EVALUATING A JOINT VENTURE: NUMMI AT AGE 20

Edwin C. Duerr*
San Francisco State University

Mitsuko S. Duerr
San Francisco State University

Gerardo R. Ungson
San Francisco State University

Yim-Yu Wong
San Francisco State University

ABSTRACT

In 2004, General Motors and Toyota celebrated the 20th anniversary of the formation of their 50-50 joint venture, New United Motor Manufacturing, Inc.(NUMMI). The success of this joint venture is set in sharp contrast to the pattern of failures of strategic alliances documented in empirical research. To explain this, we recast NUMMI in terms of an alliance learning model, and organize in three sections. First, we discuss the case of NUMMI derived from published sources and our own interviews with Toyota at different stages of the joint venture; second, we develop a conceptual model depicting learning dynamics and possible extensions of extant theories; and third, as a prelude to future endeavors by both firms, this paper explores the evidence regarding what was learned, the differences in benefits derived, and the probable causes of these differences based on field interviews.

Key Words: international joint ventures, organizational learning; labor relations; productivity and quality improvement; transparency; behavioral, design and coordination processes.

INTRODUCTION

In 2004 General Motors and Toyota celebrated the 20th anniversary of the formation of their 50-50 joint venture, New United Motor Manufacturing, Inc. (NUMMI). The visibility and prominence of this joint venture has prompted a flurry of papers, books,

* Corresponding author. Address: 2731 St. James Road, Belmont, California, USA, 94002
E-mail: theduerrs@comcast.net, eduerr@sfsu.edu

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commentaries, and cases in both the academic and populist circles.[1] The processes underlying NUMMI, particularly the learning opportunities afforded to General Motors and Toyota, have been touted as the exemplar of best management practices, offering a benchmark for erstwhile alliances in the future.

The success of NUMMI stands in stark contrast to the gloomy statistics depicting the failure rates of joint ventures and other forms of strategic alliances (see Dymstra 1986, Park & Russo 1996). Statistics suggest that failure among joint ventures is oftentimes the rule rather than the exemption, that managing alliances is daunting, and that cross-border alliances involving a partnership between firms from two different countries (such as NUMMI) are fraught with problems of coordination and opportunism (Reich and Mankin 1986, Hamel, Doz & Prahalad 1989).

Such concerns notwithstanding, NUMMI impels a different story about cross-border alliances that, while competitive rivalry is not eradicated in an alliance, cooperation can emerge from behavioral, structural, and coordinative processes that reduce opportunism, foster learning, and deepen mutual trust. In this paper we elaborate on two facets of this story: the learning dynamics that underlie cooperation through well-designed processes. The first facet is based on our critical reading of NUMMI's history and field interviews leading to a specification of a learning model that extends extant theories. The second facet is based on more recent field interviews, particularly with Toyota Corp., that offer fine-grained interpretations of how the company leveraged what it learned from NUMMI to future endeavors.

The paper is organized as follows: First, we discuss the case of NUMMI derived from published sources and our own interviews with Toyota at different stages of the joint venture; second, based on the case context, we develop a conceptual model depicting learning dynamics with extensions of extant theories; and third, as a prelude to future endeavors by both firms, this paper explores the evidence regarding what was learned, the differences in benefits derived, and the probable causes of these differences based on field interviews.

NUMMI: HISTORY AND BACKGROUND

New United Motor Manufacturing, Inc. (hereafter NUMMI) was conceived as a partnership to bring together complementary resources in some synergistic fashion, despite the fact that the partners had been historical and fierce competitors. In the broadest terms, Toyota wanted to know how to operate in the United States, and General Motors wanted to learn more about the Toyota production system and cooperative labor relations.

In the 1980s, GM and Toyota applied to the U.S. Federal Trade Commission for permission to form a joint venture located in Fremont, California. In 1984, permission was granted for a joint venture, NUMMI, to be operated for a period of twelve years.

