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Updating Trader Reputations

Research by
Chrysanthos Dellarocas

REPUTATION MECHANISMS, WHICH ALLOW PEOPLE TO REPORT ON THEIR TRANSACTIONS ON A PUBLIC ONLINE FORUM, PLAY AN IMPORTANT FUNCTION IN THE REALM OF E-COMMERCE, HELPING TO BUILD TRUST AND COOPERATION AMONG GEOGRAPHICALLY DISPERSED BUYERS AND SELLERS. SUCH MECHANISMS AROSE ON SITES LIKE EBAY AND AMAZON.COM BECAUSE WITH SO MANY BUYERS AND SELLERS, THE CHANCES WERE THAT YOU WOULD NEVER PURCHASE FROM THE SAME PERSON TWICE.

These mechanisms inform potential customers of the likely quality of service providers, and they provide an incentive for service providers to do good work. They constitute the digital equivalent of the over-the-fence chatting that used to characterize small-town life.

On a larger scale, business-to-business procurement auctions are becoming more common, and companies such as hospital suppliers are making purchases worth billions of dollars from organizations with whom they have only short-term partnerships. These companies desperately need reputation mechanisms which inform them on the track record of potential business partners, while also giving those partners incentives to provide good service even in the context of a one-time deal.

Information technology has made it possible to control a number of reputation mechanism parameters, including the granularity of solicited feedback, the amount and type of information that is included in a trader's reputation profile, and the frequency with which reputation profiles are updated with new information. The research of Chrysanthos Dellarocas, assistant professor of decision and information technologies, examines how such design parameters affect trader behavior and market efficiency. His overarching aim is to inform the design of better reputation mechanisms, and thus, of more efficient electronic markets.

Within this broader context, Dellarocas' recent paper, "How Often Should Reputation Mechanisms Update a Trader's Profile," studies the impact of the frequency of reputation profile updates on cooperation and efficiency.

Common wisdom dictates that the more information you have about a seller, the better. Accordingly, most existing reputation mechanisms update user profiles as soon as new ratings are posted to the system. But Dellarocas found that there exist circumstances where reducing the frequency at which reputation profiles are updated can increase market efficiency.

Specifically, Dellarocas recommends that a seller's reputation profile be updated every few transactions with a summary of the seller's most recent ratings; he finds that there are settings where this induces higher average levels of cooperation, higher seller profits, and higher buyer surplus relative to a mechanism where all ratings are published immediately as they are posted. Why?

Reputation mechanisms rely on self-reporting of transaction outcomes. This opens the door to intentional or unintentional reporting mistakes (reporting noise). Reporting noise reduces the effectiveness of a reputation mechanism

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Technological Diversity in Alliances

Research by
Rachelle Sampson

INNOVATION IS ONE OF THE DRIVERS OF SUCCESS IN THE DIGITAL ECONOMY, AND PURSUING INNOVATION MEANS THAT MANY FIRMS MUST MAKE A SUBSTANTIAL INVESTMENT IN RESEARCH AND DEVELOPMENT (R&D). MAKING THAT INVESTMENT PAY OFF, HOWEVER, IS NOT ALWAYS EASY. RESEARCH IS VERY EXPENSIVE, AND THERE IS TREMENDOUS PRESSURE TO CREATE NEW KNOWLEDGE AND CAPABILITIES IN A TIMELY AND COST-EFFECTIVE WAY.

R&D alliances are a common way for firms to share costs and reduce risk. There is evidence that many firms are disappointed with their alliances, however, because the alliances proved to be less profitable than they had hoped. Rachelle Sampson, assistant professor of business, logistics and public policy, found that the level of technological diversity between firms and the organizational structure of the alliance were two key factors in the success of an R&D alliance.

