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Abstract

Many business-to-business Electronic Marketplaces (EMs) are now offering collaboration functionalities, but the collaboration concept in an EM context has not been studied systematically. This paper is a preliminary effort to explore and categorize the different types of collaboration functionalities that may be offered by EMs. Using a Web survey approach, we identified five types of horizontal collaboration (buying groups) and four kinds of vertical supply chain collaboration in EMs. Our findings suggest that supply chain collaboration tends to be supported more than buying groups by existing EMs, and a high percentage of EMs now offer supply chain coordination and integration. Among online buying groups, the exchange-catalogue model is the most popular, possibly since it puts fewer burdens on members and coordinators.

Keywords

collaboration, electronic marketplaces, supply chains, buying groups

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1. Introduction

Internet-based business-to-business Electronic Marketplaces (EMs) are "*open electronic platforms facilitating activities related to transactions and interactions between multiple companies*" (Holzmuller and Schluchter 2002). EMs have evolved from pure competitive markets that support buyer/seller aggregation, to supporting transactions, and finally to supporting integration and collaboration among firms with existing business relationships (Ganesh 2004). Nowadays, most EMs support a portfolio of relationships to cater to different purchasing strategies (Grieger, Kotzab et al. 2003; Skjot-Larsen, Kotzab et al. 2003; Bartezzaghi and Ronchi 2004; Eng 2004; Wang and Archer 2005). For some EMs, supporting aggregation has become a necessity, while supporting collaboration and integration is the main source of revenue and competitive advantage.

Although there is a vast literature from different disciplines on inter-institutional collaboration, collaboration in the EM context has not been studied systematically. The purpose of this paper is to explore such collaboration, at different levels. In its broadest sense, joining an EM is called "collaborative commerce", regardless of whether business participants trade through arms-length market relationships or through long-term relationships (Barratt and Rosdahl 2002). In this sense, all EMs are collaboration initiatives. Some EMs have been collaborative initiatives by big industry players, such as Covisint in the automobile industry. These collaborations have been limited to sharing an EM infrastructure, but not purchasing and sales. We will explore how firms can collaborate in purchasing through EMs; otherwise our conclusion will be that all EMs are collaborative initiatives. This conclusion is obvious and offers few implications. Our

exploration has the objective of addressing the specific research question of enumerating the existing forms of buyer/seller purchasing collaboration through EMs, and constructing a categorization framework that reflects these forms of collaboration.

The paper is organized as follows. First, a literature review includes the concept of electronic marketplaces, collaboration, and EM collaboration. Second, different forms of EM collaboration offerings are identified, based on a survey of 135 existing EMs. The forms of collaboration identified will answer our research question. Third, we compare and explain our classifications in relation to the previous literature, and finally we outline the potential for future research on this topic.

2. Literature Review

Collaboration in purchasing can occur either vertically among buyers, or horizontally between buyers and sellers. Huber, Sweeney et al.(2004) have divided online collaboration, respectively, into horizontal (pooled purchasing) and vertical (buyer-seller cooperation) collaboration. Along this line, we reviewed the literature on both vertical and horizontal collaboration in purchasing. The literature highlights the importance of supporting collaboration among buyers and sellers through EMs, but the types of collaboration have not been studied systematically.

2.1 An Introduction to Electronic Marketplaces

The most popular classification of EMs divides them into public, consortia-based, and private EMs (Grieger 2003). Public EMs are owned by a third party, serving multiple buyers and sellers. Consortia-based EMs are those that have been established by several

big industry players. For example, *Covisint*[1], is an EM that was built for the automotive industry by the big three American auto manufacturers (Ford, GM, and Daimler Chrysler). Private EMs are established by single companies mainly to support their own purchasing and selling activities. According to the number of participants on both sides, the above EMs may also be termed many-to-many, many–to-few and many-to-one electronic marketplaces, respectively (Paviou and Sawy 2002). In this paper, we exclude private EMs and one-to-many EMs, and focus on public and consortia based EMs and many (or few)-to-many electronic marketplaces.

Both academics and practitioners have studied how EMs can attract enough customers to be viable, and the final conclusion seems to be that supporting collaboration in EMs is appealing to both buyers and sellers. Based on innovation diffusion theory, Joo and Kim (2004) and Hadaya (2004) found that external pressure from trading partners plays an important role in adoption of EMs, but that perceived benefits appear not to have significant effects on adoption. Although external pressure exerted by buyers on suppliers may encourage adoption of EMs, it may also result in distrust that could dampen actual EM use. Lee and Clark (1997) found that the implementation of electronic markets results in higher perception of risks due to higher uncertainties; e.g. buyers face the risks of incomplete and distorted information, whereas sellers face the possibility that their price offers will be undercut due to information transparency. This result was also verified by Lee (1997) who studied a used car EM. Supplier distrust and perceived buyer opportunism sometimes cause supplier dissatisfaction and resistance to the adoption of such EMs (Gulledge 2002). This highlights the importance of offering collaboration functions through EMs, since this can result in a win-win strategy, where opportunism

[1] The Web addresses of all the EMs mentioned in the paper can be found in the appendix

and price cutting have been eliminated.

2.2 Vertical Collaboration and Strategic Purchasing

Collaboration is an effort by two or more organizations to achieve results that they cannot achieve by working in isolation. Collaboration has been widely discussed in a variety of disciplines, such as in transaction cost economics (TCE) (Williamson 1975; Powell 1990), relationship marketing (IMPGroup 1982; Jap 2001), inter-organizational systems (Kuman and Dissel 1996; Alstyne 1997), strategic management (Gulati, Nohria et al. 2000), supply chain management (Cousins 2002), and sociology (Winer and Ray 1994). Collaboration and its equivalent terms such as networks and long-term relationships are "everywhere – I read about them everywhere – they are really fashionable" (Harrison 2005). The benefits of developing long-term relationships can include reductions in transaction costs, and increases in resource sharing, learning and sharing knowledge. Particularly relevant to the purchasing functionalities offered by EMs is research in transaction cost economics (TCE), the interaction model developed by IMP (International Marketing and Purchasing group), and the supply chain management literature.