Following its early success in labor relations and manufacturing, in 1993, General Motors Toyota, and NUMMI jointly petitioned the FTC to vacate the original order limiting the joint venture to a twelve-year life and to remove other restrictions that had been placed on it.

What aroused interest in NUMMI was its success, despite early skepticism and conditions that hardly seemed ideal (Inkpen 2005). The manufacturing plant used was a General Motors facility that had been closed in 1982 due primarily to poor productivity, poor quality, and labor problems. Understandably, the first steps taken by NUMMI were designed to signal a new form of labor-management relations. Prior to the actual incorporation of NUMMI, representatives of the United Auto Workers, General Motors, and Toyota had already signed a Letter of Intent formalizing a new, cooperative approach to union-management relations. Following the incorporation of NUMMI, applications were sent to some 5,000 former GM-Fremont employees; this gesture was taken as a sign of good faith. Taken in this context, the level of trust developed by these processes was such that workers were hired and initial production begun even before the formal labor agreement was signed between UAW Local 2244 and NUMMI in 1985.

To date, it is widely recognized that NUMMI has been a relatively successful joint venture, surpassing initial expectations and invalidating the skepticism from its early critics. Its early products, the Chevrolet Nova (1984) and the Toyota Corolla FX16 (1986) --- both produced on the same assembly line by the same workers ---garnered awards for quality and performance (*J. D. Power and Associates Initial Quality, Top Car under $15,000 ratings from the American Automobile Association, Consumer Digest's "Best Buy" rankings*; *Environment Management Certification (ISO 14001*) (NUMMI, 2004; Hoovers, 2004). Recently, the 2005 model of the Toyota Tacoma was named "truck of the year" by *Motor Trend Magazine* and "All-Star Pickup" of the year by *Automobile Magazine*. The joint venture produced its sixth millionth vehicle in 2005, and it is currently producing at its highest rate ever (Interview 2005, Research Methodology, Appendix 1). NUMMI has been rated highly for its skilled workforce, good labor relations, high productivity, well-designed vehicles, and well-organized plant. There has never been a strike at NUMMI, though there was a one-hour stoppage of work in 1993 during contract negotiations. No employees have ever been laid off because of lack of work or downtime due to changeovers (Wallack 2005).

NUMMI's success record contrasts sharply from patterns of alliance failure that are documented in published research (Dymstra 1986, Park & Russo 1996). To analyze this issue further, the rest of this paper unpacks the dynamics of learning and cooperation, demarcating what might distinguish NUMMI from other strategic alliances. Our analysis covers what both firms learned and how might this learning be leveraged into future strategic activities. In preparing this paper, the authors used primary and secondary research. During the period from 1983 through 2004, two of

the authors attended meetings and conducted interviews with Japanese executives in both Japan and the U.S., with American managers and workers from NUMMI, with a UAW union official, and with executives from General Motors. They visited Toyota factories in Toyota City, Japan and the NUMMI plant in California (see Research Methodology, Appendix 1).

OBJECTIVES OF THE JOINT VENTURE PARTNERS

Background

Imperatives for a strategic partnership between General Motors and Toyota were tempered by a history of competitive rivalry between Japanese and U.S. automakers, environmental conditions that favored the Japanese firms, protectionist sentiments and policies by the U.S. government, and a growing realization that partnerships provided a way to assuage heightened competition and protectionism. Historically, U.S. automobile manufacturers had concentrated on large automobiles. While several U.S. companies had produced small automobiles even before the Japanese entered the U.S. market, at the prices offered by the American manufacturers, market demand for most models had been weak. During the 1970s and 1980s, it was largely imported cars that met the growing demand for small cars. Because U.S. automakers were not able to produce small cars at as low a price or as high in quality as those made in Japan, at the time of the oil crises they were not in a position to compete effectively in this market segment. Not surprisingly, they placed the blame on unfair competition, the cheap and exploited or unreasonably hard-working Japanese labor force, and/or on American unionized labor that produced poor quality products at high cost.

