INTERVIEW

Dr. Yossi Sheffi and Dr. Larry Lapide of the MIT Center for Transportation & Logistics discuss their multiyear research project on the future of supply chain.

Yossi Sheffi
Professor of Engineering / MIT-CTL

Yossi Sheffi is a professor of engineering at MIT, where he serves as director of the MIT Center for Transportation & Logistics. Under his leadership, the Center launched many new educational, research, and industry/government outreach programs, leading to substantial growth in all these areas.

Larry Lapide
Research Director / MIT-CTL

Larry Lapide is a research director at the MIT Center for Transportation & Logistics (MIT-CTL) and recently joined it to manage a multiyear research effort looking into the future technologies, business practices, corporate structure, regulations, culture, and customer expectations of supply chain management. Dr. Lapide brings to the job 30 years of business experience in consulting, market analysis, and corporate management.

ASCET: *What exactly is the Supply Chain 2020 project about?*

LAPIDE: The Supply Chain 2020 project is a multiyear research initiative on supply chain management intended to pioneer critical success factors and concerns for supply chains in the future. Ultimately, it aims to identify the innovations that will be the foundation of successful supply chains 10 to 15 years into the future. The project deliverables will entail a variety of publications, including one or more books on the topic as well as journal articles, working papers, and field studies. Initiated by the MIT-Zaragoza International Logistics Program, this global research project involves dozens of faculty, research staff, and students at MIT and other institutions around the world.

As shown in Figure 1 depicting the project's framework, the research is far-reaching in that it is addressing at least four key research questions:

- What are the underlying scientific principles that drive supply chain structures and designs?
- What are the best practices that companies (in a broad range of industries) use to demonstratively improve supply chain performance and create competitive advantage?
- How do supply chain innovations involving business processes, organizational structure, and enabling technologies beneficially support products throughout their lifecycle – ranging from their design, manufacture, distribution, marketing and sales, postsales support, and recycle? and
- How might macro-based factors, such as trends in customer demands, economics, disruptive technologies, trade regulations, future technologies, geopolitics, and labor and Green laws, impact future global supply chains?

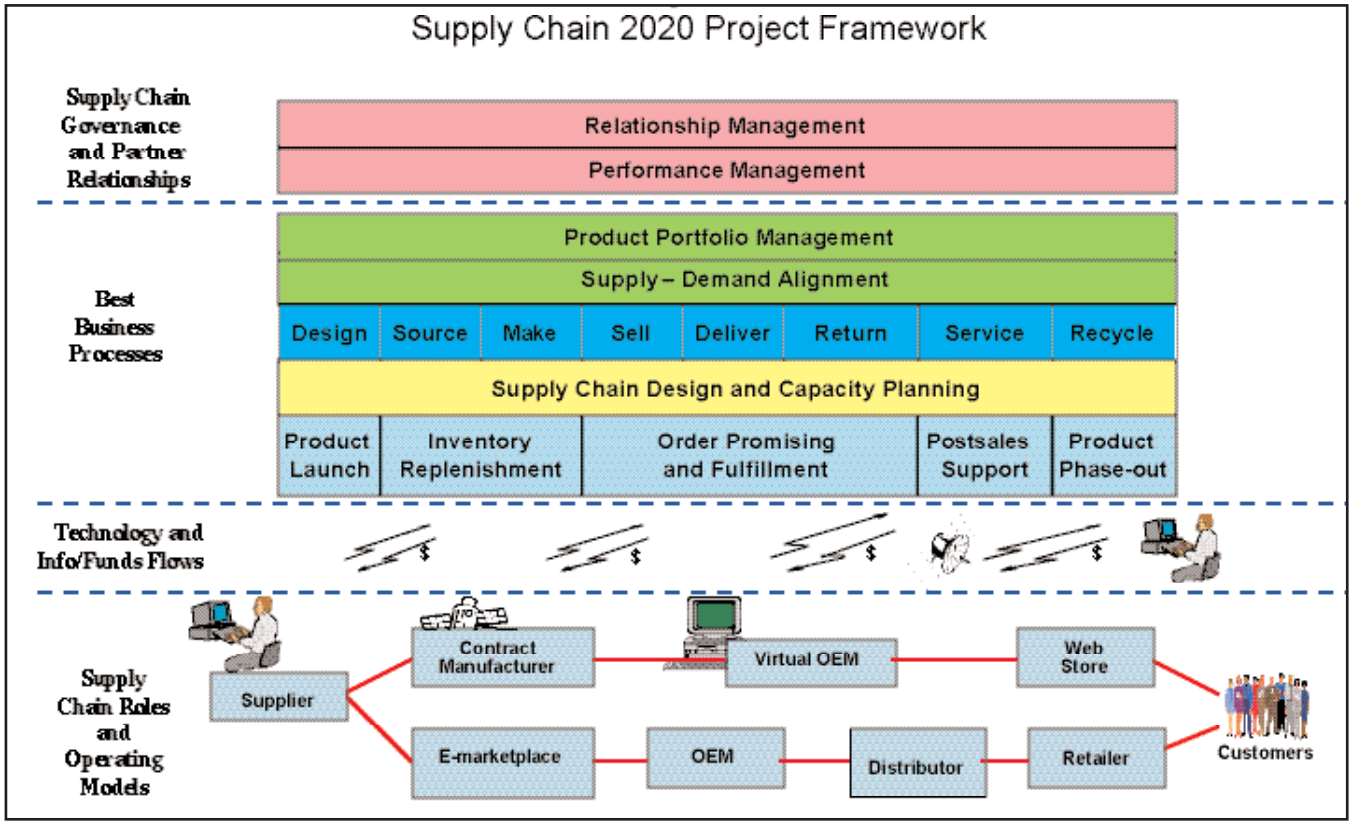
Once addressed, the answers to these questions will be used to project supply chains of the future based on scenarios that incorporate sustaining trends and significant shifts among the macro factors.