Based on human rationality assumptions, early TCE research provided insights on the choice between two governance structures: markets and hierarchies (Williamson 1975). The contingent model of TCE suggested that high transaction uncertainty, transaction-specific investment, and transaction frequency would result in high transaction cost if products were procured through the market, thus encouraging the adoption of hierarchical relationships. It was recognized later that markets and hierarchies

are not the only possible governance structure. Many intermediate forms of governance were found to be more likely, and given names such as network organizations (Powell 1990; Alstyne 1997), relational governance, and strategic alliances (Gulati, Nohria et al. 2000). Trust, collaboration, and resource interdependency are important characteristics of these intermediate governance structures.

Unlike the comparatively static approach of TCE, the IMP group of researchers adopted an interaction approach to analyze business relationships. Two of their original works (IMPGroup 1982; 1994) stressed the *stability of* industrial market structures. Buyers and sellers prefer to maintain stable business relationships, which are cultivated through years of interaction and the dominant mode of exchange. This structural side of IMP research coincides with TCE results - that business networks dominate industrial markets (Ford and Hakansson 2006). The difference between the two theories is that the interaction approach emphasizes the substance of business relationships by systematically emphasizing aspects of business interaction, such as the interaction process, socializing, environment, and atmosphere (IMPGroup 1994). The process side of IMP research enriches the understanding of business relationship dynamics and offers important managerial implications for practitioners on how to manage such relationships.

Supply chain management is an integrative approach for dealing with the planning and control of materials flow from suppliers to end users (Croom, Romano et al. 2000). Tan (2001) identified two perspectives of supply chains: a purchasing and supply perspective, and a transportation and logistics perspective. The objective of the first perspective is to reduce the supply base and inventory, and to increase customer satisfaction. The objective of the second perspective is to reduce transportation costs,

reduce demand uncertainty, and provide supply chain visibility. To achieve these goals, collaboration among supply chain members is critical (Horvath 2001; Skjoett-Larsen, Thernùe et al. 2003). In supply chain management, purchasing becomes strategic and tightly coupled with other functions of the supply chain, such as inventory management and product development. For example, in Vendor-Managed Inventory (VMI), inventory management is tightly coupled with order placement, which is triggered by inventory levels.

Strategic supply chain management is supported by e-commerce technologies such as EDI (Electronic Data Interchange) and the Internet (Garcia-Dastugue and Lambert 2003; Lancioni, Smith et al. 2003; Medjahed, Benatallah et al. 2003). Ovalle and Marquez (2003) used a systematic approach to test the effectiveness of using different e-collaboration tools to share product information, inventory information, customer demand, and transaction information. They concluded that this sharing results in an improvement in information sharing that can contribute to faster and more flexible supply chain processes among supply chain partners, and make the processes more responsive to market changes.

This review has shown that collaborative and stable business relationships have dominated market-oriented and hierarchical governance structures in purchasing and supply chain management. This raises an important implication for EM practitioners. "How much of all the purchasing is generated outside existing relationships, and can therefore be handled by (electronic) marketsites? If a majority of the buying is done through existing collaborative partners, then that share of the market must be discounted as potential transactional volume" (Barratt and Rosdahl 2002). This may be one of the

reasons that many EMs began to emphasize collaboration functionality during the 2000-2002 period.

2.3 Horizontal Collaboration and Buying Groups

Collaboration through vertical relationships has been given due recognition, but collaboration through horizontal relationships (pooled purchasing) has been largely ignored in the private sector purchasing literature (Essig 2000). This situation persists despite the fact that buying groups and volume purchasing are used widely by healthcare, school, and governmental organizations to keep prices low and achieve other organizational objectives (Essig, 2000). Buying groups was projected to be one of ten purchasing trends in the period 2000-2010 by Carter et al(2000). The benefits of purchasing through buying groups include (Nollet and Beaulieu 2003; Huber, Sweeney et al. 2004; Nollet and Beaulieu 2005; Tella and Virolainen 2005; Hernández-Espallardo 2006; Schotanus and Telgen 2006; Ridgeway 1988): lower prices due to aggregated purchasing quantities, reduced supply risks, reduced administration costs due to the centralization of purchasing activities to buying groups, and networking benefits (since group members communicate and interact with each other). This latter benefit has been touted to be as important to group members as price reductions (Ridgeway 1988). However, buying groups also have their disadvantages, including:

- Loss of flexibility since products/services purchased must have a high similarity among group members.
- Loss of control by individual group members.
- High coordination cost, especially if group members are competitors.

- Anti-trust problems.
- Potential consolidation of the supply market in the long run.
- Success relies on the quality of leadership/coordination in the group: the ability to negotiate contracts and coordinate member interests is critical.

Nollet and Beaulieu (2005) suggested that, when joining a purchasing group, one should consider the potential costs/benefits, the size of the group, the potential impact of the buying group, and member characteristics. Nollet and Beaulieu (2003) analyzed buying group trends and concluded that groups have become larger, showed more adaptation to group member preferences, managed more partnership-style types of relationship with suppliers, and many have implemented electronic catalogues for their members. Based on the intensity and number of initiatives, Schotanus and Telgen (2006) classified buying groups in the healthcare industry into five categories through a highway travel analogy: Convoy, Hitchhiking, Carpool, F1-team and Bus Rides. Hitchhiking involves the sharing of purchasing related information with other organizations, or small organizations hitchhike on contracts of large organizations under the same conditions. Bus rides involve long-term hitchhiking through a third party. In carpooling, one of the members is in charge of the procurement of goods in which this member has expertise. Convoy is a more intensive form of cooperative purchasing, involving much consultation between members to bring specifications to the same level. F1-team often involves representatives of the management teams of the cooperating organizations meeting regularly as a steering committee to discuss cooperative projects. Of these categories, bus rides are often hosted

by a third party that provides a supplier electronic catalogue through its Website, a form of electronic marketplace that is biased towards buyers.