Meanwhile, the Japanese, with increasing dominance in compacts and sub-compacts, captured a growing share of the total U.S. market for cars. Their success only aroused protectionist sentiments within the United States. Not ignored by critics was that employment in the U.S. automobile industry fell by 33.6 percent, a loss of 347,000 jobs (Wong 1989). The Reagan Administration convinced the Japanese government to impose a limit on its exports --- a Voluntary Restraint Agreement (VRA) --- in 1981. Under this agreement, Japanese imports were to be restricted to 1.68 million units per year or 17.5 percent of American market demand (Prestowitz 1989). The limits were raised in 1984 and again in 1986, but still placed an absolute limit on the number of automobiles Japan could export.

From the standpoint of the Japanese firms, imposing a VRA seemed preferable to the possibility that the U.S. government might impose even stricter quotas. The VRA did not reduce the profits of the Japanese automobile manufacturers as they had been selling at prices well below those that the U.S. competition could offer. The imposition of VRA simply changed their strategies and tactics: they placed more required options on their cars, introduced more expensive models, and eventually

raised prices. It has been estimated that the VRA thus increased the profits of the Japanese companies by $1 billion to 1.6 billion in 1983, and by $1.6 billion to $2.6 billion in 1984 (Smith 1989).

Nevertheless, Japanese manufacturers still desired to increase market share in the U.S. beyond what the VRA would permit. Honda started manufacturing automobiles in a plant in Marysville, Ohio in 1982 and Nissan began production in Smyrna, Tennessee in 1983 (Wong 1989). These factories produced automobiles of higher quality and at lower costs than American-owned plants did, leading to a realization by some U.S. automakers that at least part of the Japanese success was due to their management policies and production systems.

Toyota's objectives

Toyota's initial attempt to export compact cars to the U.S. in 1958 had failed because of poor quality and styling. After redesigning their automobiles and improving quality, the company made a second, and successful, entry into the American market. When the oil crises of 1973 and 1978-9 greatly increased U.S. demand for compact and sub-compact cars as gasoline shortages and sharp price increases occurred, Toyota and several other Japanese manufacturers were well positioned to supply this growing market with their high quality, fuel-efficient vehicles.

Toyota's primary objective in beginning manufacturing in the United States was to protect and increase its market share. It had a long-range goal of surpassing General Motors as the world's leading manufacturer of automobiles. It had already overtaken Nissan to become Japan's largest automobile manufacturer. While Toyota preferred to manufacture only in Japan and export their cars to world markets, with the VRA, and Honda and Nissan producing cars in the U.S., the company felt that it also had to establish manufacturing facilities there.

In contrast to wholly owned subsidiaries, a joint venture was viewed as lowering the risk of overcommitment, while providing flexibility in overcoming potential coordination problems. Toyota wanted to (1) gain experience with American unionized labor, (2) gain experience with American suppliers, and (3) help diffuse the trade issue between the United States and Japan. (*Community Relations Department* 1990) Regarding the third objective, the job-creating effects of foreign direct investment are believed to defuse the protectionist sentiments (Wong 1989). Douglas Fraser, then president of the United Automobile Workers union, earlier had gone to Japan to urge Toyota and Nissan to build factories in the United States but, upon receiving little encouragement at the time, had begun lobbying for protectionist policies (Gelsanliter 1992). Against this background Eiji Toyota, then Chairman of Toyota Motor Company, stated that they hoped NUMMI would be "a model of economic cooperation between Japan and the United States – one that contributes to the American economy" (NUMMI 2004).

GM's objectives

General Motors (GM) had two major objectives in entering the joint venture: (1) "to gain first-hand experience with the extremely efficient and cost-effective Toyota production system," and (2) to obtain high quality automobiles for its Chevrolet division (*Community Relations Department* 1990). GM hoped that it could apply what it learned at NUMMI in its other plants, and gain great benefits on a diffused, company-wide basis.

