Beyond eMarketplaces:
How Automated Markets Are Reinventing Online Trading

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About the Authors:

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Talk to MIS managers today, and you'll hear that the future of procurement and supply chain management lies in eMarketplaces and internal trading hubs. Imagine, for example, that you are Tom Katz, VP of MIS at Acme Mousetrap Company. You've just completed your first transaction on an eMarketplace, and you are impressed. Not only did you gain access to entirely new suppliers offering a variety of purchasing options, but you found that your transaction costs came down dramatically by avoiding the more time- and paper-intensive process you had used in the past. Automation, choice, real-time decision support; these features delivered real payoffs, bottom-line results that you could not have achieved ten years ago when you started out at Acme.

Since the 1950s, supply chains have been perceived as pipes through which products and information flow sequentially. Though companies have long recognized the potential of supply chains to bring about dramatic cost savings, a persistent linear view of their function and operation has prevented companies from capturing the tremendous opportunities inherent to a trading and procurement network where supply chain integration occurs across trading-partner boundaries and beyond constricting silos of interaction.

New enabling technologies may one day overcome the obstacles and inefficiencies of supply "pipelines" and drive new value through superior functionality, cost savings, and the innovation of supply "webs" or networks of connected partners. Online marketplaces can open the door to a range of opportunities for

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coordination, information sharing, and multidimensional optimization.

Until very recently, online purchasing had almost exclusively involved simple transactions like buying office supplies, holding auctions for basic commodities, and liquidating obsolete inventory. And while the savings delivered through these so-called automated markets have been significant, they pale in comparison to the savings that can be earned by migrating direct materials purchasing to the Internet, where decision-making tools can help companies determine the best transaction for a specific cost structure, infrastructure, market circumstances, and demand profile. Despite their publicity and early success, today's eMarketplaces have yet to prove their ability to capture value beyond the low hanging fruit of lower costs for simple transactions.

There remain several significant challenges to overcome before eMarketplaces can deliver these dramatic savings and assume a central and indispensable role in supply chain operations. For eMarketplaces to reach their potential they must:

- Increase transaction volume on their sites by accelerating the migration of materials purchasing to their online platforms; given the mission critical nature of most direct materials purchasing, the transactions necessarily involve more attributes than price alone, yet very few eMarketplaces can support multidimensional matching.
- Increase liquidity by convincing suppliers that they can realize real cost savings and revenue optimization; suppliers have been reluctant to trade on eMarketplaces because they have perceived these to be another way for buyers to squeeze a few extra cents out of every transaction, especially at buyer-led eMarketplaces like Covisint.
- Achieve integration into end-user supply chains and offer cost effective one-to-many and many-to-many optimization in order to eliminate inefficiencies such as excess inventory, stock outs, and uncoordinated production runs.
- Enable negotiation among buyers and sellers, and assist in their purchasing decisions using sophisticated optimization algorithms for evaluating RFQs (Request for Quote) as well as an in-silico negotiating mechanism for exploring a range of alternative trades.

The eMarketplace Engine: Automated Markets

There is a new category of eCommerce-enabling products that makes up the technological underbelly of eMarketplaces and will enable vast improvements in online procurement. This emerging technology is called automated markets and it allows companies to make better procurement decisions, to drive dramatic cost savings throughout their and their trading partners' supply chains, and to automate—after an appropriate calibration period—significant portions of their procurement decision chains.

Automated markets enable companies to make better procurement decisions, to drive dramatic cost savings throughout their supply chains, and to automate significant portions of their procurement decisions. Users of automated markets technology can actually specify an ideal trade across a range of attributes beyond price alone, by identifying compatible offerings from various suppliers. For eMarketplace buyers, automated markets actually drive down costs by optimizing the supply chain across multiple dimensions and guiding users toward smarter decisions. And suppliers are able to ramp up liquidity, increase site stickiness, and enable differentiation of price and offer.

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A matching mechanism enables buyers to articulate what they want to purchase and then identifies compatible offerings from various suppliers. Sophisticated automated markets engines use a multidimensional matching algorithm, so users can specify their ideal trade across a range of attributes, beyond price alone. For a manufacturer of mousetraps like Acme, these might include attributes like quality, delivery reliability and cost, terms, and the performance characteristics of key parts.

A cross-supplier analysis module uses optimization algorithms to enable buyers to evaluate multiple offerings across potentially thousands of trading points. These modules vary in their level of sophistication: the most advanced are able to use flexibility and trade-off analysis to explore simultaneously very broad trading ranges. For example, Acme may be willing to make a trade-off between quantity and price, accepting a higher than optimal quantity in exchange for a lower price. This flexibility and articulation of trade-offs is a key functionality of a sophisticated automated markets product that is able to search a much broader trading range than a less sophisticated one can, and thus is able to find trading points that offer better matches to both buyer and seller.

To identify the best trade, automated markets tools use a data analysis module. This module evaluates suppliers' offerings and makes recommendations based on users' stated preferences. For the example cited above, Acme may be willing to trade off quantity for price, but to do this wisely, Acme must understand the attendant costs and benefits. In this case, the cost side is represented by the purchase price of the materials, the shipping costs, sales tax, and any other associated costs. The benefit side is captured in how satisfied the buyer is with the final trade—i.e., how closely the supplier is to Acme's ideal trading point, given Acme's preferences and trade-offs.

Perhaps the most powerful aspect of this technology is its potential to benefit users at all positions within a supply chain enabling sophisticated revenue management and real cost savings. Automated markets are not zero-sum tools. For eMarketplace buyers, these tools drive down costs by optimizing the supply chain across multiple dimensions and guiding users toward smarter decisions. For eMarketplace suppliers, these tools ramp up liquidity, increase site stickiness, and enable differentiation of price and offer.