2.4 Collaboration Through EMs

In EMs, collaboration in purchasing can also happen either vertically or horizontally. If it is a vertical collaboration between buyer and seller, if strategic collaboration and supply chain management is offered through the EM, can it still be called an EM? There is no agreement on this issue in the literature. Some researchers think EMs are only tools that support non-strategic purchasing and short-term relationships (Kuman and Dissel 1996; Choudhury and Hartzel 1998). For example, Choudhury and Hartzel (1998) studied ILS (*Inventory Locator Service*), an EM for aircraft parts, and suggested that aircraft parts bought routinely from long-term suppliers are not actually procured through this EM but through other applications. McLaren, Yuan et al. (2002) also developed a framework for supply chain activities supported by e-business tools, among which third party EMs only support non-strategic product procurement.

However, more researchers are beginning to think of EMs supporting portfolios of sourcing strategies, including strategic supply chain management, through stable business relationships. For example, Rudberg, Klingenberg et al. (2002) discussed the possibility of supporting supply chain planning using EMs. Grieger, Kotzab et al. (2003) suggested that there were possibilities for managing multiple supply relationships through EMs. Alt and Cäsar (2002) discussed how to manage collaborative planning, forecasting and replenishment (CPFR) through EMs. Christiaanse and Markus (2003) described *Elemica* as a pure collaboration EM that supports only existing business relationships in the

chemical industry. In this paper, we will adopt the broader view - that EMs can offer a full range of supply chain management possibilities.

Buying groups on the Internet have not been studied extensively. However, Kauffman and Wang (2002) evaluated the earliest dot coms to offer innovative group buying business models, including *Mercata.com* and *Mobshops.com*. Anand and Aron (2003) surveyed 50 buying groups on the Web and attempted to build an economic model that could address such phenomena. Perhaps there is no viable economic model for such initiatives, because either the majority of the buying groups studied by these researchers do not exist anymore, or they have been modified to other more viable business models.

This literature review has shown that collaboration has been given due recognition, both offline and online, but few research papers have systematically identified the forms of collaboration in EMs. This paper will explore collaboration through EMs in a more systematic way. The literature suggests that two categories of collaboration may be offered through EMs: vertical collaboration and horizontal collaboration. We will call these categories supply chain collaboration and buying groups respectively. Our exploration will address the research question of enumerating the existing forms of buyer/seller purchasing collaboration through EMs that fit within these categories.

3. Methodology

A Website survey of EMs was conducted to identify different forms of buying groups and supply chain collaboration, including how collaboration is conducted in these

EMs. Using online resources to do research has been used extensively by many researchers (Allen 2006). Information about available functionalities is normally offered on these sites, allowing an interpretation of how collaboration is conducted on these sites, making the Web survey approach suitable for such a study. To study collaboration in EMs, the first step is to search the Web for EMs. However, a large number of variations of EMs exists, so it is necessary to operationalize the EM concept and confine the search to EMs that meet our predefined criteria.

3.1 Operationalizing the Concept of Electronic Marketplaces

We define electronic marketplaces as open electronic platforms for facilitating inter-company transaction activities and interactions between multiple participating companies. The subject EMs of interest met two criteria: (1) many (or few)-to-many electronic marketplaces that are open to the public, and (2) support a portfolio that includes both non-strategic and strategic supply chain relationships.

Figure 1 is a framework that clarifies the types of EMs included in the survey. Transaction activities can be divided into an information searching stage where suppliers and buyers get to know each other, and later stages such as negotiation and fulfillment. A competitive market is characterized by unknown trading partners and information searching, but transacting with existing trading partners lacks this stage. The framework has two dimensions: whether information search is done online, and whether resulting negotiation and fulfillment is at least partially done online. The gray area in figure 1 describes the functionalities of the surveyed subjects. One clarifying note is that virtual private networks (A) in an EM environment differ from private networks that connect

two companies with dual relationships in the traditional world, due to the availability of many potential trading partners and lower switching costs in virtual private networks, where all the trading partners use the same platform. An online buying group that satisfies the above two criteria is also considered an EM. However, if a Website's main activity is to support buying groups, it is normally called a "biased" EM since it represents the interests of buyers more than sellers.

*****Figure 1 Here*****

3.2 Identifying and Screening EMs

To study supply chain collaboration, we began with *Forbes Best of the Web: B2B Directory*[2]. EMs supporting collaboration were identified in a two phase screening process. First, adhering to the definition of EMs, we screened the *Forbes* database, and identified a total of 108 EMs in 18 industries. During screening, we eliminated private company Websites such as GE's *Polymerland*, and software companies and service providers, such as the advertising Website *Doubleclick*. Since our focus was on collaboration EMs, a second phase of screening was conducted to identify all the remaining EMs that support supply chain collaboration. We were conservative in excluding purely competitive EMs, to avoid missing EMs supporting collaboration, but retained those that offered functionalities extending beyond pre-order information searching and contract negotiation transaction stages. We also included partly consumer-oriented EMs such as *Ebay*, explained in the next section. This resulted in a final list of

[2] http://www.forbes.com/bow/b2b/main.jhtml Accessed initially on Oct 1, 2003

61 EMs in 14 industries, each supporting collaboration to some degree (See Appendix for the full list).

The preliminary list (108 EMs in 18 industries) was not suitable for studying horizontal collaboration. We found only one EM in this list that supports buying groups, which was *WWRE*, a retail EM. Since there is little available consolidated EM literature or directories on online buying groups, we established such a list by searching several major databases such as *ABI/INFORM*, *LexisNexis Academic*, *WEBSPHERE*, and the Web search portals *Google* and *Yahoo*, using the keywords "demand aggregation", "buying/purchasing group/organization/consortia", "volume purchasing" etc. Internal company purchasing or buying centers were excluded since our focus is on inter-organizational collaboration. As a result, 28 EMs supporting buying groups in 11 industries that fit our definition of EMs were identified. This difficulty in identifying EM buying groups is an indication of the low popularity of such business models.

Among the 89 EMs identified as offering either supply chain or purchasing group solutions, there were 77 U.S. and Canadian, and 11 European EMs. *Forbes.com* listed only one Asian EM (*Alibaba*). However, it was excluded since at that time it supported only information searching.

EM selection for this study was biased in several ways. First, the *Forbes* B2B directory is not exhaustive and its editor is probably subjective in deciding what B2B sites to include. The supply chain sample is representative of this directory. Second, the searching process to identify EMs supporting buying groups was subjective and some EMs might have been missed, depending on the use of keywords. An attempt was made to overcome this bias, by checking all the Websites mentioned by Kauffman and Wang

(2002) that were still viable. Although a limited bias is still present in the survey, it is a worthwhile initial effort that other researchers may build on. However, readers should be cautious when interpreting the percentages reported from the survey.