General Motors' own multi-billion dollar investment in the Lordstown plant –an attempt to meet Japanese competition in compact car manufacturing-- had been a failure. Despite the fact that the facility was highly automated at a cost of billions of dollars, labor strife had curtailed any increase in productivity required to justify the facilities' investment in automation. The workers viewed any increases in productivity as potential threats to their jobs, and with GM's policy of laying off excess workers, such only confirmed their worst fears (Tsurumi 1984). In terms of NUMMI, the Nova, one of a family of GM sub-compacts, was to be produced and priced at a level to allow GM to compete more effectively in that part of the U.S. market.

LEARNING DYNAMICS: THE CONTEXT OF NUMMI

Even when two partners in a joint venture enter with good intentions, the venture is vulnerable to failure for many reasons. Kogut (1991) has argued that, despite good intentions, competitive rivalry is not fully eradicated in any partnership. Therefore, firms might see themselves as erstwhile partners in the short run, but as formidable foes in the future. Moreover, coordination issues are formidable—problems that are exacerbated in a cross-border alliance (Park & Ungson 1997). As such, other theorists see alliance resulting from a breakdown in learning dynamics (Hamel, Doz & Prahalad 1989). After the formation of the alliance, each partner embarks on a learning trajectory about each other. If both partners are learning at their own pre-determined pace, the alliance is stable. If, however, one partner earns at the expense of the other, then a "dependency spiral" occurs, where one partner become overly dependent on the other (Hamel et al. 1989). In such cases, alliances become unstable and even subsequently fail.

The success of an alliance is influenced by the extent to which firms or partners can learn from each other, as trust and commitment result from the successful exchange of knowledge. Learning is determined by: (1) the propensity or desire for one partner (firm) to learn the core skills of another, and (2) the degree to which partners are "transparent,' that is, easy to learn about. This refers to the degree to which a partner can see through or interpret the actions and intent of the other partner (Hamel et al. 1989). Naturally transparency is achieved when partners adopt clear and explicit learning goals, as they become the object of purposeful search,

rather than having to occur surreptitiously in a partner's actions and behavior. In addition, transparency is enhanced to the extent to which partners are less arrogant and strive to learn each other's customs and traditions.

Accommodating Learning Objectives

Taken in the above context, we now examine how learning developed within NUMMI. In the original division of responsibilities for the joint venture, Toyota was to be responsible for manufacturing while General Motors was to market all of the output. The only car to be produced was the Chevrolet Nova. Toyota entered into the agreement with the full intention of using its own approaches to manufacturing. While preserving the basic approach they used in Japan, they attempted to learn everything they could about American labor relations and American values.

A General Motors executive commented that: "The nature of Toyota is not to copy anyone. They are avid learners and carefully watch what others do, learning from the mistakes of others as well as from their own mistakes…. They wanted a lot of counsel and advice - they knew nothing about (our) labor unions or the psyche of American workers…. They wanted more information about U.S. labor relations than GM felt comfortable in divulging" (Interview 1990c, Research Methodology Appendix 1).

Some of the modifications to policies used in Japan that Toyota made at NUMMI were relatively minor, though quite effective. The joint venture provided only one cafeteria to serve both workers and managers, something that is not done in their Japanese plants (nor in typical American plants). The parking lot at NUMMI is on a first-come, first-served basis without reserved spaces for managers (though reserved spaces are provided for visitors). Again, this is not done in Japan. In a visit to the NUMMI plant in 2004, two of the authors noted that the employees now wave to visitors going by in plant tour vehicles. This had not been done in earlier years, but the value of it was apparent. Besides giving a good impression to visitors, the visitors tend to give friendly waves in return giving a more friendly environment overall. (Factory visit 2004, Research Methodology Appendix 1).

