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**DYAD AND NETWORK: MODELS OF MANUFACTURER-SUPPLIER COLLABORATION
IN THE JAPANESE TV MANUFACTURING INDUSTRY**

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ABSTRACT

The analysis of manufacturer-supplier relationships in Japan has contributed significantly to the advancement of interorganizational theory. It has yielded broad evidence that long-term collaborative partnerships enable firms to exploit the incentive benefits of market-based exchange while reaping the learning and coordination benefits of internalization within a corporate hierarchy. In this paper, we go beyond the issues of trust and cooperation that have occupied much prior theory and research on supplier relations in considering another dimension along which collaborative agreements may be arrayed. We build on transaction and network theories respectively to propose two types of long-term collaborative ties: dyadic or bilateral governance and network embeddedness. A comparative analysis of collaborative relationships in product and process development between two Japanese TV manufacturing companies and their suppliers provides empirical evidence for the distinctive effect of network ties over dyadic relationships for collaborative knowledge-sharing.

Introduction¹

Long-term interfirm partnerships are a conspicuous feature of the contemporary business landscape within and across industries in developed economies. This growing global reliance on patterns of cooperation that depart significantly both from arm-length market exchange and merger/acquisition has sparked much scholarly interest. Studies in macro-organizational theory (e.g. Powell, 1990), economic sociology (e.g. Granovetter, 1985; Podolny and Page, 1998), political science (e.g. Piore and Sabel, 1984), or economics (e.g. Williamson, 1985 & 1996) document the positive effects of stable collaborations on such organizational processes and outcomes as organizational learning (Saxenian, 1994), diffusion of technology (Dyer and Nobeoka, 2000), risk sharing (Womack et al., 1990), or relation-specific investments (Asanuma, 1993; Williamson, 1996). This research shows how partnerships enable companies to acquire status (Stuart et al., 1999), to exploit the incentive benefits of market-based exchange while reaping the learning and coordination benefits of internalization within a corporate hierarchy (Lincoln and Ahmadjian, 1997), and thus to increase economic performance (Baum et al., 2000).

While there is wide agreement that stable partnerships serve as viable governance structures with numerous benefits for corporate behavior and performance, there is little consensus on the precise nature and significance of relational forms of organization. Theorists in the transaction-cost economics tradition view them as hybrids, intermediate between the polarities of market and (administrative) hierarchy (Williamson, 1985 & 1996). They are sustained by credible commitments and expectations of repeated exchange, as opposed to the force of competition (on the one hand) or internal auditing and order-giving on the other. In a similar vein, resource dependence theorists discuss the “bridging” strategies whereby firms in bilateral exchange relationships manage such dependencies through quasi-administrative devices such as director interlocks, joint ventures, and the like (Pfeffer and Salancik, 1978).

Yet other theorists see network organization as irreducible to a transaction cost logic (Powell, 1990). Inherent in such forms, they argue, is reliance on trust and obligation-- not legalistic or bureaucratic safeguards-- to deter parties from exploiting windows of opportunities for short-term one-sided gains over the collaboration’s course (Podolny and Page, 1998; Uzzi, 1996). Beginning, perhaps with Dore’s (1983) claim that norms of “good will” and reciprocal obligation abet opportunism in Japanese market transactions, a considerable stream of work shows how trust and

¹ Some of the case study material on Matsushita also appeared in Lincoln, Ahmadjian, and Mason (1998).

reciprocity infuse commercial exchanges with superior information transfer and mutual learning properties than is typical of Western markets (Lincoln, 1990; Gerlach, 1992).

While much writing sees trust and obligation reducing transaction costs while averting the various perils associated with arms-length contracting and bureaucratic rigidity, less discussion has centered on the appropriate unit or level of analysis in the study of relational forms. From the perspectives of such prominent interorganizational theories as transaction cost economics, agency theory, and resource dependence, it is the transacting *dyad*— the parties to a bilateral exchange. Williamson (1994:85) is explicit on this: “Transaction cost economics is preoccupied with dyadic relations, so that network relations are given short shrift”. Others, however, argue persuasively that analysis should be pitched at the *network* level and that dyadic exchange cannot be understood without taking into account its network “embeddedness,” to use Mark Granovetter’s influential term. From the embedded network perspective, third party and other indirect ties shape the interaction between a pair of firms, such that attention confined to the pair is apt to blind the observer to processes operative at triad, clique, and network levels (Burt, 1992). The point is nicely made in Uzzi’s (1996) discussion of the role of indirect ties in the purchase-supply transactions in the New York garment industry:

“In the firms I studied, third-party referral networks were often cited as sources of embeddedness. Such networks operate by fusion: one actor with an embedded tie to each of two unconnected actors acts as their go-between by using her common link to establish trustworthiness between them. The go-between performs two functions: he or she (1) transfers expectations of behavior from the existing embedded relationship to the newly matched firms, and (2) “calls on” the reciprocity “owed” him or her by one exchange partner and transfers it to the other.”

From Uzzi’s perspective, then, the third- (and 4th, 5th, ..., Nth) party ties implied by network-embedded exchange renders it superior to strictly dyadic exchange in limiting opportunism, as they create a cross-cutting web of trust and obligation, spreading information, sharing risks, and allocating resources. The embedding of pairwise transactions in a network promotes synergies across firm boundaries. As Uzzi (p. 677) puts it: “thicker information’ on strategy, production know-how, and profit margins is transferred through embedded ties, thus promoting learning and integrated production in ways that the exchange of only price data cannot.” Powell, Koput, and Smithdoerr (1996) further frame the issue (p. 119):

“Interorganizational collaborations are not simply a means to compensate for the lack of internal skills, [...] nor should they be viewed as a series of discrete transactions [...]. Firms deepen their ability to collaborate not just by managing relations dyadically, but by instantiating and refining routines for synergistic partnering [...]. Richard DiMarchi, Vice President for Endocrine Research at Eli Lilly and Company, emphasizes that the biggest mistake his company could make in managing research alliances is to treat them as “one-offs”—independent

relationships pursued separately. Firms must learn how to transfer knowledge across alliances and locate themselves in those network positions that enable them to keep pace with the most promising scientific or technological developments”.

Thus, where interorganizational learning and innovation is the goal, an embedded network strategy, such that a firm actively manages not only its direct dyadic ties with a given set of alters, but the connections among the alters as well, best taps the collective expertise of the network and synergistically enhances it in ways that benefit the whole.

In this paper, we consider two models of governance -dyad, and network- in a study of manufacturer-supplier relations in the Japanese consumer electronics/electrical machinery industry. Specifically, we examine the sourcing strategies of two prominent companies— Matsushita Electric Industrial Co. and Sanyo Electric Co. (thereafter MEI and SE respectively). Of the two, MEI’s approach to supply chain management is the development of its supplier pool as a *network*, so that shared and synergistic learning can take place, while SE’s strategy is essentially to manage its exchange relations with suppliers independently and sequentially and to encourage competition among them. We will see that, associated with this difference in the level at which supply transactions are managed, is a difference in the degree to which suppliers are delegated responsibility for product and process design, enabling them to co-develop and thereby learn in partnership with the parent manufacturer. These differences are roughly consistent with and extend the teachings of transaction cost theory as to how variation in governance mode and organization form is pegged to relation-specific investment.

