

## Escaping the Commodity Trap: Toward Sustainable Growth

John Zysman ©

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The economic health of the advanced industrial democracies requires that they escape what we call “the commodity trap”. A diverse array of competitors use widely available conventional technologies to generate roughly similar standard goods, components and services. The resulting intense competition leads to commoditization, competition based principally on price. The consequence of the commodity trap, competition based principally on price, is intense pressure on wages and profit margins alike.

Clearly, the way out of this trap is for firms in the advanced countries to create distinctive high value added products – both goods and services. But how to do that? One pathway is opened as ICT transforms the way both goods and services are produced and innovated.

The case of Cargotec helps us understand the problem that the Commodity Trap poses, as well as how ICT enabled services create an escape. Cargotec is a Finnish company that in one business area, Kalmar, produces port equipment, including amongst other things, cranes. But in recent years, Cargotec began facing intense competition, particularly from Chinese producers offering very similar products. Rather than attempt to compete principally on price, the company decided to begin selling “port management services.” This did not mean that Cargotec was ending its manufacturing business. Rather it increased the intelligence of its products, developing a digital platform capable of managing and integrating the various types of port equipment they were offering. Cargotec can now go to its customers with a proposition: “Buy a Chinese crane? Great, but your port will be more competitive, much less expensive as well, if you buy our integrated system.” Cargotec’s business unit, Kalmar, created what we call ICT (Information and Communication) enabled service offering. Its products are embedded into the ICT enabled system.

We consider both aspects of the transformation of production: ICT enabled services and classically understood manufacturing.

### ICT Enabled Services

ICT-enabled services and service systems have become a source of dynamism in the economy.<sup>1</sup> It shouldn’t have come as a surprise that digital technology revolutionizes the service economy. The application of rule-based ICT tools to service activities alters how activities are conducted and how value is created. The fundamentals of this Algorithmic Revolution are simple:<sup>2</sup> tasks underlying services can be transformed into formal, codifiable processes with clearly defined rules for their execution. When activities are formalized and codified, they become computable.<sup>3</sup> Processes with clearly defined rules for their execution can be unbundled, recombined, and automated. The inexorable rise in computational power and the development of sensor technology means that computable algorithms can express an ever-greater range of activities, and consequently a growing array of service activities are reorganized and automated.<sup>4</sup>

The impact of this ICT-enabled service transformation is pervasive. Once this was principally a matter of finance, insurance, retail and entertainment – sectors that are at their core about information and hence directly affected by the revolution in information. Now services are increasingly embedded within products, supporting the sale of products as in automobile communications and entertainment. Indeed, often the manufactured products are sold as delivery mechanisms for the services: MP3 players are portals to music stores, cranes are entangled with port-management services, and agricultural equipment is now

a mechanism for managing soil content and allocating fertilizer. This is really the story of the Internet of Things, the Industrial Internet, and the varied other flashily branded versions of the story.

These systems have at least three important characteristics. First, value is created in the service system, what the system can do, not in the basic cost of the individual elements. Therefore, competition is based on the value creation of the system, not on the cost of labor per se. Second, IcT -enabled services, and service systems, rest on capital-intensive infrastructures and share production characteristics with manufacturing. Google's collection of server farms requires capital investments of billions of dollars. Third, many of the IcT enabled service systems generate local employment directly. Sensor systems, for example, to control energy use in buildings, to assess safety on bridges, or to monitor patients require the installation and maintenance of physical systems. Assessing the balance of jobs created by IcT enabled services and those destroyed by the power of digital processing will be difficult. But as consistently in the past, the Luddites may well be wrong.

## The Manufacturing Transformation

Classically understood manufacturing is the other part of the story. 21st Century manufacturing is being pulled in two directions, both facilitated by IcT tools. On the one hand, and the best understood and widely discussed, the decomposition of manufacturing, and indeed of IcT-enabled services, has produced complex cross-national supply networks. Production is not only geographically dispersed, but phases of the production process are increasingly localized in specialized regions.<sup>5</sup> For example, development and design of new product groups is associated with, for example, Silicon Valley. Volume production, particularly in electronics has become associated with firms such as Foxconn operating in China. As important, in some countries, including the United States, that decomposition has in some sectors undermined the core infrastructure of skills and knowhow required for competitive advantage in production.