The Market Prowess Suite™

Bios Group Inc., a Cap Gemini Ernst & Young joint venture based in Santa Fe, New Mexico, is currently developing a suite of sophisticated automated markets products called Market Prowess. In initial product testing, Market Prowess has brought about savings that are dramatically more substantial than those offered by other eProcurement tools. One user was able to decrease inventory levels across a supply chain by an average of 23 percent in less than 60 days. Several unique functionalities permit Market Prowess to deliver these superior results.

Market Prowess™ is an automated market technology developed by Bios Group, Inc. The tool allows companies to reduce costs and decrease inventory with a multidimensional matching mechanism. Market Prowess benefits both buyers and sellers, eliminates slack in the supply chain, and operates in real time, using a hybrid of algorithms from operations research, computer science, and complexity science.

abstract

Anything involved in a purchase decision can be factored into a trade through Market Prowess' multidimensional matching mechanism. Most multidimensional trading engines on the market use simple spreadsheets with weights assigned to various dimensions, and then use a weighted average formula to optimize the negotiable attributes. Market Prowess is able to recognize different types of negotiation variables and treats these differently. For example, while price and volume might vary continuously, product size is generally a more static variable and offers only a few discrete choices such as small, medium, or large. Some dimensions do not fall into discrete units at all, requiring instead the specification of an interval. A machined part, for example, may be statistically required to fall within a specified range of tolerance. Just as negotiations among people often call for compromises and trade-offs across multiple factors, Bios Group's next-generation matching engine supports multiple dimensions of negotiation.

Market Prowess integrates many disparate data feeds into its optimization engine to make purchasing recommendations. These include both operational data such as current inventory levels, and total cost of purchase factors such as inventory carrying costs. An ideal trade provides the highest possible buyer satisfaction across multiple dimensions, taking into account buyer preferences and trade-offs, supply chain statistics, total cost of purchase factors, and actual supplier responses and capabilities.

By allowing buyers and sellers to express their desires across multiple dimensions and to specify the trade-offs that would be acceptable to them, Market Prowess finds win-win situations for both buyers and sellers. This flexibility is unusual for online trading where buyers are traditionally pitted against sellers in a zero-sum negotiation over price. By exploiting the flexibilities of all trading partners, Market Prowess eliminates the slack in supply chains, consequently reducing inventories and transaction costs for all in the supply web, through one-to-many or many-to-many optimization. Finally, Market Prowess operates in real-time, using a hybrid of algorithms from operations research, computer science, and complexity science. This dynamic capability makes it possible to explore all of the options possible for a given transaction.

Market Prowess from a User's Point of View

Let's return to Tom Katz and the Acme Mousetrap example to look at Market Prowess from a user's perspective. You have a production run coming up on Thursday, and you expect that the line will assemble 3,000 mousetraps. You know the materials requirements to meet your production run, you know your buffer inventory levels, and you want to engage in transactions that reflect your purchasing and production policies. Market Prowess not only ranks suppliers' offerings for you, but it suggests alternative trades and lets you explore different purchasing options in real time.

With the relevant operational and total cost of purchase data that the tool provides, you are able

to identify the optimal transaction and the contingent values achieved through trading off among various suppliers of pallets of board lumber, nails, metal wire, and other materials, for a range of possible delivery dates. You want delivery on Wednesday afternoon of 12 pallets of lumber, six boxes of nails, and four spools of wire. Your computer whizzes reassuringly, evaluating thousands, even millions, of different potential transactions based on your preference profile and the relative costs and values of contingent variables. A few minutes later a screen pops up. The system has just identified the optimal trade based on your input and current data. Then the phone rings. It's your boss telling you he wants 2,000 units to be shipped out Wednesday evening. Three years ago, accommodating a last-minute change like this would have been enormously complicated, and you almost certainly would have ended up sacrificing cost for time.

Market Prowess arbitrates your trade-offs and negotiations for you. Its behind-the-scenes workhorse can explore an unlimited number of dimensions and trade-offs in parallel, whereas your poor, overworked purchasing agent used to do it alone, in a linear fashion, and usually ended up agreeing on some less than optimal trading point. And most of the time, he didn't even have the information he needed to understand the contingent values of various trade-offs. With Market Prowess this information is integrated through a real-time data feed.

Automated Markets of the Future

The near-term benefits and impact of sophisticated automated markets trading engines are impressive, and the future holds even greater promise as the technologies mature and additional data sources become more effectively integrated.

Automated markets tools will eventually link different vertical supply chains in order to optimize across supply silos, beyond immediate trading partners. So while Acme Mousetrap optimizes trades with its direct suppliers, these suppliers will be optimizing with their suppliers, those suppliers with others, and so on from node to node in the supply web. The power of many-to-many optimization at an unprecedented scale promises dramatic cost savings to all in the network.

As these tools are refined, users will be able to customize their total cost of purchase data, and to tailor cross-supplier analysis to a format that is consistent with their internal operating metrics. Users will also be able to deconstruct and reconstruct RFQ responses as automated markets tools provide aggregation across time and/or suppliers.

Online procurement is just the tip of the iceberg. We expect many leading-edge companies to use automated markets to coordinate internal supply chains, to optimize cross-divisional commerce, to determine prices for shared service offerings, and to reach any other decisions that rely heavily on market- and cost-based data.

John Jordan and Jamie Taylor on Networked Innovation, pg. 76