The paper is organized as follows. We first review some theoretical arguments for dyadic and network modes of organizing exchange and for the differential impact of such modes on technological partnering between firms. We then provide some background on Matsushita Electric and Sanyo Electric as contrasting cases of supply chain organization, focusing, in particular, on Matsushita’s *kyoei-kai* or supplier cooperative association. There is no comparable association at Sanyo. Next, based on interviews we conducted in both firms, we examine how the nature of the part and the structuring of the supply transaction shape the role suppliers play in product and process development. Theoretical and practical implications of the results are then discussed.

Theories of bilateral exchange

The distinction between dyadic and network forms is an important elaboration of extant theory on the management of purchase-supply relations. To date, most work is pitched at the dyad level— the customer-supplier pair. Such dyadically-based exchange is presumed to take three organizational forms: arms-length market contracting, hierarchical internalization (e.g., vertical integration), and “relational contracting”, i.e. high-trust, long-term, obligational exchange. Students of supply chain structure in the automobile industry have devoted much attention to the propensity of

Japanese firms, in contrast to American carmakers, to develop close, diffuse, and stable relations with their suppliers (Clark, 1991; Womack et al., 1990; Nishiguchi, 1996; Smitka, 1991). The same difference has been documented in the electronics industries (Sako, 1992). This is a logical extension of interorganizational theory, given that diffuse and trusting relations in the organization of exchange pose a challenge to the classic antinomy of market and hierarchy (Williamson, 1975, 1985).

With few exceptions (e.g., the Powell et al. and Uzzi pieces cited above), theorizing on the virtues of high-trust relational contracting has yet to tackle directly the question of what difference it makes if exchange relations with these qualities are dyadic, discrete, and sequential versus networked, simultaneous, and synergistic. Most studies that look beyond dyadic interactions to how the network of collaborative ties conditions its member firms' performance focus chiefly on strategic alliances between competitors (e.g., in R&D; Rowley et al., 2000), neglecting ties formed across supply-chain stages (see Dyer and Nobeoka, 2000 for an exception).

Dyad and network represent alternative frames of reference and levels of analysis for the assessment of cooperative interfirm relations. Transaction cost and resource dependence theory, as noted, view the transacting pair in isolation, divorced from the broader network in which it is situated or embedded. In such models, the parties strive to manage and stabilize their exchange, by (in the first case) forging credible commitments and (in the second) installing bridging and co-opting devices (Baker, 1998; Lincoln, Gerlach, and Takahashi, 1992). In practice, these comprise the same bundle of practices: equity stakes, board interlocks, reciprocal trade agreements, etc. Such cementing ties motivate the parties to invest in the relationship, thus creating and conserving assets whose value is largely confined to the immediate pair (Asanuma, 1989 & 1993).

Bilateral governance strategies of this sort have both advantages and disadvantages. On the upside, they attenuate incentives for opportunism and foster hard-to-emulate capabilities. On the downside, by approaching partnerships in pairwise fashion as discrete and independent, such strategies give up economies of embeddedness; e.g., gains from synergistic learning and network-wide cooperation. The greater the connectivity and multiplexity of the network, the richer is the information flow, the faster is the learning, and the stronger are the normative safeguards against opportunism (Coleman, 1966). For instance, a firm may realize a one-time gain from cheating on a business partner, but if that partnership is deeply embedded in a network, the adverse reputational effects and loss of access to resource channels can be costly indeed.

Because the relational safeguards afforded by networks give more protection against opportunism than pairwise commitments can provide, embedded partnerships allow for greater relation-specific investment. Applied to supply chain organization—our present concern—network embeddedness motivates suppliers to invest in innovation and customization of products and services to the unique requirements of customers, and, conversely, motivates customers to share risks with suppliers and entrust high-level design and development responsibilities to them.

The merits of network governance for crisis management are clear as well. A compelling case of a supply network mobilizing to share risk and manage crisis was the Toyota supply network's response, chronicled separately by the Wall Street Journal (1997) and Nishiguchi and Beaudet (1998), to a catastrophic fire at an Aisin Seiki factory in 1997. The fire halted production of a key brake component used in a number of Toyota models, thus bringing to an abrupt standstill much of Toyota's assembly operation in Japan. Yet, because of the fast response and tight coordination of the supply network as a whole, p-valve production was restored in a matter of days. As Aisin was Toyota's sole source of the p-valve, suppliers of other parts had to convert their operations, a process requiring the collective mobilization by the network in sharing knowledge and transferring skills. Reitman (1997), the Journal reporter, comments that:

The secret lay in Toyota's close-knit family of parts suppliers. In the corporate equivalent of an Amish barn-raising, suppliers and local companies rushed to the rescue. Within hours, they had begun taking blueprints for the valve, improvising tooling systems and setting up makeshift production lines.

A quote from a manager of one affiliated company, Toyoda Machine Works, also testifies to the network embeddedness of Toyota's supplier relations. "Toyota's quick recovery," he said, "is attributable to the power of the group, which handled it without thinking about money or business contracts" (Reitman, 1997).

The remainder of the paper is a study of dyadic and network strategies of managing purchase-supply transactions in the Japanese television manufacturing industry. Our core hypothesis is that supply transactions governed by network, rather than dyadic, forms motivate and facilitate knowledge-sharing, mutual learning, and relationship-specific investment.

The case studies: Matsushita and Sanyo compared

The industry

The Japanese TV manufacturing industry is an interesting setting for a study of the organization of supply networks. First, while Japanese electronics has been the venue for some significant supply chain research (e.g., Fruin, 1997; Hiramoto, 1994; Roehl, 1989; Sako, 1992; Lincoln, Ahmadjian, and Mason, 1998), it is on the whole less studied than is the automobile industry and less well understood (see, e.g., Nishiguchi, 1996; Smitka, 1992; Womack et al., 1990). Second, the TV industry utilizes a large number of parts and sub-assemblies, which vary in complexity and value and thus how they constrain collaboration and exchange.

Japanese firms' incentives to pursue collaborations with positive sum benefits in terms of joint innovation, risk-sharing, and knowledge-sharing – versus gains to the core firm at the supplier's expense (e.g., lower labor cost)—are weaker in electronics than in autos (Asanuma, 1989). Japan's large electrical machinery and electronics makers are more integrated vertically and horizontally than the carmakers: each embraces an array of product divisions, from relatively low tech “white goods” (rice cookers, irons, washing machines) to high tech computer and consumer electronic products (Beer and Spector, 1981; Shimotani, 1989). By comparison, the pattern in the Japanese auto industry is one of core firms, themselves fairly specialized in product line, diversifying through consignment (“*itaku*”) pacts with *keiretsu* partners (Shioji, 1997). Hino, for example, is the Toyota Group truck producer and Daihatsu is the specialist in minicars.

Moreover, while the auto firms are known to outsource high-value electronic and electrical parts and even drivetrain components such as transmissions, the electronic/electrical machinery producers procure these internally, going outside for relatively low-value components such as plating, packaging, and the like.

