Davies, & Hobday, 2003).

However, we should not assume that knowledge about the role of public procurement in shaping supply can be transferred to a commercial context. The means available for public actors, to shape supply markets such as purchasing power (e.g. Aschhoff & Sofka, 2009) and policy instruments (e.g. Edquist & Zabala-Iturriagagoitia, 2012) are far removed from the means available for a private actor, even those with considerable purchasing power. To some extent, large companies can influence their supply structure in terms of, for example, allocating high volumes to particular suppliers and forcing marginal suppliers out of the market, choosing to pursue technology development with a few selected suppliers (Axelsson & Håkansson, 1984), or by initiating supplier development programs (Wagner, 2010). This paper proposes to go beyond these efforts to examine *how a single buying company can attempt to shape market through its purchasing practices*.

Our study addresses two gaps in the current literature. First, relatively little attention has been paid to buyers' attempts to influence a supply market as a whole, as opposed to working at the relationship or supply network level. Secondly, a purchasing perspective is largely missing from research focusing on market innovation. This paper contributes to the theoretical discussion over the functioning of markets within the emerging tradition of Market Studies (see Araujo, Kjellberg, & Spencer, 2008; Araujo, Finch, & Kjellberg, 2010) focusing on how markets are constructed through multiple and distributed efforts (Azimont & Araujo, 2007; Cochoy, 2008; Kjellberg & Helgesson, 2007b). Lastly, we aim to add to the purchasing and supply management literature by broadening the focus from supplier-centered interaction and the management of supply networks, to supply market-shaping efforts as an objective of purchasing practices.

The paper uses an example of an emerging market for software components. The evolution of software components markets are not only based on technological innovations by suppliers but also on the essential role of prospective buyer companies in adopting a new software engineering method. Component-based software engineering (CBSE) refers to software systems developed by pre-producing and selecting appropriate modules and assembling them according to a well-defined architecture. Software architectures divide the systems into several functional parts, which are interconnected through standard interfaces. The architecture is composed of modules that can be developed either in-house, through subcontracting, or bought from external component suppliers. This engineering approach has started to generate new types of software market where software components are sold and bought like any other standard components. These components are so called commercial-off-the-shelf (COTS) software components.

Our first task is to describe the market from a buying company's perspective using our theoretical knowledge on the operation of markets. We identify five market elements that help discern the actions that a buyer company engages in its attempt to shape a market. In the empirical section, we present an analysis of a single case study of a buyer company operating in the emerging COTS markets. We will describe the market-shaping actions that the focal buyer company undertook to steer the development of the supply structure for COTS software toward a preferred market template. This template included a competitive supply base, robust standards to facilitate the easy specification and purchase of COTS, and an appropriate system allowing buyer companies to assess the risk they take on by including COTS in their software systems.

2. The conceptualization of COTS markets

To find out how the buyers of COTS software components attempt to shape the emerging market, it is essential to first describe, *what is a market* and *what elements of a market do we expect the buyers to shape* through their actions. Relying on the current understanding of markets as constructed through multiple and distributed efforts (Azimont & Araujo, 2007; Cochoy, 2008; Kjellberg & Helgesson, 2007b), we will identify the market elements that describe different aspects of the functioning of the market from a single buyer's perspective. The resulting five market elements are used to identify the market-shaping actions of a buying company. Our perspective means that what is defined as relevant suppliers to be included within the market scope, for example, may differ according to the vantage point taken. A buyer can thus include certain suppliers into its market definition while another buyer may exclude some suppliers while adding others that were not contemplated by the first buyer. Thus who should be included in a particular market is always based on perception and perceptions may vary across actors.

Caliskan and Callon (2010: 3) see markets as socio-technical arrangements of heterogeneous elements that organize basically any actions involving goods, creating a space that involves confrontation and power struggles between agents and resolved by pricing mechanisms. Barnhill and Lawson (1980: 51) remarked that market is "…an active process involving the exchange transactions of buyers and sellers and the actions of other bodies that facilitate such transactions". Thus markets can be examined through *actors* (buyers, sellers, and other actors) and their *actions* (transactions being the key ones, cf. Thielemann, 2000). To identify the market elements from the perspective of a single buyer company in its efforts to participate and shape a market, we will thus take actors and actions as points of departure.

Market actors can be divided into generic groups of sellers and buyers, which create supply and demand, the two first and essential elements of a functioning market. Although intermediaries can be seen as one type of market actors, taking a buyer company perspective, they are here seen as a specific type of sellers. Other bodies facilitating market transactions may include governments, mediators, standardization bodies etc. that can be highly relevant for the market process.

The sellers of software components are very heterogeneous. As components are difficult to define and categorize, the notion of component vendors also becomes diverse. According to the industry's literature, some of the vendors offer COTS components in the strictest sense of the term, while other vendors also provide services that could be regarded as customized software rather than COTS components. Many of the sellers, however, aim to increase their sales of COTS software components. Brereton and Budgen (2000) observe that component vendors typically develop markets along horizontal and vertical dimensions. This means that a specific component may be used in a variety of different environments thus creating a range of business opportunities for vendors.

Component buyers, in turn, usually represent different types of manufacturers of products including software and possibly also hardware. Instead of being a software developer, many software companies see themselves more and more as system integrators, integrating their products and systems from several reusable components, commercial or those developed in-house (Ochs, Pfahl, Chrobok-Diening, & Nothhelfer-Kolb, 2000). COTS markets are thus not easily definable in terms of a relevant and bounded set of actors.