Sampson examined the alliance and patenting activities from over a thousand alliances within the telecommunications equipment industry. Technological development in this industry proceeds at such a rapid pace that firms frequently collaborate in R&D to spread the risk and expense of development. She used patents to track innovations using the Micropatent database. She tracked all alliances and joint ventures from 1991 to 1993 through information available on the Securities Data Company Database on Joint Ventures and Alliances. Calculating the degree to which partner's patent portfolios overlapped allowed Sampson to determine the technological diversity between partners. During the course of the study she interviewed managers and attorneys from many large companies, such as Ford and Eli Lilly, for more insight.

Sampson found that firms benefit most from alliances when they have most, but not all, technological capabilities in common with their partners. The number of patents produced by a firm initially increased with the level of technological diversity within an alliance, but then sharply decreased—an effect that she didn't

expect. It appears that a moderate level of technological diversity was important because firms must be different enough from each other that an exchange of knowledge is profitable. "It's much easier for a particle physicist to talk to another type of physicist than to a biologist, because there's more common ground," says Sampson. "But if they're too close, they have much less to learn from each other."

The organizational structure of an alliance was also important to its prospects for success. "Some managers view this as a superfluous detail: 'Just hand it over to the lawyers.' But firms need to think ahead about what contingencies will arise out of the alliance, and map that out in an organizational structure," says Sampson.

Firms that are too close also have problems with mutual trust, as there is a fear that knowledge belonging to one firm will be co-opted by the R&D partner. Just as firms should avoid R&D partnerships with direct competitors, alliances between firms that are too similar seem to have difficulty with effective knowledge sharing and knowledge transfer.

On the other hand, firms that were too technologically diverse were not able to reap the maximum benefits from their partnership. "It appears that if firms are too different in terms of technology capabilities, they just can't work together effectively," says Sampson.

When partners are more technologically diverse, or when the alliance is more ambitious, involving a radical change rather than just a small project, joint ventures appear to be more successful, as they structure the mechanisms for information flow and coordination between partners. Because the cost of setting up and negotiating a joint venture is much higher than a simple contractual form of alliance, it should be reserved for very diverse partners or ambitious projects—designing the next generation of integrated circuits, say, rather than just adapting a type of fiber optic cable.

An effective organizational form will help the partners feel confident about combining their intellectual resources and can encourage cooperation. For example, an equity-joint venture has safeguards in place that protect against technology leakage, one of the barriers that can impede successful knowledge transfer between partners.

Sampson's paper, "R&D Alliances and Firm Performance: The Impact of Technological Diversity and Alliance Organization on Innovation," is forthcoming in the *Academy of Management Journal*. Partial funding for the study was provided by the Ameritech Foundation and the Center for International Business Research (CIBER) at the University of Michigan. For more information about this research, please contact rsampson@rhsmith.umd.edu.

KUDOS

William DeWitt has been named Professor of the Practice of Logistics, Transportation, and Supply Chain Management, an appointment given by the University of Maryland to individuals who have demonstrated excellence in the practice as well as leadership in specific fields. The appointment recognizes DeWitt's regional and national prominence in the field and superior teaching.

Anil Gupta, Ralph J. Tyser Professor of Strategy and Organization, joined the Advisory Board of Asia Silicon Valley Connection, one of the two largest networking organizations based in Silicon Valley (San Mateo, CA) and dedicated to nurturing entrepreneurs and new high technology ventures that leverage the U.S.-Asia connection.

Wendy Moe, assistant professor of marketing, was elected to be chair of the Section of Marketing and Statistics in the American Statistical Association for 2007.

Rebecca Ratner, associate professor of marketing, won the "Influential Article Award" from the Academy of Management (Conflict Management division), for her paper "Disparity Between the Actual and Assumed Power of Self-Interest," published in the *Journal of Personality and Social Psychology*.

Roland Rust, David Bruce Smith Chair of Marketing and chair of the marketing department, received a Highly Commended Paper Award, awarded for the 2005 *International Journal of Service Industry Management* article, "The Business Value of E-Government for Small Firms," (with Debora Viana Thompson, PhD '06, and Jeffrey Rhoda of IBM). The award, chosen by the journal's editorial review board, is given to the top four articles of the year.