4. An Overview of the Results

After the EMs that supported collaboration were identified, they were classified into five categories of buying groups and four categories of supply chain collaboration (See Table 1), addressed in detail in the following sections. These identified nine forms of collaboration that will answer the research question: "What types of purchasing collaboration are supported through these EM categories?"

*****Table 1 Here*****

4.1 Horizontal Collaboration: Buying Groups

Buying groups use several different business models. The key differences among them are: 1) who is the coordinator, and 2) how the coordinator manages purchasing activities. There are three business models for the assignment of the coordinator: (a) the EM; (b) a supplier; or (c) a buyer. When a supplier or buyer serves as the coordinator, coordination is limited. However, when the EM serves as coordinator, there are three ways of coordinating: (a) the EM owns the products, (b) the EM provides a catalogue offering with no product ownership, or (c) the EM has no product ownership and negotiates with suppliers dynamically. As a result, the first category where the EM is the coordinator, can be divided into three sub-categories: dealer-type EMs, exchange-

catalogue EMs and exchange-negotiation EMs. This results in a total of five forms of buying group, as explained below.

When an EM serves as coordinator, buying group models have three possible types:

(1) Dealer-type EMs. Dealer-type EMs take ownership of the products. For these EMs, products are bought before group members/buyers make any promise to purchase, and products are offered online for members to order. The volume that these EMs purchase is based on demand forecasting, which can be derived from buyer suggestions and sales history. EM operators purchasing products in large quantities may qualify for volume discounts. Part of the discount is returned to buyers, and the remainder is EM operator profit. Dealer-type EMs put minimum requirements on buyers: they can purchase any quantity of whatever products are offered through the EM at any time, and larger discounts may be offered to premium buyers. Most online distributors are examples of this type of EM. For example, *Grainger*, a U.S. based EM, offers a wide variety of industrial and business maintenance, repair, and operations (MRO) supplies. Other examples include *ChemPoint* in the chemical industry and *Chumbo* in the retail industry.

(2) Exchange-catalogue EMs negotiate contracts with preferred suppliers for their members, before members make any specific purchasing commitment, and offer these contracted prices to members that sign up. The difference between exchange-catalogue and dealer-type EMs is that exchange-catalogue EMs do not take ownership of products. They may publish selected supplier product catalogues online for member ordering, or they may direct members to supplier Websites and let them order directly from

contracted suppliers at any time they wish. Deliveries and returns of goods are usually arranged directly between suppliers and buyers. Most EMs that support buying groups use this model, since it puts less burden on both EM operators and buyers. An example is *Bath and Kitchen Buying Group*. It negotiates pricing agreements and rebates with preferred vendors for its buy-side clients, who are bath and kitchen product distributors. Distributors purchase directly from the manufacturer, and the bath and kitchen buying group does not own or operate central warehousing. According to aggregated group purchasing volume over an agreed time period, a rebate is calculated by the EM and returned to distributors. Distributors pay an annual fee of $1000, and can place orders anytime. Another example is *Happy Many*, a utility purchasing group that negotiates favorable pricing with preferred utility and telephone companies, and then places these services online for its members to order. Members can purchase these services from the *Happy Many* Website at any time.

(3) Exchange-negotiation EMs are similar to exchange-catalogue EMs, as they do not take title to the products. However, these EMs negotiate pricing contracts with suppliers only after they have buyer commitments. EM operators collect orders from buyers, and then submit these orders to suppliers. In order to build volumes that will bring bigger discounts, all of the products purchased must be the same or similar. Negotiation can be offline, or it may use EM dynamic pricing platforms. *Petrosilicon* is such an example in the energy industry. Members are requested to submit their requirements by grade for a particular month. These are aggregated and forwarded to preferred suppliers who then contact members directly with their best prices. Other

examples include *Unistar* in the food and hospitality industry, and *Broadlane* in the healthcare industry.

Both supplier- and buyer-initiated buying groups are innovative models of the Internet age, which we refer to as supplier-initiated and buyer-initiated buying groups. When *a supplier is the coordinator,* it publishes its production schedule, price curve, and shipping date, and buyers submit their orders according to the price curve and previously submitted orders (Akman 2002; Kauffman and Wang 2002). The price curve falls when the quantity purchased by the group increases. *EWinWin* is a technology provider that implements this model, utilizing their patented DAS (*Demand Aggregation System*), and *Shopmate* and *letsbuyit.com* are retail industry EMs that use this model. For example, in *Letsbuyit*, a supplier can initiate a purchasing session, specifying the price curve and wait online for buyers to come. Supplier-initiated buying groups became popular around 2000. A number of such EMs were identified by Kauffman and Wang (2002) in 2001, but most of these EMs can no longer be found on the Web.

In our survey, buyer-initiated purchasing group functionality was found in only one EM, *World Wide Retail Exchange-* (*WWRE*), a retail industry EM. The *WWRE* model lets a buyer initiate a group purchase. Buyers nominate and approve a leader among all the buyers. The leader takes responsibility for harmonizing different needs of all buyers in the group and organizes negotiations with suppliers.

Within the 28 EMs that supported buying groups, we found that the majority of them adopted the exchange-catalogue model (Table 1). A comparison of the five models explains the relative popularity of this model (see Table 2), since it is a low risk, low profit model for EM operators, and it is a safer model for operators when technologies are

uncertain. For buyers, although the price discounts they can get from an exchange-catalogue model are lower than from supplier- and buyer-initiated models, they are willing to sacrifice price discounts for reduced product lead times. Lead times are often much longer in session-based buying groups, where members have to wait until there are enough buyers. Liquidity appears to be the key factor for EM success in this category. Because the exchange-catalogue model puts the least burden of all the business models on buyers, it also makes it easier for EM operators to attract more buyers.