On the other hand, the rapid evolution of advanced manufacturing often has the opposite effect, encouraging the re-composition of production as well as the reintegration of development and production. As IcT tools support, promote, and accelerate innovation across the production phases of twenty-first century manufacturing: ideation, design, prototyping, fabrication, supply chains, sustainability, and engineering services.<sup>6</sup> Consequently, the rapid evolution of tools and materials lead to a reintegration of production in which design, as an example, needs to take into account rapidly evolving choices of materials and processes. Just as with IcT enabled service systems, manufacturing systems require continuous recalibration and re-integration of the array of rapidly evolving tools across the phases of the production system. Henrik Glimstedt, staying within the electronics domain, presents a case in which Ericson begins to bring semiconductor production back in house precisely because separating design from fabrication was causing real problems in new product development.<sup>7</sup> GE reports the same logic in bringing production of some products back into the United States. In a slightly different vein, Toyota, seemingly concerned about losing competitive advantage if it depends for batteries on its long time supplier, has begun its own internal development of batteries for hybrids.

There is a basic question that must be answered by firms and places. When will manufacturing be a strategic asset, essential to competitive advantage, and when it will be a vulnerable commodity that can be safely outsourced? Or very simply, Can you control what you can't produce?<sup>8</sup> There will not be a single or dominant answer. Rather there will be a mosaic resulting from varied strategy choices by firms and policy choices by "places".

## **The Cloud Accelerator<sup>9</sup>**

We are only at the beginning, really, of the transformation of the production of manufacturing and ICT enabled services. The emergence of the next information technology platform, cloud computing, will accelerate both the ICT-enabled transformation of services and the revolution in manufacturing. Cloud computing is hyped by ads that show folks in an airport watching a movie, for example. But crucially, Cloud Computing is not simply a story of geography. It is not just about where computing is done, not just about computing in some undefined place called the Cloud. This is not just about computing at a geographically distant or at an organizationally separate location rather than on a company premises or at least within the company or agency's control. Cloud is also, and more importantly, a story of computing architecture, a change in how computing is organized and implemented, how new architectural concepts are put to work. We distinguish, thus, between Cloud geography, where the computing takes place, and Cloud architecture, what is done and how. The architecture and implementation of cloud computing is a basic change in the way of organizing ICT activities.

Why will Cloud be such an accelerant? First, cloud computing makes computation intensive resources widely available, not only to startups and small and medium sized businesses but also to smaller innovative groups within major companies. That means access to and the deployment of big data, design tools, prototyping, analytics for new materials, or just sophisticated logistics. Cloud will speed the development and deployment of new applications and tools.

Second, without delving into the details of Cloud architecture, the new "how" of computing will make the development and deployment of new applications and services less expensive and faster. So we will expect ever-greater experimentation by large and small firms, and ever more rapid change in the services and production arrangements that are provided.

## **Implications for Policy and Strategy**

The implications for corporate strategy are clear. Questions such as the organization of production, the lines between development and manufacturing, or management of ICT, which were until now responsibilities of the CTO or head of manufacturing, must become strategic C-suite questions.

Policymakers find themselves in a double bind<sup>10</sup>. They are called on both to support these transformations and to protect society against abuses that may result. Supporting the transformations requires, for example, not only building the information infrastructure and investment in the skills to build and deploy the ever-evolving ICT tools, but creating the market rules for experimentation and innovation. There will, though, be intense political fights about who captures the value and jobs these transformations create. To start, the policy debates will require new ways of talking about jobs creation. An exclusive focus on classic manufacturing will mislead us. The jobs will not principally be on the factory floor. There will be jobs in the development and deployment of tools and of ICT enabled service systems. And who will be the winners and losers? Will the winners be Uber or classic taxi medallion owners? Will ICT financial tools improve the functioning of the financial system, its ability to support business development, or, for instance, create high speed platforms the generate advantage for a limited few traders? Will renting a room in your house on Airbnb be a violation of zoning rules that discomfits your neighbors?