Rachelle Sampson, assistant professor of logistics, business and public policy, was elected to the Executive Committee of the Business Policy and Strategy Division at the Academy of Management.

PHD PROGRAM

The Smith School PhD program, which was ranked #25 globally and #18 in the U.S. by the *Financial Times* in 2006, is producing scholars who go on to teach at top-ranked institutions around the world. Over the past five years, roughly 99 percent of Smith's PhD students have been successfully placed directly after they graduate—about 80 percent as tenure track assistant professors at an accredited university, and the rest as researchers in either private or government organizations. Recent placements include:

- **David Cantor**, logistics, business and public policy, Pennsylvania State University;
- **Jay Carson**, management and organization, Southern Methodist University;
- **Jason Kuruzovich**, decision and information technologies, Rensselaer Polytechnic Institute;
- **Tashfeen Sohail**, accounting and information assurance, Instituto de Empresa in Madrid;
- **Debora Viana Thompson**, marketing, Georgetown University;
- **Liu Yang**, finance, University of California, Los Angeles.

Thompson received the American Marketing Association's John Howard Doctoral Dissertation Award and was named one of three winners of the Marketing Science Institute's Alden Clayton Doctoral Dissertation Proposal Competition, the only person in the last 10 years to have won both awards.

The research of Smith's PhD students and their faculty collaborators has also received significant recognition, publishing in top journals. Recent publications include: At the May 18, 2006, Doctoral Awards Banquet, the Smith School honored PhD students for exceptional achievements.

- *Academy of Management Journal*
- *Organization Science*
- *Strategic Management Journal*
- *Academy of Management Review*
- *Journal of Applied Behavioral Science*
- *Human Resource Management Review*
- *Journal of Business Management Science*
- *Marketing Science*
- *Journal of Consumer Research*
- *Quantitative Marketing and Economics*
- *Communications of the ACM*
- *Journal of Marketing Research*
- *Harvard Business Review*
- *Journal of Accounting and Public Policy*
- *Transportation Journal*
- *Journal of Business Logistics*

Training Outcomes and Adaptability

Research by
Gilad Chen

IN TODAY'S DIGITAL ECONOMY, WHERE THE PACE OF INNOVATION IS SO RAPID, THE ABILITY TO ADAPT IS A CRUCIAL SKILL, NOT JUST FOR INDIVIDUAL EMPLOYEES BUT ALSO FOR WORK TEAMS. EMPLOYEES MUST LEARN TO MASTER NOT JUST THE ESSENTIAL KNOWLEDGE AND SKILLS OF THEIR JOB; THEY MUST ALSO BE ABLE TO ADAPT THAT KNOWLEDGE IN COOPERATION WITH TEAM MEMBERS.

Adaptability is particularly crucial for 'action teams' such as Special Forces combat units, search and rescue teams, orchestras, sports teams, or flight crews. These highly skilled specialists must cooperate and improvise in situations that are complex and unpredictable.

Gilad Chen, associate professor of management and organization, examined how training programs can facilitate adaptive performance at both the individual and team levels. Chen's research is concerned with training transfer, the ability of an individual or team to apply or modify the knowledge and skills acquired during training in new, difficult or complex situations. This is the first study to look at training transfer at both the team and individual level in the same study.

Chen and his colleagues structured the study to apply principles that worked in training individuals to the training of action teams. In the study, undergraduates learned to operate a simulated but very realistic Apache attack helicopter in order to fly a complex mission. Participants were assigned the role of pilot or gunner and had to learn a specific set of tasks. After receiving individual training, participants were trained as teams. During their simulated mission, pilots and gunners were given tasks and information that did not overlap, forcing them to coordinate with each other to succeed in their mission.

At the end of training, participants were asked to play the same roles, but apply

the tasks and procedures they'd learned in a much more complicated mission which involved more enemy targets in a dynamic environment. In order to succeed, participants had to coordinate their efforts to think through and carefully plan their tasks in context of the mission.