***** Table 2 about here *****

4.2 Vertical Collaboration: Supply Chain Collaboration

EMs are now increasingly accommodating supply chain management activities, usually conducted somewhere along the continuum between arms-length market relationships and hierarchical relationships. According to the depth of the collaboration intentions of supply chain parties, we classify supply chain collaboration into: collaborative fulfillment, pre-negotiated purchasing contract execution, product life cycle management, and supply chain coordination and integration. Among these, the first two categories are transaction-oriented and the last two are interaction-oriented. We believe that collaboration intention in the latter two categories is greater than in the first two.

(1) Collaborative fulfillment: collaborative fulfillment represents the lowest intended level of collaboration among all the categories. There is no hard boundary between arms-length relationships and collaboration. After trading partners negotiate a deal, they may collaborate on fulfillment, including payment, delivery, order tracking, and

after-sales maintenance. In our survey, we included any EMs supporting negotiation of contracts as well as fulfillment of the contracts, no matter how minor this support was. Support provided might include payment, delivery, order tracking, etc. By these criteria, some purely competitive EMs were also included, such as *ebay*[3] (other examples of such EMs are noted in the appendix). This is because *ebay* supports payments. After an auction is over, both parties continue to cooperate until the products are delivered and payments are cleared. Some EMs offer order tracking, requiring suppliers to cooperate temporarily in order to share certain information with buyers.

(2) Pre-negotiated purchasing contract execution: Usually two kinds of purchasing contracts are supported by EMs: preferred supplier contracts, and single source contracts. Technically, supporting pre-negotiated preferred suppliers in contract execution is no different from supporting single source contract execution. Both may involve installing customized private online catalogue(s) at the EM, and transferring transaction data between partners, such as purchase orders, delivery notices, and invoices. More and more EMs have been providing private e-catalogues within their public systems. A private e-catalogue includes pre-negotiated terms, which are only accessible by a specific buyer and its recognized suppliers (Dai and Kauffman 2002) . However, except for pricing and other financial terms, the private catalog still shares the same systems and entries as the public e-catalogue. Through these facilities, business partners can use the EM infrastructure to manage and automate their business processes, while avoiding open market negotiation. In our survey, EMs offering

[3] Only the *Ebay* B2B section is included in the survey

product catalogues and supporting separate accounts to accommodate preferred suppliers or single source contracts were also placed in this classification.

(3) *Product life cycle management, including project management, document management, and collaborative R&D:* Product life cycle management concerns mostly the development stage of the product. It is seen in a number of industries, including construction, printing, aerospace, and the automotive industry. The common characteristics of these industries are the large number of parties involved in product development. Project lifetimes can vary from weeks to years, depending on the complexity and size of the project. For example, *Supplyon* is a European EM that connects first tier and deeper tier suppliers in the automobile industry. Its business solutions include collaborative engineering, document management, and CAD (Computer Aided Design) conversion. In the automotive industry, numerous component, subsystem, and system designs must be generated by automakers and their suppliers when developing new vehicles. These designs and related documentation may be generated in different formats by different software applications on different systems, so the conversion and transmission of this design information among the business partners are important.

(4) *Supply chain coordination and integration:* this concerns the transportation and logistic aspects of the supply chain. The purpose of supply chain coordination is to drive inefficiencies out of the supply chain. However, different industries have different

industry-specific inefficiencies, so the details of the application depend on the industry. Some examples are listed in Table 3.

***** Table 3 about here *****

Table 3 shows that the most popular supply chain coordination functionality is *Vendor Managed Inventory* (VMI), and its variants are seen in the retail and automotive industry. For example, the above-mentioned *Supplyon* also offers vendor-managed inventory to handle logistics problems. *Collaborative Planning, Forecasting, and Replenishment* (CPFR) is an enhanced VMI service used in the retail industry (Alt and Cäsar 2002). CPFR is used to ensure enough quantity to meet consumer demand, while minimizing inventory costs. In order to achieve this goal, trading partners agree to mutual business objectives and measures, develop joint sales and operational plans, and collaborate to generate and update sales forecasts and replenishment plans. A nine-step CPFR implementation guideline was published by the *Voluntary Industry Commerce Standards* (VICS) Association[4] in 1998, in order to facilitate the adoption of such collaborative practices. In the transportation industry, a *Private Logistics Network* (PLN) serves as an information "nerve center" for the enterprise and its trading partners. This enables suppliers, third party logistics operators, forwarders, carriers, brokers, and end customers to connect seamlessly with one another, in order to coordinate the movement of goods and information.

In our study, 61 EMs in 14 industries offered supply chain collaboration. Table 1 lists the percentage of EMs offering each type of supply chain activity. Collaborative fulfillment and supply chain coordination and integration were the most frequently seen applications, with 42 and 39 EMs supporting such applications respectively. 15 pure

[4] www.cpfr.org

collaboration EMs with minimum competitive elements were found. They only try to build connectivity between companies, the so-called "between the firewall" applications, which can support pre-negotiated contract execution, supply chain coordination, and product life cycle management. Examples of these pure collaborative EMs are noted in the appendix.

Among all types of "between the firewall" applications, pre-negotiated contract execution and supply chain coordination were often seen in EMs. Product life cycle management was the least frequent form of collaboration (in 12 EMs), since product life cycle management practices are less popular among all the industries, being used mostly by large companies within their own private portals. In our survey, we found that product life cycle management usage was concentrated in the construction and aerospace industries. Here product development projects involve multiple parties and complex coordination activities.

5. Discussion

5.1 Buying Groups in Electronic Marketplaces

Fitting the forms of buying groups identified in this survey into Schotanus and Telgen (2006)'s work , our work may further suggest that in EMs the number of initiatives and sessions of group purchasing are much more frequent than traditional offline buying groups. Comparing with the buying groups identified by Schotanus and Telgen (2006), most online buying groups resemble Bus Rides, with the exception of buyer-initiated and catalogue-negotiation buying groups, which look more like Carpool. In Bus Rides, members come randomly and get involved in the group whenever there is a

good deal, and there is little relationship-forming among group members. The Carpool classification involves a moderate intensity of collaboration and actual communication activities for transactions. Carpool and Bus Rides are all ranked high in one of Schotanus and Telgen (2006)'s classification dimensions: "the number of initiatives".