Developing cooperative management-labor relations

Management-labor relations in major industries in Japan, at the time NUMMI was formed and for many years afterwards, were generally cooperative rather than confrontational. This was supported and reinforced by a system sometimes called 'lifetime employment.' Regular employees could expect to be kept on the job even when improvements in productivity or reduced demand made positions redundant. They also shared in increases in profits. In turn, employers could expect their workers to give total loyalty as well as support for productivity and quality improvements. This system is presently changing with only a minority of the total workforce now covered,

but it still provides the model for management-labor relations in Japan (Duerr & Duerr 1998).

While NUMMI could not offer lifetime employment, the United Auto Workers union was invited to participate in the development of a collective bargaining agreement along with Toyota and GM representatives (including former U.S. Secretary of Labor W.J. Usery). The Letter of Intent stated: "Both parties are undertaking this new proposed relationship with the full intention of fostering an innovative labor relations structure, minimizing the traditional adversarial roles and emphasizing mutual trust and good faith" (*International Labor*… 1990).

The final result was a labor agreement offering the highest level of security in the U.S. automobile industry. It provided for advance consultation with the union on major business decisions, non-confrontational problem-resolution procedures based on discussion and consensus, and provisions giving team members (workers) the right to stop the line combined with a limited no-strike provision (*Collective Bargaining Agreement 1985).*

A unique feature of the contract was that the company would not lay off employees unless compelled to do so by severe economic conditions threatening the company's long-term financial viability (NUMMI 2004, "NUMMI is…" 2004). This commitment was tested in 1987 when reduced demand for the automobiles caused line slowdowns and an excess number of workers. Even so, NUMMI did not lay off any workers. They reduced the number on the assembly line, but reassigned the excess workers to "continual improvement teams" and to training to upgrade their skills. NUMMI lost $80 million in 1988 and additional money in 1989 (Hof & Treece 1989).

Similarly in 2004 when the company shut down the truck line to set up for a new model, it did not furlough any workers. Instead, the time was spent in retraining team members to work more productively on the remodeled line (Wallack 2005).

Careful selection and training of workers

Applicants for positions at NUMMI were (and still are) carefully selected (Interviews 2004, Research Methodology Appendix 1). They are told that all employees need to be willing to contribute to an atmosphere of trust and cooperation. Potential production employees go through a three-day assessment that includes production simulations, individual and group discussions, and written tests and interviews. Those hired go through a four-day orientation covering the team concept, production system, quality principles, attendance policies, safety policies, labor management philosophies, and the competitive position of the auto industry (Factory visit 2004, Research Methodology Appendix 1, NUMMI 2004).

In 1984 the first 26 production workers hired included most of the former officers of the UAW local union. This might seem like a strange choice, given the difficult labor problems GM had when it operated the Fremont plant. However, the

union had worked cooperatively in designing the new management-labor system. Furthermore, having been elected union officers in the past indicated that the individuals had leadership potential.

The former union officers, now NUMMI hourly workers, were invited to help in interviewing and evaluating additional applicants for jobs. They participated in orientation sessions, played an important role in training, and participated in discussions about the selection of supervisors. Approximately 85 percent of the initial total workforce was comprised of former GM Fremont plant UAW workers.

Though hiring began in May 1984, initial assembly did not start until December of that year and actual full production on the first shift wasn't reached until eleven months later. The reason for the slow start was Toyota's plan to provide a high level of training. Beginning in June 1984, several groups of 32 members each were sent to Toyota's Takaoka plant in Japan for three weeks of classroom and on-the-job training. The membership typically included group leaders, team leaders, and union representatives. Returnees became the trainees for newly hired workers. A total of 450 group leaders and team leaders eventually went to Japan. Many NUMMI employees still go to Japan to observe operations and training, but most methods have been institutionalized at the Fremont plant now. Currently, almost all on-going training is done at the NUMMI plant in a two to four week "Foundations in Training" program (Factory visit 2004, Research Methodology Appendix 1).