At the conclusion of the two simulated missions, Chen measured participants knowledge (their mastery of their tasks); skill (how well they could execute the knowledge); and efficacy (participants' confidence in their ability to complete their tasks).

Chen found that on an individual level, mastery of knowledge and skills were the most important factors for successful adaptation. But at a team level, motivation was more important than team knowledge or mastery. "Even if teams were composed of highly skilled and highly knowledgeable individuals, they could not adapt unless their member shared a collective sense of confidence and motivation to coordinate the effort needed for them to adapt well," says Chen.

Individual adaptation seems natural and easier, says Chen, especially as individuals master tasks to the point where they become automatic; that confidence helps individuals to adapt knowledge and skills from one situation to another. A team is a less natural environment, and it takes longer for a team to develop the same confidence in their joint skills and knowledge, so it is consequently more difficult for teams to adapt. A team's collective confidence plays an important role in their motivation. Teams that are collectively more confident exhibited better planning; they not only worked harder, they also worked smarter, developing more effective strategies to meet the team's goals.

"It's very easy to train people in a setting where everything remains the same," says Chen. "On a battlefield, or in the fast-moving business world, it's not possible to train someone in everything they might encounter. So training for adaptability is very important."

Chen feels that longer team training periods may help teams to adapt more quickly, because it allows more time for the team's confidence to build. "If you train teams longer, it may help them coordinate their effort as a team and adapt more quickly," says Chen.

Chen's paper, "A Multilevel Examination of the Relationships Among Training Outcomes, Mediating Regulatory Processes, and Adaptive Performance," with co-authors Brian Thomas, Georgia Institute of Technology, and J. Craig Wallace, Tulane University, received the American Society for Training and Development's 2005 Research Article Award. For more information about this research, please contact giladchen@rhsmith.umd.edu.

- Frank T. Paine Award for Academic Achievement—Ioannis Gamvros, Shweta Oza, Michael Pfarrer, Xiaomeng Zhang
- Allan N. Nash Outstanding Doctoral Student—Tashfeen Sohail
- Abraham Golub Memorial Dissertation Proposal Prize—Daliborka Stanojevic
- Marvin A. Jolson Outstanding Marketing Student—Debora Viana Thompson
- Gerald and Deana Stempler Competition for Research Related for Family Owned/Controlled Businesses—Jason Kuruzovich

For more information about the Smith School's PhD program, visit www.rhsmith.umd.edu/doctoral. For a broader view of Smith's current research, including award-winning papers by Smith's PhD students, visit www.rhsmith.umd.edu/research.

UPCOMING EVENTS

AMA Sheth Foundation Doctoral Conference

The Smith School hosted the AMA Sheth Foundation Doctoral Conference July 12-14, 2006. Photo highlights and presentations are available online at www.rhsmith.umd.edu/ama2006/

Digital Economy Forum 2006

October 5-7, 2006

The Smith School's Center for International Business, Education and Research (CIBER) and the Localization Industry Standards Association (LISA) are offering a globalization conference with topics such as how globalization is affecting the U.S. economy, how to make off-shoring successful, and how to manage localization. For more information or to register, visit www.rhsmith.umd.edu/digitaleconomyforum

CIBER

The Smith School has been awarded a four-year, \$1.4 million grant by the U.S. Department of Education to fund a Center for International Business Education and Research (CIBER). This high honor designates the Smith School as a national resource center in international business education and research. There are only 31 CIBERs in the nation.

The federal government instituted the CIBER program to increase U.S. competitiveness in the global marketplace by creating useful links between the business and academic communities on international business issues. In addition to programmatic enhancements and faculty research, the Smith School CIBER will support conferences and seminars, training, and consulting to the business community in the mid-Atlantic region as part of its outreach activities.