ASCET: *Given the lackluster interest in supply chain of late, especially in the technology areas, why embark on such an ambitious project?*

LL: It is true that the bloom has come off the rose of supply chain lately. It was a phenomenon in the mid to late 1990s when companies spent (probably one could argue even overspent), on technology to try to solve big supply chain problems and make their supply chains more efficient and responsive. There were some high-profile project failures that tended to put a damper on things. In addition, corporations came to the realization that installing new technology without business process changes just automated inefficient existing processes and resulted in negligible business benefits. Since process change was difficult and arduous some abandoned their supply chain initiatives.

However, several recent studies are showing that those companies that did not give up and made the requisite business process changes are now reaping benefits from their efforts. Basically, it just took longer and more effort than most anticipated given that integrated supply chain management concepts were new to everyone involved – users, consultants, and technology suppliers.

found impact on creating and sustaining great civilizations such as the Roman Empire. We like to believe that logistics is the glue that held great civilizations together. That said, just in the last 15 years we've seen great change in the way it is used by corporations, and we expect even more profound change in the next 10 to 15 years. Furthermore, the fast pace of change in outsourcing, product introduction, and customer



Which brings us to the question you asked. Supply chain management concepts appear to work and innovative companies are leveraging them for even greater competitive advantage, further separating the have from the have-not companies. We need to do this research to help companies understand how SCM will evolve, what works and does not work, and what the future might hold.

ASCET: *But given that supply chain and its earlier incarnations in logistics go back a long time, haven't we learned most of what there is to know already?*

YS: You are right that supply chain has a long history and is a subject area with hundreds, and one could argue, even thousands of years of history that has had pro-

expectations will only increase the importance of sound supply chain designs and operations.

ASCET: *Can you summarize what those big changes were and why they happened?*

YS: There are probably two concepts. To understand the first has to do with a simple concept known as suboptimization in the optimization world. That is, most companies and supply chains were set up functionally with each department focused on operational excellence within its own area of responsibility and each company focused on enterprise-level excellence within itself. Thus supply business processes 15 years ago were comprised of suboptimized links both within individual companies as

well as among companies within a supply chain. What changed is that companies started to think about and implement cross-functional and inter-enterprise processes that could manage (or optimize) multiple parts of a supply chain, simultaneously. Evolving technologies played a critical role in enabling them to do this.

In the 1990s, companies implemented client-server enterprise resource planning (ERP) systems that formed the foundation of information and data needed to manage cross-functional processes. In additional, EDI standards and more recently Internet technology allowed them to better communicate electronically with customers and suppliers supporting the co-management of intercompany business processes. So conceptually, while technology alone was not the panacea to curing suboptimization, it became the enabling force allowing companies to extend, in a scalable way, business processes beyond single departments and outside the four walls of the corporation – getting them a step closer to optimization along the full lengths of their supply chains.

The second concept is risk management. Even when optimizing over the entire chain, companies took into account only static and known demand patterns, lead times, yields and other variable. In reality, a point forecast is always wrong and thus companies have started to analyze and manage risk in a more comprehensive fashion.

Some of the applications of modern risk management involve better information technology tools but many involve different relationships among companies. Such relationships include risk-sharing contracts and collaborative planning which is aimed to minimize the risk to the entire channel from not having enough or having too much product.

ASCET: *You mentioned that the project would look at the underlying scientific principles of supply chain. Is there a science to supply chain?*

LL: Product-based supply chains involve the movement, conversion, and storage of physical goods, so we suspect that a supply chain as a physical system has a physics behind it that needs to be researched and understood. For example, the value-to-density ratio of a good affects how it is transported within a supply chain. High-value goods that are small are normally flown around because transportation costs are small in relation to obsolescence costs and the potential for lost sales. Meanwhile, low-value items of low density, like water- or paper-based products are transported via low-cost means, such as by boat, rail, or truck. For example, that is why TVs and automobiles manufactured in Asia are shipped to the U.S. via boat, while hard drives and luxury fashion apparel items are often flown. In addition, high demand variability leads to postponement or build-to-order strategies while stable demand leads to outsourcing and long supply lines.

ASCET: *We also noticed that you have included product design and recycling into your definition of supply chain. Are these areas normally considered part of SCM?*

YS: Normally they are not; however, our working hypothesis is that since SCM can add value throughout a product's lifecycle – from birth to death – extended and integrated processes will become more and more important over time. For example, we believe design-for-supply-chain processes will become more prevalent 10 to 15 years out. As manufacturing processes become both more agile and leaner, design-for-manufacturing and postponement will become more of the norm. In addition, future Green laws will make design-for-recycling important. Add to this design-for-serviceability for extending a product's life to address environmental concerns as well.

ASCET: *Do you expect any surprises to come out of the study?*

LL: Most definitely. Ten to 15 years is a very long time. Let's take technology for example. There is an old saying in technology that one always tends to overestimate the speed of implementation of a new technology and underestimate its impact. We are just starting to see the tip of the iceberg of the change to be brought about by a disruptive technology like the Internet. Add to it the potential with RFID and smart objects and the changes will be profound in the way supply chains operate.