Extensive retraining of current team members is carried out when new models are introduced. In 2004 the Toyota Tacoma pickup truck assembly line was shut down for two weeks for changes to the equipment and the retraining of the thousands of workers who operate the line (Wallack 2005). NUMMI accepted the loss of output during shutdown in order to ensure that quality and productivity would be maintained.

Stressing teamwork and responsibility of the individual

From the beginning of discussions with the union, there has been an emphasis on a team approach. Each worker is assigned to a four- to eight-person team with a team leader who may also be a union coordinator. Above the team leaders are group leaders who coordinate three or four teams each.

Each team is responsible for doing the work assigned to it, and each team member is responsible for supporting his/her team. Individual members are responsible for improving their own productivity and efficiency, and teams are responsible for improving operations in their areas of responsibility. Teams are kept informed of company objectives in quality, cost, production, and safety, and the teams' parts in meeting these objectives. There are periodic reviews and evaluations of performance.

Team members receive training in problem-solving methods. In accordance with the Collective Bargaining Agreement they are responsible "for participation in

Quality/Productivity improvement programs such as QC circles" (Collective Bargaining Agreement 1985). The company, teams, and individual employees take pride in the improvements that have been made due to their suggestions, particularly the suggestions that have subsequently been adopted in the similar Toyota plant in Japan (Factory visit 2004, and earlier visits, Research Methodology Appendix 1).

In the production groups, each member is cross-trained to do every job. For production line workers, there are only two work classifications. Workers in the skilled trades are divided into three functional areas. Under GM, there were over 100 different job classifications in the plant.

NUMMI does not employ so-called 'relief workers,' individuals who are multi-skilled and without permanent assignments who can fill in for absent employees. Because each team member is cross-trained and there is a lack of restrictive job classifications, other members of the team can fill in for a member who is missing. When a person is absent from his team, the other members are expected to do his/her job in addition to their own. Thus if an employee is late or absent, it places an additional burden on all of his/her teammates. This provides peer pressure for being on time and doing a full share of the work.

NUMMI stresses consensus decision-making and channels for staff feedback, obtaining input from all areas concerned, and holding discussions until agreement is made. A GM executive who worked at the plant indicated that this resulted in slow decision-making, but that the managers never experienced surprise changes when they arrived in the morning (Interview 1990a, Research Methodology Appendix 1). Cultural openness, consensus decision-making, and channels for staff feedback are still in place.

Where the union is concerned, as when adding additional capacity for manufacturing compact trucks was proposed, they were consulted. In that case the company indicated that, in order to make such an expansion economically feasible, they would hire additional workers but would also need to be able to assign involuntary overtime. The union leaders objected to any mandatory overtime so the company said they would not make the trucks in Fremont. The union members, in turn, objected to what their leaders had decided and they immediately recalled the existing leaders and elected new ones. The expansion then went ahead. For decisions affecting only their own team or area, team members are encouraged to make their own decisions.

Worker responsibility and control in safety and quality

From the beginning, NUMMI recognized that for safety and quality to be given primary emphasis, the workers must be able to have some control over the process and operations. This is accomplished in two ways. First, any assembly line worker can stop the line in the event of safety or quality problems simply by pulling an overhead cord. No prior consultation with a supervisor is required.

Second, there are electric signboards located throughout the plant that are controlled by the workers. Each board has three lights: green, yellow, and red. Green indicates that everything is okay, yellow indicates that there is a problem that requires assistance but does not require shutdown of the line, and red indicates line shutdown. Yellow or red lights may be triggered by sensors on the machines themselves or by the workers pushing a button. The yellow light typically results in assistance being provided by the team leader or group leader.

Each worker and each team is responsible for ensuring that the materials, parts and components coming to them do not have identifiable defects and do fit properly into the assembly they are making. They are also responsible for ensuring that their work is done properly. The company's commitment to quality was clearly illustrated in August 1990. It was discovered that parts that had been received from a new supplier were defective. Rather than continue production with parts that might later require replacement, the plant was shut down for three days until new parts could be obtained. Cars that had already been produced were not shipped to dealers but were held for part replacements. Since it was not the workers' fault that the parts were defective, and NUMMI wanted to encourage them to report defects, the company offered the workers full pay for the period the plant was shut down (*San Francisco Chronicle* 1990).