A key area of concern to international businesses relates to national and homeland security and its implications for enterprise continuity; the Smith School CIBER will provide significant leadership in this area. The Smith School's Larry Gordon, Ernst & Young Alumni Professor of Managerial Accounting, and Martin Loeb, professor of accounting and information assurance and Deloitte & Touche LLP Faculty Fellow, are already well known for their research relating to the economics of information security. The Smith School CIBER will combine their work with existing programs and centers in the University of Maryland which deal with national and homeland security. The Smith School CIBER will sponsor its first Conference on Global Security in 2008 to bring together the best scholars in this area, along with leaders from government and business.

The Smith School CIBER will pursue other strategic initiatives as well. The University of Maryland has extensive resources related to language study and research, and the center will leverage those resources to develop business language courses and support the school's International Fellows track of the Undergraduate Fellows Program. Global e-commerce, entrepreneurship and innovation, global services and emerging markets are also among the CIBER's strategic initiatives.

e-Commerce

The efficiency of electronic markets that rely on reputation mechanisms for trust building can sometimes be increased by reducing the frequency of updating such mechanisms with new information.

RESEARCH BY

Chrysanthos Dellarocas

Research & Innovation

Different levels of technology and attention to organizational structure help make successful R&D alliances.

RESEARCH BY

Rachelle Sampson

Management

Motivation is an important factor in a team's ability to adapt their training to new situations.

RESEARCH BY

Gilad Chen



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Updating Trader Reputations
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because it leads to occasional unfair punishment of honest sellers and, thus, to lower incentives of seller cooperation: if sellers understand that there is a good chance that they might be punished even if they behave honestly they then have a lower incentive to "do the right thing." In settings where reporting noise is substantial, judging a seller's behavior on the basis of a batch of reputation ratings, as opposed to publishing each individual rating, minimizes the effects of noise and thus, makes it worthwhile for sellers to exert higher effort.

On the other hand, the longer one waits before publishing reputation ratings, the more chances a fraudulent seller has to deceive or give bad service before his behavior becomes public knowledge: whereas too many updates are subject to noise, too few allow fraudulent behavior to go unpunished. This fundamental tradeoff determines the optimal reputation update frequency. Dellarocas' paper provides formulae for calculating the optimal update frequency and shows that on several real-life settings the optimal frequency is less than one.

Higher cooperation is good for sellers and buyers, but it also benefits auction operators. In most real-life settings, auction operators charge sellers and/or buyers a percentage of the price paid for each transaction. Given that higher expected cooperation results in higher bids and thus higher auction revenue, a reputation mechanism that maximizes cooperation benefits all stakeholders and, thus, induces more efficient markets.

"More and more people are doing business globally," says Dellarocas. "When you are evaluating a potential business partner in another country, you desperately need a mechanism to help evaluate that partner. In a small town, if you provided a poor service, the next day the whole town would know about it, but that kind of feedback isn't possible in a global environment – until Internet-based reputation mechanisms came along. As the value of the items that people buy online increases, so does the need for more effective reputation mechanisms."

This paper is forthcoming in *Information Systems Research* and is part of a greater body of analytical reputation mechanism research. For more information, please contact cdell@rhsmith.umd.edu or visit

<http://www.rhsmith.umd.edu/faculty/cdell>

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We'd like to put *Research@Smith* directly into the hands of faculty and administrators who are interested in learning about the latest research conducted by Smith School faculty. To request a copy of this publication or make an address correction, contact Rebecca Winner via e-mail, editor@rhsmith.umd.edu, or phone, 301-405-9465.

Visit the Smith Research Network:
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NEW FACULTY

The Smith School is pleased to welcome the following new faculty for the 2006-2007 academic year.

Finance

- Georgios Skoulakis, PhD Northwestern University
- Albert (Pete) Kyle, PhD University of Chicago
- Dalida Kadyrzhanova, PhD Columbia University

Management and Organization

- Subrahmaniam Tangirala, PhD Purdue University
- Gilad Chen, PhD George Mason University

Marketing

- Michel Wedel, PhD University of Wageningen
- Jie Zhang, PhD Northwestern University
- Rebecca Ratner, PhD Princeton University
- Sanal Mazvanchery, PhD University of Michigan