Thus, the boundaries of the Japanese electronics firm are wider-- encompass more diverse transactions—than is generally true of the automakers, which by the nature of their business are thrust into highly co-dependent vertical and horizontal ties. These higher-valued and more relation- and product-specific transactions ensure that supply transactions in the auto industry are organized less in arms-length fashion, more in terms of organization and network. Asanuma (1989, p.6) concurs:

“[Auto firms develop and produce a single] ... product which is in a relatively mature stage with respect to technology. By contrast, a typical original equipment manufacturer in the electric machinery industry produces many final products that are extremely diverse both with respect to the typical scale of production, [...] and regarding the degree of technological maturity.”

Each electrical machinery plant thus specializes in one or more product lines, which share features with other plants in terms of core technology but differ in production scale and technological maturity. This heterogeneity of production operation and organization configures the network of vendors and subcontractors from which core manufacturers source parts and materials. The operating divisions of the core firm are fairly autonomous, retaining much of the responsibility for purchasing and procurement decisions.

We chose to focus on the television manufacturing operations of Matsushita and Sanyo. The two firms have similar product mixes-- medium and large screen color television sets-- and similar representation of consumer electronic products in their overall product portfolios (roughly 65%) Both are headquartered in the Osaka metropolitan area of the Kansai region and thus access the same

localized pool of suppliers and subcontractors. They have also been relatively similar in terms of position in the domestic consumer market for televisions, MEI leading in 1996 with 17% of total domestic sales, SE ranking fifth with an 11% share.

In April 1997, MEI implemented a form of organization, pioneered by Sony, that was then diffusing rapidly among large Japanese firms (Shimotani, 1997): the “in-house company system” (*sha-nai bunsha seido*). Most of MEI’s existing divisions were grouped into the following four “internal companies”: Audio-video, electrification-housing, air conditioning, and electric motors. The TV division of MEI is one of 13 divisions within the AVC (Audio Video Company) internal company. SE did not formally adopt the in-house company form, but its ten business headquarters played a similar role. However, the number of divisions under each such headquarters is smaller at SE than at MEI. At SE, the TV division had just one production plant in Japan, located in Daito, a suburb of Osaka. The division also had 16 TV production plants located abroad.

For the purposes of this study, a “supplier” is a firm providing parts, materials, or services to the television manufacturing divisions of MEI or SE located in Japan. As we explain below, suppliers can be independent companies, member of a customer-specific supplier association, or affiliated (“*keiretsu*”) companies in which the customer has an equity stake and a degree of management control.

Methodology

Our interviews with Matsushita Electric and Sanyo Electric span a period of 8 years, the first interviews were conducted in July of 1994 with members of the Corporate Purchasing Department in Osaka. Additional interviews were conducted in the summer of 1996. A questionnaire was then sent to managers of both firms’ purchasing centers. A final set of interviews with purchasing general managers at both MEI and SE was conducted in the summer and fall of 1997 to monitor changes and clarify issues raised in the questionnaire and in the earlier interviews. Finally, we have consulted extensively with Professor Masahiro Shimotani of Kyoto University, an expert on Matsushita Electric and its affiliated companies. Over the course of our research, Shimotani-sensei’s assistance and advice has been invaluable.

The Matsushita *kyoei-kai* as a case of network governance

MEI buys parts and materials from some 10,000 suppliers, accounting for roughly half of MEI’s total sales. Most produce relatively low-value parts and services (packaging, molding, painting, plating). Few if any enjoy expertise and technology rivaling MEI’s own, although that has changed as MEI’s program of upgrading its elite (*kyoei-kai*) suppliers’ capabilities has proceeded. 40% of these are proprietary suppliers from whom MEI obtains off-the-shelf, highly standardized products.

The remainders are supplier-subcontractors whose production is to some degree tailored to MEI's needs. Of the latter, 270 formed the MEI *kyoei-kai* ("mutual prosperity association;" see Shimotani, 1997; 2002). The *kyoei-kai* is an elite group of suppliers, chosen for the quality and reliability of their products. They account for 33% of MEI's externally procured parts and materials. The *kyoei* membership, however, has declined over time. In 1984, there were 348 members from which MEI purchased close to 50% of its outsourced materials. Of the TV group's 24 *kyoei-kai* companies, two supply MEI plants with electric parts, 14 with structure parts and 8 provide manual insertion and sub-assembly.² To become a *kyoei* member, a firm must: (1) have more than 100 employees; (2) maintain a trading relationship with MEI for more than 3 years; and (3) do more than 20 million yen per month of business with MEI. These criteria were set by the MEI Corporate Purchasing Department (Shizai Center), which oversees the *kyoei-kai*.

While most procurement decisions are decentralized to the operating division level, Corporate Purchasing is responsible for developing and implementing corporate policy toward the *kyoei-kai* and its member firms. In 1993, it began a "Revitalization Plan" aimed at developing the *kyoei-kai* as a learning efficient network of elite MEI suppliers. Corporate Purchasing sought to better measure and monitor the performance of the *kyoei* suppliers and assist them in: (a) raising their quality; (b) lowering costs by "rationalizing" (*gorika*) production; (c) improving delivery; and, last but not least, (d) increasing their involvement in design and development. The program features an elaborate system of grading suppliers on these performance dimensions along with numerous procedures for communicating MEI's expectations and enabling suppliers to meet them.³

MEI Corporate Purchasing manages transactions between the MEI product divisions and their suppliers by helping the division maintain clear and detailed cost, quality, and technology standards, thus spelling out the objectives that the *kyoei* companies must achieve. *Kyoei* firms are encouraged to participate in the process and offer countermeasures. The ultimate objective is to move both division and suppliers down parallel learning curves in the achievement of lower cost, higher quality and reliability, and greater sophistication.

The *kyoei* motto is "trust and coprosperity," and references to trust in supplier relations were frequent in our interviews with MEI. One upgrade in trust actively sought by MEI directly reduced its supplier monitoring costs. A supplier making it through MEI's quality evaluation and ranking process was awarded MEI's Quality Independence Guarantee (QIG). Incoming parts and materials from QIG-certified suppliers were presumed not to require inspection. Small *kyoei* suppliers required

² The body of the TV set is composed of "structure parts." Their function is to hold and protect the "active" elements, which are the electro-mechanical and electronics parts. The molds are the metal "casts" in which the plastic parts (mostly the cabinets) are molded.

³ Rationalizing production, our informants said, meant reducing cost price through strengthening process management, thus enabling suppliers to remain profitable and strong.

considerable assistance from MEI to meet the QIG standard. In 1995 MEI introduced a new evaluation system for its *kyoei* subcontractors based on four criteria: quality, suggestions, deliveries and cost. MEI rates every supplier on a 4-point (A to D) scale. To remain in the association, a supplier must be graded “A” on each criterion. The evaluation led MEI to drop 31 subcontractors from the *kyoei-kai* and admit 8 new ones. The 24 members of the TV sub-group all passed the QIG screening.

The purpose of the *kyoei-kai* was to ensure the survival both of MEI and its best domestic suppliers. The association was founded in a time of growing competition in the consumer electronics market (Shimotani, 1997). As MEI is an integrated and divisionalized company manufacturing many of its high-end parts, much of its outsourcing has been relatively low-value, low-tech items. The *kyoei-kai* was part of an MEI strategy to shift more product and process design responsibility for high-value components to MEI’s elite domestic suppliers. Pressure to reduce costs and globalize operations had led MEI to diversify its supply base, encouraging low-end domestic suppliers to find new customers. Only suppliers in possession of specialized higher-tech skills would be retained. In the stringent economic environment of Japan in the 90’s, many manufacturers adopted this line with their domestic suppliers: unless the suppliers acquired competencies not available at lower cost offshore, they lost the business. Thus, MEI’s challenge was to transform its domestic supplier base from producers of low-tech low-value materials to builders of complex components whose technology matched or surpassed MEI’s own.