The literature suggests that online buying groups offer several benefits to their members such as global reach, electronic ordering and negotiation, anonymity, etc. Despite its benefits, both the literature and our survey suggest that online buying groups may not be very popular. The following suggests potential reasons for this:

(1) Loss of networking benefits. Ridgeway (1988) suggested that sharing ideas with others within the "family" and enjoying consulting services from the group purchasing organization are big benefits of traditional groups. Networking is also important for coordinators, to encourage member commitment. This research also showed that, in traditional group purchasing organizations, one recommended strategy is for the coordinator to network directly with member CEOs, CFOs, or CIOs. However, many online groups do not involve these relationships, and most members remain anonymous, so networking benefits are lost to EM buying groups. Furthermore, EMs support only routinized coordination, and social networks tend to be characterized by richer face-to-face meetings. This suggests that there is a misfit between EMs and buying groups.

(2) Geographical dispersion. One benefit of the Internet is its ability to attract global memberships. However, geographic closeness and group cohesion facilitate user commitment, which greatly affects the coordinator's ability to negotiate prices.

(3) Price cutting feature of buying groups. Since networking benefits may be largely lost in EMs, the biggest benefit of an EM buying group must be lower prices. But most models of EM buying groups have a limited ability to force lower prices, probably due to a lack of commitment (since no deep relationships are usually formed among members). Price cutting behavior of buyers may result in biased electronic marketplaces, and could potentially cause supplier dissatisfaction.

5.2 Supply Chain Collaboration in Electronic Marketplaces

Unlike the small amount of online buying group analysis, supply chain collaboration in EMs has received a great deal of attention (Phillips and Meeker 2000; Holzmuller and Schluchter 2002; Christiaanse and Markus 2003; MacDuffie and Helper 2003). Holzmuller and Schluchter (2002) divided EM activities into two groups: transaction-related and interaction-related activities (Holzmuller and Schluchter 2002). The latter group in fact represents collaboration, which can be further classified into two types: product life cycle management (including document management and collaborative R&D) and supply chain collaboration (logistics, collaborative planning, inventory management, etc.). MacDuffie and Helper (2003) also suggested two forms of collaboration in EMs: collaborative design and supply chain collaboration. Phillips and Meeker (2000) argued that industries with many players involved in the supply chain are suitable for collaboration functionalities, and outlined several collaboration forms in the aerospace, construction and printing industries.

Results from the Web survey indicated that more than half of the EMs studied offered collaboration functionalities. Our classification results go beyond what other

researchers have discussed, including (1) collaborative fulfillment as a form of collaboration, although both buyers and sellers do not have a strategic intent to collaborate, (2) Pre-negotiated purchasing contract execution, which has received little attention in the literature, but our experience from this survey indicated that this could be an important form of collaboration, since more than one third of the EMs investigated offered this kind of collaboration . (3) Supply chain coordination and product life cycle management included in our survey, appears to be industry-specific (Phillips and Meeker (2000).

6. Summary and Future Research

6.1 Summary and Conclusions

Our exploration of electronic marketplaces has found five types of buying groups and four types of supply chain collaboration that were supported by existing EMs. Ordered from high to low by their frequency in this survey, the five types of EM buying groups were exchange catalogue, dealer-type, exchange negotiation, supplier-initiated and buyer-initiated buying groups. The exchange-catalogue model was the most popular, since it puts fewer burdens on members and coordinators. Supply chain collaboration appears to be more fully supported by EMs than are buying groups. Again ordered from high to low by their frequency in this survey, the four types of supply chain collaboration were collaborative fulfillment, supply chain coordination and integration, private catalogue, and product life cycle management.

Due to the limitations of our research method, which relies on secondary information drawn from EM Web sites, a more comprehensive primary data survey of both EMs and participants would be needed to draw more statistically valid conclusions.

6.2 Future Research

There are many potential areas of research into EM collaboration, including: investigating the difficulties of supporting online collaboration, designing viable business models for supporting EM buying groups, estimating the impact of the Internet on group member behavior, using an interaction approach to study EM supply chain collaboration, and developing a strategic framework that combines horizontal and vertical collaboration together in a logical manner.

Evaluating the level of online collaboration is another promising area of future research. The framework of (Kagan 1991; Winer and Ray 1994) can be borrowed to evaluate the types of collaboration identified in this survey. In their framework, cooperation, coordination. or true collaboration represent increasingly higher levels of collaboration, depending on six criteria: mutuality of goals, resource sharing, trust, structure, commitment, and agreement. An example of using this framework to evaluate the level of EM collaboration is provided in Table 4. By evaluating each type of horizontal and vertical collaboration using the above mentioned criteria, this framework suggests that EMs might be more likely to support the lower levels (cooperation and coordination). First, due to lack of mutual goals, information sharing, and trust, dealer-type and exchange catalogue buying groups fit with the cooperative sourcing category, the lowest level of collaboration. A simple mutual goal, simple information sharing, minor modifications in structure, and a dominant and definitive contract suggest that exchange-type negotiation, supplier-initiated, and buyer-initiated buying groups fit more with the coordinated sourcing category. Second, collaborative fulfillment and pre-negotiated purchasing contract execution fit more with the supply chain cooperation category, due to lack of mutual goals and commitment. Product

life cycle management and supply chain coordination and integration can span the spectrum of coordination and collaboration level, depending on the time frame and complexity of project and supply chain initiatives. We speculate that, in an EM environment, product life cycle management and supply chain coordination and integration should be at the supply chain coordination level, since the EM environment does not foster trust and commitment. However, these suggested results need to be validated empirically by collecting field data in a future study.