Escaping the commodity trap will be a necessity. Doing so opens an era of new challenges and opportunities.

## Endnotes

<sup>1</sup> "Services with Everything" The title of this section is borrowed from the article "Services with Everything". The section on services is drawn from work done jointly on that article with Jonathan Murray, Stu Feldman, Niels Christian Nielsen, and Kenji Kushida. It also draws on much earlier work with Stephen Cohen: Cohen, Steven. *Manufacturing Matters: The Myth of the Post Industrial Economy*. Basic Books 1987.

Other work drawn on for this section includes:

- Kenji Kushida, Jonathan Murray, John Zysman. "Diffusing the Cloud: Cloud Computing and Implications for Public Policy." *Journal of Industry, Competition and Trade*, Sep 2011.
- Kenji Kushida, Jonathan Murray, and John Zysman "The Gathering Storm: Analyzing the Cloud Computing Ecosystem and Implications for Public Policy." *Digiworld Economic Journal, Communications and Strategies* 85.1 (2012): 63.
- John Zysman, Jonathan Murray, and Kenji Kushida. *Cloudocopia, Into an Era of Abundance*. CLSA University, Credit Agriculture Securities, 2013.
- Niels Christian Nielsen, Jonathan Murray, and John Zysman. *The Services Dilemma: Productivity Sinkhole or Commoditization*. Copenhagen: Sats: Rosendahls – BookPartnerMedia, 2013.

<sup>2</sup> John Zysman, "The 4th Service Transformation: The Algorithmic Revolution." *Communications of the Association for Computing Machinery Special Issue on Services Sciences*, 48 (2006).

<sup>3</sup> By now we can all recite the examples; bank ATMs have automated simplified bank transactions, and consumers increasingly book airline tickets and car rentals online. In major enterprises, payroll processes have been reorganized and largely automated.

<sup>4</sup> Nordhaus, William D. "The Progress of Computing." Working Paper. Version 5.2.2 Yale University Press and NBER (2002).

<sup>5</sup> D. Breznitz & M. Murphree, *Run of the Red Queen: Government, Innovation, Globalization, and Economic Growth in China* (New Haven: Yale University Press, 2011).

<sup>6</sup> Paul Wright, "Manufacturing Metropolises: Design, Fabrication, and Service" in UNIDO 2013 21st Century Manufacturing Ed. Zysman, John; Dan Breznitz, Martin Kenney, Paul Wright.

<sup>7</sup> Private conversation and unpublished articles.

<sup>8</sup> Op. Cit; Cohen and Zysman, *Manufacturing Matters*.

<sup>9</sup> This section is drawn from work done by Jonathan Murray, Kenji Kushida, and myself. There are three principal pieces.

1. The most recent is: Zysman, John, Jonathan Murray, and Kenji Kushida. "Cloudocopia: Into the era of abundance." CLSA University, January 2013. Web. [www.clsau.com](http://www.clsau.com).
2. "Diffusing the Cloud: Cloud Computing and Implications for Public Policy", Kenji Kushida, Jonathan Murray, and John Zysman in the *Journal of Industrial Competition and Trade* released June 3, 2011.
3. Kushida, Kenji, Jonathan Murray, and John Zysman. "The Gathering Storm: Analyzing the Cloud Computing Ecosystem and Implications for Public Policy." *Communications and Strategies*, March 2012.

For up to date discussion of these issues see Jonathan Murray's Blog: [www.adamalthus.com/](http://www.adamalthus.com/)

<sup>10</sup> John Zysman & Dan Breznitz "Facing the Double Bind: Maintaining a Healthy and Wealthy Economy in the 21st Century" in Dan Breznitz and John Zysman Ed. *The Third Globalization: Can Wealthy Countries Stay Rich in the Twenty-first Century?* Oxford University Press, 2013.