We asked our informants whether MEI produced in-house the same parts and materials it sourced from the *kyoei* association. They said that they did or at least were capable of doing so. Many MEI products are complex and require large capital investments to make. The *kyoei* companies are generally small and lack the plant, equipment, and skills necessary to produce complex, high-value components. However, under pressure from and with the assistance of MEI, *kyoei* firms had been increasing their investments in such capabilities.

Although the *kyoei-kai* routinely pressures MEI to raise its purchases from them, MEI’s stance is that it cannot do so if equal value and quality exist at lower cost abroad. The long-term solution for both sides, MEI managers said, was to develop the capabilities of its best domestic suppliers through the *kyoei* structure and process so that they have a competitive advantage over the offshore suppliers, if not in cost, in quality, technology, and customization.

Unlike MEI’s old practice of minimizing supplier initiative and control by having them produce to detailed MEI-supplied blueprints, the company now expects *kyoei* suppliers to participate in early-stage design decisions. It is the product division’s responsibility, with the support of Corporate Purchasing, to solicit clear and specific input from *kyoei* firms. For example, a division will begin with a set of drawings or paper or wood model and invite suggestions from suppliers as to product form and function. According to MEI, the *kyoei-kai* suppliers as a whole gain a competitive

advantage from the early information they receive on MEI's product development plans and procurement needs.

The TV division delineates the tasks of the supplier in three areas: design- or concept-in activity, understanding the target, and grasping the division's long-term product trajectory. If the division effectively communicates its expectations in these areas--through publication of specs, formal training, *shukko* (personnel) transfers, and the like-- the suppliers will acquire a clear vision of what is required and can orient their products and processes accordingly. Since many of these organizational learning processes are similar across *kyoei* suppliers, there are benefits to them and to MEI from pooling and sharing know-how and experience.

As MEI's efforts to assist and motivate the *kyoei-kai* in acquiring special competencies bore fruit, it began reversing the teacher – student roles. A special headquarters team was charged with enabling MEI to absorb new technology from the most advanced suppliers. A small number of *kyoei* suppliers were developing technology that MEI itself did not have. One was a very precise method of gold plating that MEI said would take it five years to develop. Another was a novel method of plastic injection molding. A third was a technique of punching tiny sound holes directly into the TV cabinet plastic, thus eliminating the need for speaker holes and netting.

MEI will share *kyoei* suppliers' risks, assisting firms in difficulty if the problem is bad luck or bad management and the core assets and capabilities of the firm remain strong. Corporate Purchasing managers told us that, if a drop in business with one MEI division threatened the survival of a *kyoei* member, they would help it find new business with another division. Moreover, MEI's policy of going abroad if a better price for the same quality could be had is in practice softened by the assistance it gives *kyoei* suppliers in moving their own production facilities overseas (often to the vicinity of MEI plants). Two *kyoei* suppliers we interviewed in Osaka told us that MEI had supported their forays into Asia in significant, if indirect, ways. Consequently, one of these suppliers said, its business, unlike that of many small and medium-sized Kansai firms dependent on large manufacturers, had expanded during the lean 90's.

MEI, of course, benefits by absorbing some of its suppliers' risks. A manager of a *kyoei* member told us: "We know that MEI will do its best to help us if a problem-- falling demand, for example—occurs. We are therefore confident and do not hesitate to make specific investments when possible."

So, MEI's *kyoei* program of upgrading the production capabilities and knowledge assets of its top suppliers has engendered closer ties and greater cooperation with fewer partners than was true in the past. Unlike the rather arms-length posture toward suppliers for which MEI has been known, the company is committed to helping suppliers adapt to the new procurement environment, thus strengthening the *kyoei* members as individual businesses and the *kyoei* organization as a whole.

The *kyoei-kai*, we suggest, is example of network governance of purchase-supply transactions in the Japanese electronic industry. It has upgraded MEI suppliers' capabilities, as individuals and as a group, through training, quality rating, and information sharing. By organizing its best suppliers in a formal association governed by strict rules of entry and participation, MEI has moved beyond dyadic or bilateral ties.

We stress that the *kyoei-kai* is not merely a vehicle for superior management of MEI's dyadic relations with its best suppliers, but also one for managing the ties among the suppliers themselves. An interview we conducted with Osaka-based Chiyoda Container testifies to this. Chiyoda has been a major MEI supplier for forty years-- MEI was its largest customer—and a *kyoei* member. It had a close working relationship with MEI and took care to protect MEI in its dealings with other customers, for example, by assigning different employees to MEI and the competitor in order to foreclose information spillovers. Indeed, managers at the Chiyoda factory we visited said that, out of loyalty to MEI, it did no business with SE, although Chiyoda factories elsewhere did sell to SE. Moreover, a product or technology that Chiyoda codesigned with MEI would not be offered to other customers as long as the patent was in force. MEI gave Chiyoda wide discretion in product and process design. The supplier, in turn, gave MEI suggestions on TV design that would increase packaging efficiency. Finally, Chiyoda's business had gained directly from the horizontal ties that its *kyoei* membership had fostered. The trust and communication that existed in the *kyoei-kai* created opportunities for firms to do business and otherwise partner with one another.

In its work with the *kyoei-kai*, MEI has walked a fine line. On the one hand, it sought to reap the benefits of relationship-specific investment and network synergy by reducing costs and raising the speed and quality of its product and process development. On the other hand, given its policy on offshore production and procurement, MEI is concerned to avoid excessive dependence on the *kyoei* suppliers and they upon it. MEI managers claimed that the *kyoei* program was in fact reducing supplier dependence rather than increasing it, for demonstrated ability to meet MEI's lofty procurement standards would benefit the *kyoei* suppliers' reputations and thus their attractiveness to other customers. Yet MEI was hardly blind to the risks of design collaboration and other forms of knowledge sharing with suppliers who were at the same time serving competitors. As in Chiyoda's case, suppliers playing the most strategic roles in MEI product and process design (e.g., the plastic injection example) were prohibited from offering other firms the same technology during the first year of use by MEI or, in the case of a patented technology, until the patent expired.

Thus, MEI's drive to upgrade the knowledge and skill of its suppliers rests, not only on more productive one-on-one procurement relationships, but also on the cultivation of a tighter-knit, better managed network wherein collective learning occurs through a web of horizontal ties. The *kyoei* strategy is the realization of a commitment to long-term, mutual and synergistic learning, and so enables suppliers to adopt new technologies and business methods, while exploring new markets for

products as MEI divisions' domestic sourcing declines.⁴ Among suppliers, the *kyoei-kai* bolsters loyalty to MEI, opportunity and incentive to learn from one another, and willingness to invest in relation-specific assets, all the while enhancing competitive capability and reputation.