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Figures and Tables

Figure 1: Electronic Marketplace Survey Framework

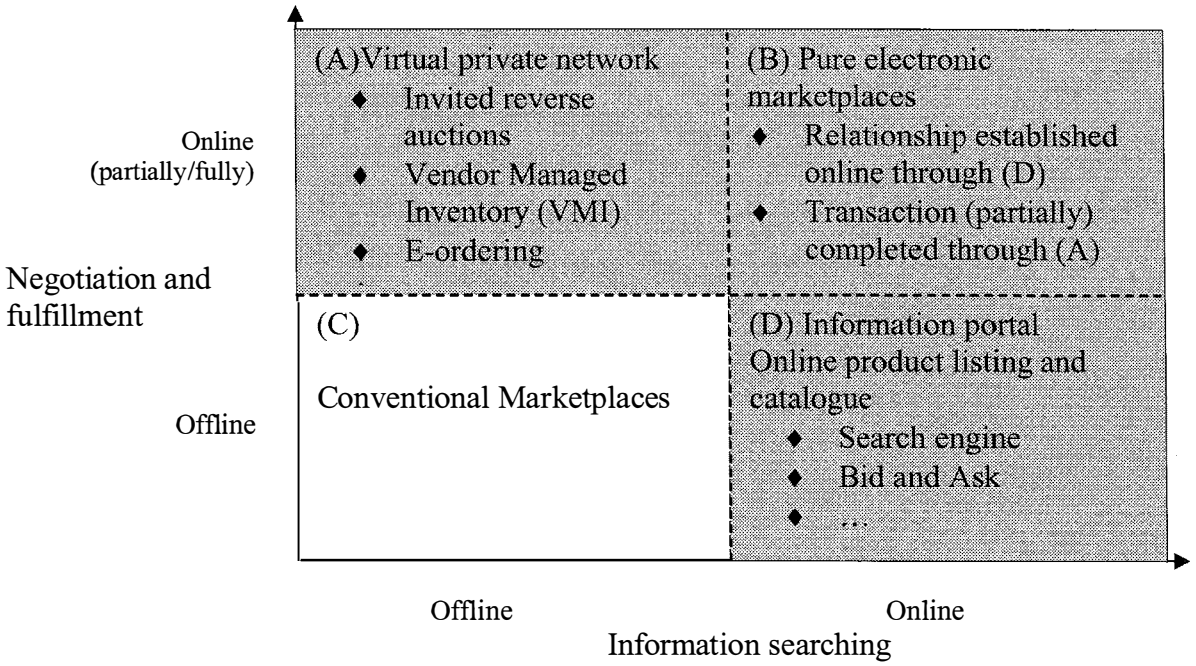

Table 1 Types of EM Collaboration

Horizontal Collaboration: Buying Groups			
	Sample		**Evaluation criteria**
Dealer-Type	5	18%	(1) EM is the coordinator of buying activities (2) EM takes ownership of the products
Exchange-Catalogue	17	61%	(1) EM is the coordinator of buying activities (2) EM does not take the ownership of products (3) EM organizes purchasing by providing supplier product catalogue
Exchange-Negotiation	4	14%	(1) EM is the coordinator of buying activities (2) EM does not take ownership of products (3) EM organizes purchasing by negotiating with suppliers after collecting enough buyers.
Supplier-Initiated	3	11%	(1) A supplier is the coordinator of buying activities
Buyer-Initiated	1	4%	(1) A buyer is the coordinator of purchasing activities.
Total	**28**		
Vertical Collaboration: Supply Chain Collaboration			
Collaborative fulfillment	42	69%	(1) Must include information search and negotiation stage of the transaction (2) Must support one of the other stages of the transactions, such as order placement, payment, transportation.
Private catalogue	24	39%	(1) Must offer product catalogue (2) Must support ordering from single source or preferred supplier
Product life cycle management	12	20%	Must include one of the following: (1) Document management (2) Product co-development (3) Project management (4) Collaborative R&D
Supply chain coordination and integration	39	64%	Supports certain forms of supply chain collaboration, such as private logistics network, inventory management, production planning and forecasting, supply chain integration, Web-based EDI[5], etc.
Total	**61**		

[5] Web-based EDI can transmit information about product design and project progress. However, since the application is not tailored specifically to product design and project management, this type of support is limited. For simplicity, Web-based EDI is classified as supply chain coordination and integration.

Table 2 Comparison of Forms of Buying Group in Electronic Marketplaces

Models	Weakness	Strength
Dealer-type	• High risk for EM operators due to ownership of products • Low price discount for members	• High-profit for EM operators • Member can buy and receive immediately any products offered by the EM at any time (immediacy)
Exchange-Catalogue	• Low profit for EM operators • Low price discount for members	• Low risk for EM operators • Members can buy any products offered by the EM at any time
Exchange-Negotiation	• Low profit for EM operators • Session-based purchase • Limited products • Long product lead time	• Low risk for EM operators • High price discount for members
Supplier-Initiated	• Session based purchase • Limited products • Require high similarity among buyers • Long product lead time	• Easy to arrange production plans for suppliers
Buyer-Initiated	• Session based purchase • Require high similarity among buyers • Long product lead time	• High price discount for members

Table 3 Examples of Supply Chain Coordination and Integration

Industry	Examples of Supply Chain Coordination	Examples of EMs
Retail Industry	Collaborative Planning, Forecasting, and Replenishment	GlobalNetXchange www.globalnetxchange.com
Food and Beverage Industry	Vendor Managed Inventory; Warehouse Utilization and Appointment Scheduling; Collaborative Inventory Planning; Forecasting and Replenishment	EFSNetwork www.efsnetwork.com
Electronics	Vendor Managed Inventory	Avnet www.avent.com
Energy	Vendor Managed Inventory	Pantellos Group www.pantellos.com
Transportation	Private Logistic Networks	GT Nexus www.gtnexus.com
Auto Industry	Vendor Managed Inventory; Web EDI	Supplyon www.supplyon.com

Table 4 Collaboration Levels of Different Forms of Buying Group and Supply Chain Collaboration in EMs