The Sanyo Electric case

At SE, suppliers are ordinarily not involved in product and process development until late stages. The Sanyo product development process, not atypically among Japanese technology firms, begins with one function (the R&D Division or the Design and Development division) taking the lead. A working group is then formed early on that draws in people from a cross-section of the organization (other product divisions such as semiconductors, audio-functional groups such as manufacturing, marketing and accounting, QC, and purchasing. Suppliers, we were told, are not invited to join, but the purchasing managers know the suppliers and represent their interests and concerns to the group.

Thus, the involvement of suppliers in the Sanyo product development process is low. Sanyo develops the product, presents the specs to suppliers, some negotiation takes place, and the price is set. Sanyo people told us this generally was the norm in Japanese electronics. Matsushita, they said, was similar, but at the time of our interview this was a reference to Matsushita's past practice, not its later strategy of promoting knowledge-sharing and mutual learning with an elite supplier pool developed and organized through the *kyoei-kai*. SE engineers did say that stronger partnerships with suppliers in new product/process development was desirable, for it would permit them to focus on core products and technologies while delegating to suppliers the responsibility for parts and subassemblies. (MEI people voiced similar hopes for what the *kyoei* program would achieve.) SE managers cited the fast product development and frequent remodeling cycles typical of electronics as the principal barrier to close collaboration with suppliers. The introduction of minor model changes every six months and a full remodeling of the product range every year, they said, demanded that SE engineers design the products and parts. MEI, of course, is under the same time constraints.⁵ Indeed, echoing Sanyo's concerns, one MEI informant confided that some managers were frustrated with and unsupportive of the *kyoei* program. Given rising competitive pressures to shorten product development times, they felt that MEI could design and build products faster if it abandoned the effort to work with the *kyoei-kai* and (as in the past) made the parts itself.

⁴ MEI's material center manager told us that they try to find new markets inside MEI's group for *kyoryoku* members' products when the demand from one division jeopardized the future of the supplier.

⁵ Indeed, in a personal communication based on his research in the Japanese electronics industry, Tom Roehl suggests to us that MEI's marketing strategy differs from Sanyo's in that MEI does *more* frequent product changes and fits products to more specialized market segments.

While SE has no formal supplier association like MEI's *kyoei-kai*, it nonetheless has long-term procurement relations with an elite set of suppliers. According to the director of purchasing for the TV division, SE uses a total of 211 regular suppliers, of which 50 trade regularly with the TV division. Of these 50 firms, 30 are considered by SE to be primary suppliers. In 1997, these suppliers represented 83.3% of total parts procurement for the SE TV division. Some of these firms, such as Sanyo Denshi Buhin, are affiliated companies, but most are independents. At 30, SE's elite supplier pool is quite comparable to MEI own elite pool (26 *kyoei* suppliers and two affiliated companies).

Yet a critical difference between SE and MEI in their purchasing management is that SE seeks to maximize competition among suppliers at each remodeling cycle, giving no preference to those who already have a piece of the business. Such competition is possible, because most of SE's suppliers are parts manufacturers (*buhin meka*) rather than "set" manufacturers (*setto meka*).⁶ MEI, it appeared from our interviews, was less concerned with stimulating competition among its top suppliers than in working with them through the *kyoei* process to develop their abilities and stimulate cooperation. The MEI QIG system, for example, was not a rank-ordering of suppliers aimed at sparking competition but rather the criterion for selecting them into the *kyoei-kai*. A supplier who failed to make the grade was out.

Thus, the main sense in which SE manages the relationships among its suppliers is the competition that it fosters among them. Such competition has well-known advantages in motivating suppliers to lower costs and raise quality and reliability in order to get and keep a manufacturer's business. But if the goal is the kind of knowledge-sharing, joint learning, and general cooperation that MEI sought from its *kyoei-kai*, the downsides to supplier competition are clear as well.⁷

Levels of cooperation and modes of governance

In this section, we use a more systematic methodology to demonstrate: (a) that MEI shares more initiative and responsibility with suppliers in developing products and processes than does SE; and (b) that MEI is most likely to share responsibility with suppliers when the latter are organized in embedded network fashion either via the *kyoei-kai* or *keiretsu*-type equity ties. For Matsushita (unlike, for example, Japan's principal automakers), organization by cooperative association and by *keiretsu* are alternative, not overlapping and reinforcing governance forms. We use Banri Asanuma's methodology for gauging supplier initiative and responsibility-sharing with a manufacturer. Similar

⁶ Set manufacturers are the suppliers which have in charge the development and/or production of a whole subsystem (combination of different parts) rather a single part. In the case of a remote control for instance, a part manufacturer would provide only the electric components, or the plastic case, while a set manufacturer would be in charge of the whole product.

⁷As a reviewer pointed out, one reason for the much-vaunted production cooperation and knowledge sharing among Toyota suppliers is that they are in general not direct competitors.

methodology has been applied to manufacturer-supplier relations in the Japanese automobile and electronics industries (Asanuma 1989; Chen, 1992).

As noted, while MEI's daily decisions on parts procurement are made at the division level, the Shizai Center (Corporate Purchasing) has responsibility for managing MEI's supplier association (*kyoei-kai*) and for developing and implementing company-wide policy toward *kyoei* firms. SEI has no such purchasing center at the headquarters level; the TV division has sole charge of its suppliers.

The suppliers recorded in table 1 are MEI and SE's "strategic suppliers," according to the managers we interviewed. They account for approximately 80% of the two manufacturers total purchasing/procurement costs. Our informants classified suppliers by: (1) type of product transacted; (2) type of governance structure; (3) degree of cooperation and initiative in product and process design (the Asanuma classification). We were able to cross-check the governance structure classification with archival data from published sources (Toyo Keizai, various years), providing information on equity relationships, membership in known *keiretsu* groups; and supplier association membership. Moreover, since interviews were done with different managers of the same company on different days, one informant's report could be compared with against others'. The responses were highly consistent.

Table 1 classifies MEI and SE suppliers by the Asanuma scale. Each cell entry labeled "MEI" or "SE" refers to a one supplier. The scale distinguishes seven levels. At one extreme are Level I relations-- the supplier's involvement in product/process development is minimal and the core firm provides minute and comprehensive instructions. At the other is Level VII transactions—"marketed goods"—which involve no tailoring to customer needs and thus no investment in relationship-specific assets. At Level II, the customer wholly controls the process and the supplier merely executes the customer's designs. At Level VI, the customer issues specifications, but the supply transaction is of the "black box" sort— the supplier's knowledge exceeds the manufacturer's and the supplier controls both product development and manufacturing process. Few of either manufacturer's supplier relations are of this type.⁸ Levels III-IV are where the greatest customer-supplier cooperation and responsibility-sharing take place. Each firm is a knowledgeable and valued partner, and each must trust and depend on the other for the transaction to succeed.

<Table 1: about here>

Differences by parts

Whatever the differences among manufacturers' procurement strategies and the modes of supply chain governance, the nature of the part sourced to some extent conditions the customer-

⁸ In the automobile industry, by contrast, many more parts such as seats, brakes or injection systems are of this type (Asanuma, 1993; Ahmadjian and Lincoln, 2001; Nishiguchi, 1996).

supplier collaboration. We see from Table 1 that electronic and electro-mechanical parts are generally purchased ready-made and “off the shelf.” Indeed, of the electro-mechanical components that MEI and SE outsource, there is no variance: all are marketed goods. The purchase is a thus straightforward market transaction. The supplier monopolizes product design and production, and the customer selects from a catalog of products and models.

Of the remaining parts in the table, structure parts, printed circuit boards and subassemblies all involve customization to the customer’s manufacturing and marketing requirements, so there is considerable customer involvement in their design and manufacture. Like electro-mechanical parts at Level VII, the other pole of the continuum, all subassemblies are sourced by MEI and SE. At Level I the supplier has little discretion or initiative. Product and process design are the customer’s domain. Structure parts, PCB’s and molds all vary across Levels I, II, and III of the Asanuma continuum. All are ordered goods in which the customer provides drawings—product and process specification—but there is variation by manufacturer and governance form in the detail of those drawings and the discretion given the supplier.

Differences by manufacturer

Within each class of parts, MEI’s relationships with suppliers are more collaborative than SE’s. Take the case of electronic parts. Both manufacturers buy many of them as “marketed” goods, requiring no customer-specific modification and thus little cooperation and communication between customer and supplier. Indeed, all of SE’s electronics parts purchases fall in this class. Yet two MEI suppliers produce such parts in Level VI, “drawing-approved” fashion, sharing some product and process design responsibilities with MEI. Our informants said that MEI had been reducing its “off-the-shelf” purchases, increasing reliance on drawing-approved ordered goods. The shift is consistent with Asanuma’s (1989) dynamic take on supply chain organization. In his words, drawing-approved parts and quasi-DA parts (structure parts) “[...] mainly originate from two directions: from marketed goods type parts and from DS parts” (1989, p.14). The change is in line with MEI’s development and increased use of the *kyoei-kai*.

Further, in its purchases of “PCB”, “structure parts,” and “mold” types, MEI entrusts more discretion and control to suppliers than does SE. MEI provides only rough drawings for the manufacture of printed circuit boards (PCB) and “structure” parts. SE, on the other hand, presents its suppliers with full blueprints. The difference is important, because the Level III parts (customer supplies rough drawings only) are quasi-“drawing accepted” in the Asanuma’s terms, implying greater customer-supplier sharing and asset/relationship specificity than are Level II (“blueprint supplied”) parts. Our respondents at MEI told us that they had previously outsourced structure parts as Level II, but were now using Level III methods. Thus, MEI and Sanyo’s sourcing strategies have

diverged as MEI developed the *kyoei-kai* and, through it, distributed product and process responsibility to its top-rated suppliers.

Differences by governance form

We have established that, for the same complexity/customization of part, MEI delegates more expertise and initiative to its suppliers than does SE. The question we now address is whether this contrast in sourcing strategy is attributable to a difference between the companies in the organizational form of supply transactions. Specifically, we hypothesize that the suppliers on whose expertise and control MEI is most dependent are organized in network as opposed to dyadic form.

MEI and SE suppliers may be classified according to the following three governance modes:

1. *Independent suppliers*: “Independent suppliers” are legally and administratively independent, not owned or controlled by the manufacturer (MEI or SE) or combined in a supplier association established and maintained by the manufacturer. Of these, we focus on suppliers considered to be important trading partners. What is distinctive about supply relations of this sort is not that they consist of market contracting—their long-term, relationship-specific nature means that trust, reciprocity, and commitment structure them beyond what market governance generally implies. Rather, they are *dyadic*—what organization they have is specific to the transacting customer-supplier pair, and they thus lack “embedded network” character. Dyadic or bilateral organization includes the monitoring, incentive alignment, absorption, cooptation, and reciprocity processes given much attention in theories of organizational exchange such as transaction cost economics, agency theory, and resource dependence.

2. *Cooperative association (kyoryoku-kai) suppliers*: The second governance form is the organization of suppliers in a cooperative association set up by and dedicated to one manufacturer. The member suppliers are independently owned and managed, but are committed to a long-term business relationship with the manufacturer and to making specific investments in that relationship. As noted, of the two manufacturers we study, only MEI maintains a cooperative association, the *kyoei-kai*.

2. *Affiliated (“keiretsu”) companies*: The third governance form is *keiretsu* or capital-related (*shihon kankei*) companies. *Keiretsu* in its narrowest sense is a vertically-ordered network of companies linked to one another through stable purchase-supply agreements, partial ownership ties, and personnel exchanges.⁹ Supply relations in the electronics industry generally have fewer of the

⁹ *Keiretsu* also refers to horizontally-organized business groups such as Mitsubishi or Sumitomo, but these do not concern us here. There is, however, a parallel between the *kyoryoku-kai*—the

trappings of *keiretsu* than in the auto industry (Asanuma, 1984; Fruin, 1997: 99; Lincoln and Ahmadjian, 2001). Neither MEI nor SE has forged the kinds of *keiretsu* connections common at Toyota and elsewhere in the auto industry. Other electronics/electrical machinery firms such as Hitachi, Toshiba, Mitsubishi Electric, and NEC have stronger *keiretsu* supply networks in this sense (Fruin, 1999; Lincoln, Ahmadjian, and Mason, 1998; Lincoln and Ahmadjian, 2001).

Yet MEI—and to a lesser degree Sanyo—leads a well-defined vertical *keiretsu* of another sort—the “Matsushita Group”. Spun-off divisions in several cases, these are independently managed firms in which MEI and SE maintain equity stakes and on whose boards they typically have installed one or more directors.¹⁰ Such *keiretsu* affiliates serve to expand the parent firm’s final product line and supply it with manufactured parts and services.¹¹

The *kyoei-kai* is a device for organizing MEI’s top suppliers as a network, not as a set of individuals. As a formal governance structure, it encourages horizontal ties between *kyoei* members based on common membership, compliance with *kyoei*-rules (e.g., the QIG), and various knowledge-sharing and capability enhancement activities.

Generally speaking, cooperative associations and *keiretsu* are not mutually exclusive governance forms: in the auto industry, for example, they consist of overlapping sets of firms (Sako, 1994). Supplier cooperative associations at Toyota and Nissan, for example, overlay a network of *keiretsu* equity stakes and personnel transfers. In the case of MEI and SE, however, no overlap exists between the two.

On its face, the *kyoei-kai* would seem to be a closer approximation to the network mode of governance than are the *keiretsu* devices of equity ties and personnel dispatches. In the vertical *keiretsu*, unlike the horizontal *keiretsu* groups, the bulk of the quasi-administrative linkage is between manufacturer and supplier, not among the suppliers themselves, although such ties may well exist. Yet a cohesive *keiretsu* supply network, as Toyota’s is known to be and as the Aisin fire case again

cooperative supplier association—as a governance form associated with the vertical *keiretsu* and the *shacho-kai* or presidents council as a body that supplies a degree of governance to the companies in a horizontal group).

¹⁰ The principal members of the Matsushita Group (MEI equity stake in parentheses) are: Matsushita Kotobuki (58%), Matsushita Reiki, JVC Corporation (52%) National House Industrial (26%), Matsushita Denko (32%), Matsushita Tshin Kogyo (56%), Kyushu Matsushita Denki (51%), Nihon Otis Elevator (28%). Matsushita Seiko (59%), Matsushita Kosan (31%), Nippon Victor (Asahi National Lighting (26%); Matsushita Denshi Buhin, and Matsushita Denshi Kogyo. See Career Development Center, 2002.