	Mutuality of Goals	Resource Sharing	Commitment	Structure	Agreement	Trust	Level of Collaboration
Buying group							
Dealer-type	Pursuing own best interests	No	No min. purchase required	Individual autonomy	Definitive	No	Cooperative Sourcing
Exchange-catalogue	Pursuing own best interests	No	No	Individual autonomy	Definitive	No	Cooperative Sourcing
Exchange-negotiation	Pursuing group's best price	Human resources; desired info	Willing to change	Temporary group formed	Definitive	Moderate	Coordinated Sourcing
Supplier-initiated	Pursuing group's best price	Human resources; wanted info	Willing to change	Temporary group formed	Definitive-relational	Moderate	Coordinated Sourcing
Buyer-initiated	Pursuing group's best price	Human resources; desired info	Willing to change	Temporary group formed	Definitive-relational	Moderate	Coordinated Sourcing
Supply chain collaboration							
Collaborative fulfillment	Pursuing own best interests	No	No	Individual autonomy	Definitive	Low	Supply Chain Cooperation
Pre-negotiated contract execution	Maximizing own interests	Shared private catalogue	Depends	Individual autonomy	Definitive	Low	Supply Chain Cooperation
Product life cycle management	Satisfying end consumers	Human skill, intelligence, etc	Willing to adapt	Temporary joint programs formed	Relational contracts (low level)	Moderate-high	Supply Chain Coordination
Supply chain coordination and integration	Satisfying end consumers	Inventory, planning, and customer info.	Special IT or production equipment investment	Joint programs lasting contract life time	Relational contracts (Low level)	Moderate-high	Supply Chain Coordination

Appendix: List of EMs Surveyed

EMs Supporting Supply Chain Collaboration

Aerospace & Defense

Exostar: www.exostar.com

Aeroxchange: www.aeroxchange.com

Agriculture

XSAg: www.xsag.com #

Agribuys: www.agribuys.com

CattleSale: www.cattlesale.com#

E-Markets: www.e-markets.com

ForTheFarm: www.forthefarm.com #

Chemicals

CC-Chemplorer: www.cc-chemplorer.com

ChemConnect: www.chemconnect.com

Elemica: www.elemica.com*

CambridgeSoft: www.cambridgesoft.com #

SciQuest: www.sciquest.com

DoveBid: www.dovebid.com #

Construction

BuildOnline: www.buildonline.com*

Construction.com: www.construction.com

Citadon: www.citadon.com*

BuildPoint: www.buildpoint.com *

Hyphen Solutions: www.mh2.com *

Electronics

Arrow Electronics: www.arrow.com

Avnet: www.avnet.com

E2open: www.e2open.com *

FastParts.com: www.fastparts.com

Energy

Intercontinental Exchange: www.intcx.com #

Pantellos Group: www.pantellos.com

Excess Inventory

EBay: www.ebay.com #

Visagent Surplus Goods Exchange www.visagent.com/surplus_exchange.htm #

Food and Beverage

EFSNetwork: www.efsnetwork.com/*

Sysco: www.sysco.com

Logistics & Transportation

GT Nexus: www.gtnexus.com *

Celarix: www.celarix.com*

Elogex: www.elogex.com *

Freightquote.com: www.freightquote.com #

Manhattan Associates: www.manh.com #

Nistevo: www.nistevo.com *

Shiplogix.com: www.shiplogix.com

Transplace: www.transplace.com

Metals

OnlineMetals.com: www.onlinemetals.com

Paper & Forest Products

ForestExpress: www.forestexpress.com

Paper2Print.com: http://paper2print.com/home.jhtml

Noosh: www.noosh.com

PrintCafe Software: www.printcafe.com

Retailing

FurnishNet.com: www.furnishnet.com*

JCommerceRetail.com: www.jcommerceretail.com*

RetailersMarketXchange www.RetailersMarketXchange.com*

GlobalNetXchange: www.gnx.com

Transora: www.transora.com

UCCnet: www.uccnet.org

WorldwideRetail: www.worldwideretailexchange.org

Automotive

Cobalt Group: www.cobaltgroup.com

OEConnection: www.oeconnection.com

Powerway: www.powerwayinc.com

Covisint by Compuware: www.covisint.com

SupplyOn: www.supplyon.com

Hospitality & Travel

Avendra: www.avendra.com

GetThere: www.getthere.com

Sabre: www.sabre.com

WorldRes: www.worldres.com #

Industrial Equipment

Amphire Solutions: www.amphire.com *

Camelot Technologies Group: www.camelottech.com#

IronPlanet: www.ironplanet.com #

PartMiner: www.partminer.com #

Note: # Pure competitive EMs with collaborative fulfillment functions.
* Pure collaboration EMs

EMs Supporting Buying Groups

Name	Address	Industry
1. Letsbuyit	www.letsbuyit.com	Retailing
2. Sphere 1	http://www.sphere1.coop/default2.htm	Industrial supplies
3. NetPlus alliance	http://24.75.39.203/	Industrial supplies
4. Retex	http://www.retex.com/	Retailing
5. Online choice.com	http://onlinechoice.com	Business services such as insurance plans
6. WWRE	www.RetailersMarketXchange.com	Retailing
7. Broadlane	www.broadlane	Healthcare
8. Shopmate	www.shopmate.com	General
9. Unistar	http://www.unistarllc.com/index2.html	Food and hospitality
10. The buying group	http://www.the-buying-group.com/	Retailing
11. IPCRX	www.ipcrx.com	Healthcare
12. Gringer	www.gringer.com	Office supplies
13. Heatusa	http://www.heatusa.com/	Energy
14. Charities group buying	http://www.charitiesbuyinggroup.co.uk/	Not for profit
15. Hospitality Buying Group	http://www.hospitality-buying-group.com/	Food and hospitality
16. Group Buy Center	http://www.groupbuycenter.com/	Automotive industry
17. Massachusetts Interface Power and Light	http://www.mipandl.org/oil.html.html	energy
18. Prime advantage	http://www.primeadvantage.com/	Industrial supplies
19. Chem Point	http://www.chempoint.com/companyoverview.asp	Chemical
20. Chumbo	http://www.chumbo.com/biz.aspx	Retail
21. American association of Microbusiness	http://www.mnhomebiz.org/memberbenefits.html	General
22. Vipar	http://www.vipar.com/DesktopDefault.aspx	Automotive industry
23. Hospice provider	http://hospiceprovider.com/index.asp?topic=5	Healthcare
24. Happy Many	http://www.happymany.be/index_en.asp	Business services
25. Independent Restaurant Purchasing Group	http://www.independentrestaurants.com/	Food and hospitality
26. HCIS Group Buying	http://www.hcis.org/groupbuying.htm	Healthcare
27. Bath and Kitchen Buying group	http://www.bkbg.com/	Retailing
28. Petrosilicon	www.petrosilicon.com	Energy
Technology Enabler		
ewinwin	http://www.ewinwin.com/corp/	

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