¹¹ Indeed, in early 2002 Matsushita announced that it was folding in as wholly owned divisions several major affiliated companies, including Matsushita Kotobuki, Kyushuu Matsushita, and Matsushita Tsushin (communications). The principal reason given for the consolidation was that the affiliated companies had attained too much independence, and their product lines were inefficiently overlapping with and competing with Matsushita Electric’s own.

confirms, also comprises, not merely a series of “one-off” customer-supplier transactions, but a genuine network in which productive third-party ties proliferate. Our information on the degree to which MEI and SE manage their affiliated suppliers’ horizontal relationships is limited, but it does appear –consistent with the Matsushita Group’s reputation in Japanese business circles as a prominent vertical *keiretsu* (Dodwell, 2002; Career Development Center; Shimotani, 2000) that MEI and its affiliated firms together form a coherent and strategic cluster collaborating and supporting one another. Sanyo, however, appears to manage its affiliates in rather more sequential, dyadic fashion. While Sanyo has an expansive network of subsidiaries and affiliates, it does not show up in the usual published classifications as a well-known industrial *keiretsu* grouping. Further testimony to this point is an SE purchasing manager’s comment that: “[...] *our purchasing strategy is to treat affiliated and independent suppliers equally. No priority is given to affiliated companies over other suppliers and we always encourage competition among all our supply sources [...]*”.¹²

We acknowledge that our three-way classification of governance form is also an ordering by internalization or absorption (in Williamson’s sense) of the exchange within the boundaries of the customer firm. Transactions between MEI and SE and the affiliated companies, which they partly own and control, are most “absorbed” in this sense; transactions between MEI and its *kyoei* suppliers are at an intermediate level (particularly since, again in contrast with the autos case, the *kyoei-kai* is *in lieu* of, not on top of *keiretsu* governance); and exchanges with the independent suppliers are least absorbed (although, again, such relations are close and enduring). In contrast, both *keiretsu* and *kyoei* governance may be considered network forms in the sense that the manufacturer is actively involved in the cultivation and orchestration of horizontal, cross-supplier ties. Transactions between the manufacturers and their independent suppliers, on the other hand, are more dyadic in nature, however strong they are in a long-term, relational contracting sense. If absorption of the transaction is the salient dimension along which governance forms may be arrayed, we expect the collaboration to be closer between the manufacturer and affiliated companies than between manufacturer (MEI) and supplier cooperative association (*kyoei-kai*). If the collaboration is greater with the *kyoei-kai*, the implication is that network organization—management of the supplier pool as an integrated whole rather than a series of independent pairings—counts most for cooperation and sharing.

How, then, does governance in these terms relate to customer-supplier sharing of product and process responsibility as indexed by the Asanuma scale? Our hypothesis is that MEI’s use of the *kyoei-kai* as an embedded network form explains its propensity to collaborate with suppliers more than Sanyo does for the same type of part. The evidence for that hypothesis is greatest for structure

¹² We were also told that SE expects internal divisions to compete with outside suppliers. If one Sanyo division can get a better price for a part or service outside the company than within it, the division will go outside.

parts, secondarily for PCB's. Structure parts, again, require tailoring to the customer's production and marketing requirements. SE sources such parts from independent suppliers at Level II on the Asanuma scale: the supplier works from blueprints that the manufacturer provides. MEI, too, sources structure (plastic) parts from independent suppliers, but its purchases of this type are preponderantly with *kyoei* companies. Most importantly, MEI's procurement of these parts from independent companies, like SE's, is pitched at Asanuma Level II. When MEI sources the same parts from *kyoei* members, on the other hand, the supplier's responsibility shifts to Level III: the customer provides only no more than rough drawings, leaving the detailed designs to the discretion of the supplier.

A parallel pattern for a different part and different mode of network governance is that both MEI and SE source PCB's from independent suppliers at Asanuma Level I—the manufacturer monopolizes the design phase and the supplier merely executes. MEI's sourcing of PCB's from affiliated suppliers, however, occurs at Level III.

Finally, both manufacturers buy electronic parts from a mix of affiliated ("*keiretsu*") and independent suppliers. Consistent with other patterns in the table, MEI's procurement of electronic parts from affiliated companies (Level VI: "black box") is more cooperative and relation-specific than its sourcing from independent suppliers (Level VII: "marketed goods"). Indeed, the bulk of MEI's outsourced electronic parts come from these two affiliates -- Matsushita Denshi Buhin and Matsushita Denshi Kogyo—which respectively provide more than 50% and 80% of the TV division's inputs of cathode-ray tubes and semiconductors, respectively. MEI buys the remainder from large independent manufacturers.

As noted above, both MEI and SE source all their electronic parts as Level VII marketed goods from a mix of *kyoei*, affiliated, and independent firms. The part in this case fully determines the nature of the customer-supplier relationship, so our hypotheses as to differences between manufacturers and among governance forms cannot be addressed.

Thus, for the same class of part, MEI's purchases from the *kyoei-kai* involve greater supplier responsibility and cooperation than is true of SE's purchases from its independent suppliers. This finding is consistent with the hypothesis that the knowledge-sharing and organizational learning of the *kyoei-kai* have resulted in design and development collaboration between MEI and its top suppliers. In MEI's case, purchases from affiliated suppliers have similar implications for the nature of the supply transaction-sharing, but we discern no such difference between SE's affiliated and independent suppliers. For MEI, *kyoei-kai* and *keiretsu* operate similarly to bind manufacturer and supplier in a collaborative pact such that development tasks are truly shared. In SE's case, there is no *kyoei-kai*, and affiliated companies receive no special treatment. For SE, the division of labor between manufacturer and supplier is fixed, SE controlling all phases of the design process for structure parts and the supplier monopolizing the design and manufacturing of electronic and electro-mechanical parts.

Conclusions

Stable collaborative interfirm relations are widely seen to be a fruitful alternative to arms-length market contracting and integration under a corporate hierarchy, and considerable recent theoretical and empirical literature addresses their causes and consequences. We study a distinction in organizations' choice of collaborative forms to which a few important studies have given attention, but which on the whole have not received the research scrutiny they deserve. We develop a theoretical argument for the distinctiveness and complementarity of dyadic and network modes of organizing purchase-supply relationships, and we provide some empirical evidence that the distinction is key to how two major Japanese electronics firms differ in the management of their production supply chains.

Our comparison of the procurement practices of the television manufacturing divisions of Matsushita Electric Industrial and Sanyo Electric underscore some important differences in how Japanese electronics manufacturers collaborate with and share responsibility with their parts suppliers and how governance modes affect those differences. Our principal argument is that through its supplier cooperative association (the *kyoei-kai*) and its coherent *keiretsu* grouping of affiliated companies, MEI manages its supplier base as a *network*, not an assemblage of disconnected dyads, and that MEI's strategy in this regard accounts for the collaboration and knowledge-sharing in product and process design we find between MEI and its primary suppliers as compared with SE. Such collaboration, in turn, has enabled MEI to reduce its reliance on highly standardized catalog components by motivating suppliers to make specific investments in parts and assemblies customized to MEI's particular needs.

The difference between MEI and SE is not, we argue, that the first maintains high-trust relational contracts with its suppliers while the second transacts with them at arms-length. Both MEI and SE have stable and supportive relationships with their strategic (elite) suppliers. Indeed, MEI's pairwise dealings with its suppliers are by reputation, at least, the more *kibishi* (strict) and *dorai* (dry, cold). SE has no *kyoei-kai*, but, like MEI, it buys parts and subassemblies from an array of subsidiaries and affiliates linked to it by equity ties and personnel placements. Yet SE's relationships with its suppliers, whether independent or affiliated, are essentially *dyadic*. SE's suppliers are not organized into strategic groupings, nor has SE sought to foster knowledge-sharing and cooperation among the suppliers themselves. The principal horizontal relationship it cultivated among them is competitive rivalry. In contrast, MEI, most conspicuously in the *kyoei-kai* but also in its *keiretsu* network of affiliated companies, has fostered active collaboration and responsibility-sharing with its elite domestic supplier pool, although, as part of the same program, it has stoked the flames of competition between that pool and its large and growing offshore supplier base.

These results draw our attention to the need for more research on long-term collaborative interorganizational relationships and for greater theoretical emphasis on network forms. The network perspective with its stress on the emergent properties of collectivities is an essentially sociological one, contrasting with the individualistic and dyadic perspectives of organizational economics. It thus alerts the researcher to a set of phenomena with important implications for the behavior of firms and the performance of economic systems that economics theories tend to overlook. Both streams of theorizing would, of course, gain from further research on the interplay of network and dyad processes in a variety of interorganizational settings.

Moreover, we need not belabor the value of our research for practitioners. If our perspective on the importance of network structures and processes is correct, the best intentioned and executed strategies of supply chain and other interorganizational management may fall flat, because managers are failing to devote attention to a critical set of causal processes. Managers, as Powell and Koput's (1996) informant observed, must look beyond dyadic alliances to how they might identify, organize, and sustain productive relationships at the network level.

We have stressed the benefits to MEI from its network approach to supplier relationships with both its affiliated and *kyoei-kai* partners. However, the construction and management of a network is not without cost. We noted the heavy investment made by MEI's headquarter level purchasing department (the Shizai Center) in the development and administration of the *kyoei-kai*. Furthermore, the management of supply relations within a complex network is more constraining and cumbersome than is the management of a series of independent dyadic customer-supplier ties. Networks are by definition densely coupled systems where interaction effects and other systemic complexities abound. Many of these, such as the learning and responsibility-sharing we have referred to, are desirable from the standpoint of the manufacturer. Others, needless to say, are not. MEI's and SE's practice of absorbing a supplier's risks by shifting it between lines of business is fraught with adverse unintended consequences if the skills of the supplier are integral to a nexus of partnerships within the supplier community on which the success of the entire manufacturing operation depends.

Similarly, a manufacturer whose supply relations are essentially dyadic may have to overcome less organizational inertia than one whose purchasing transactions are intertwined in a network form. This is particularly salient in times of economic contraction, when cost reduction is a paramount concern and reduction of component and materials costs is sought through offshore dispersion of production and procurement. The trend in the Japanese auto industry has been one of increasing standardization and substitutability of parts, so as to reduce development costs and raise economies of scale in purchasing (Ahmadjian and Lincoln, 2001). A casualty of this trend is the withering of traditional *keiretsu*-style supply networks. Advances in technology combined with global diffusion of what were once uniquely Japanese manufacturing methods may be enabling such developments without the tradeoffs in quality that they once implied.

Indeed, as we write in 2002, Sanyo Electric's corporate financial performance has markedly outstripped Matsushita's and that of most other large Japanese electronics firms. After an earnings decline of 37% in 1999, Sanyo aggressively cut costs, scrapped uncompetitive lines of business, streamlined its supply chain, and through a series of well-timed and –chosen acquisitions expanded into some new and profitable lines of business (e.g., rechargeable batteries, digital cameras, and cellular phone components). Matsushita, by contrast, is regularly criticized for its weddedness to low margin businesses and its slowness in jettisoning what some see as a costly and cumbersome organization structure (the decentralized divisional system) and management style (the paternalistic culture descended from the teachings of founder Konosuke Matsushita; see Shimotani, 2002).

The economic stagnation of the Japanese economy is a force for change in purchase-supply relations in electronics and other industries. Companies like MEI try to weather the hard times while maintaining commitments to a select pool of elite domestic suppliers (affiliated and *kyoei* suppliers) able to offer customized and sophisticated parts and sub-systems. Other manufacturers are more aggressive in letting their domestic suppliers go, abandoning the long-term commitments and relation-specific assets that have been the hallmark of Japanese industrial goods markets and the erstwhile key to Japanese manufacturing success. In the auto industry, Renault-controlled Nissan's radical and to date successful overhaul and downsizing of its *keiretsu* supply network is a model of restructuring that other Japanese manufacturers are watching and will likely emulate in growing numbers in the years to come. MEI's weak earnings performance is driving it to step up cost reduction. Its reliance on offshore suppliers is growing rapidly and its domestic purchases declining. The *kyoei-kai* is in difficulty as a consequence. Member suppliers are leaving, as their business with MEI falls off. These developments, in our view, constitute indictment of the *kyoei* program. MEI's investment in upgrading the skill and knowledge of its best suppliers clearly paid off in greater sharing of the burden of innovation with a network of trusted partners and in greater technological and manufacturing capability for the MEI manufacturing enterprise as a whole. Even the best business strategies, however, are undone by circumstances, and the circumstances surrounding Japanese manufacturing have been difficult for some time. Its strengths notwithstanding, the *kyoei* model may have been a better adaptation to the Japanese economy of another day.

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TABLE 1: CLASSIFICATION OF PARTS AND SUPPLIERS ACCORDING TO THE DEGREE OF INITIATIVE in Design of the Product and the Process and by type of governance structure*

Parts manufactured according to specifications provided by the core firm (“ordered goods”)

Parts offered by catalog (“marketed goods”)

	Parts manufactured according to drawings provided by the core firm (DS)			Parts manufactured according to drawings provided by suppliers (DA)			
	I	II	III	IV	V	VI	VII
	The core firm provides minute instructions for the manufacturing process	Supplier designs the manufacturing process based on blueprints of products provided by the core firm	The core firm provides only rough drawings and their completion is entrusted to the supplier	Core firm provides specifications and has deep knowledge of the manufacturing process	Intermediate region between IV and VI	Although the core firms issues specifications, it has only limited knowledge concerning the process	The core firm selects from a catalog offered by the supplier
PCBs	I (MEI=4, SE=2)		A (MEI=1)				
<i>Electromechanical</i> - Resistances - Switches							A (MEI=4), K (MEI=2), I (MEI=1, SE=3) A (MEI=4), K (MEI=2) I (MEI=1, SE=2)
<i>Electronic parts:</i> - Semiconductors - CR tubes						A (MEI=1) A (MEI=1)	A (SE=2), I (MEI=34, SE=36) I (MEI=3, SE=4)
<i>Structure parts:</i> - Cabinet - Plastic parts		I (SE=2) I (MEI=5, SE=2)	K (MEI=3) K (MEI=3)				
Sub-assembly	K (MEI=8), I (MEI=1, SE=1)						
Mold		I (MEI=1, SE=1)	K (MEI=3)				

Sources: Interviews

* A: Affiliated company
K: *Kyoryoku* supplier

MEI: Matsushita Electric Industrial
SE: Sanyo Electric I: Independent supplier