Implementing the Toyota Production System

The successful implementation of the Toyota Production System at NUMMI required and was based upon the development of cooperative labor-management relations, careful selection and training of workers, development of teamwork, and giving workers the authority to assure safety and quality as outlined above. The elements of the lean production system include: a just-in-time inventory system; a quality assurance system under which workers do not allow defect parts to pass from one workstation to the next; continuous improvement to eliminate waste in machinery, material, labor, and production methods; standardizing of improved procedures ("NUMMI is…" 2004).

The just-in-time (JIT) inventory system is designed to produce only what is being ordered or sold rather than to produce for inventory that will be used to absorb ups and downs in demand. The JIT system has been modified at NUMMI to account for the fact that that some parts are obtained from suppliers located at a distance from the plant, may be subject to delays, and need to be purchased in quantities that may be shipped economically. Modification was also required by the need to run assembly lines at constant speeds in order to maximize productivity. Therefore some inventories of incoming materials and finished goods do occur, but are kept at a minimum. Finished parts are kept on the premises for 48 hours or less (Factory visit 2004, Research Methodology Appendix 1).

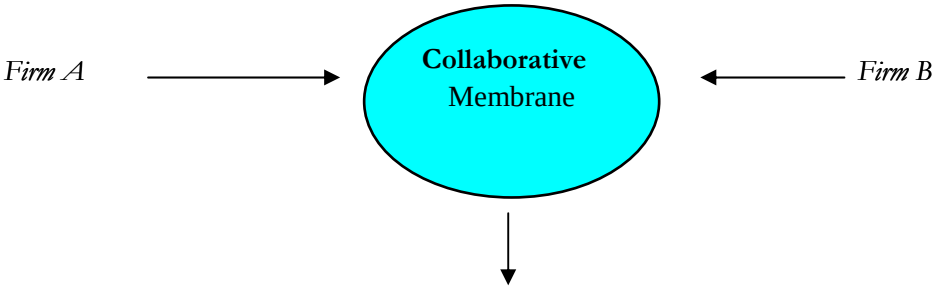
Continuous improvement and standardization of improved processes have resulted from suggestions made by teams and individual team members. Adopted by the company and made into standard practices, these have resulted in making work safer, easier, and/or more productive (Factory visit 2004, and earlier visits, Research Methodology Appendix 1). A continuing pressure for improvement comes from the electric signboards indicating the status of each process step at all times. A team leader who met with the authors away from the plant, and requested anonymity, indicated that some of the workers believe management wants all of the green lights to be on most of the time, but not all of the time. If the line is on green all of the time, except for unanticipated breakdowns (which should be virtually eliminated by preventive maintenance), it means things are too easy. Then the line speed should be increased until yellows and/or reds appear occasionally. These distress signs will point up the weakest parts of the system, which can then be studied to find ways of improvement. When the line is back to all green again, another speed increase can be used to identify the next bottleneck.

A question arises over the effect of the continued increase in line speeds has had on worker support of NUMMI's overall approach. Ken Higashi, when president of NUMMI, indicated that the workers went through several stages after the beginning of production at the plant. First, they were very happy just to have jobs with good pay and benefits, and did not complain. Then they began to feel that they were being pushed too hard. But in 1987, when there were no layoffs in spite of low demand and cutbacks in production, "the workers realized that they were greatly appreciated" and "began to fully realize that we really do value them as an important part of the company" (Interview 1990c, Research Methodology Appendix 1). Since then, the company has continued to add more workers as production has increased, and it appears that the workers do realize that their hard work is giving them secure employment.

LEARNING DYNAMICS REVISITED: APPLYING LESSONS LEARNED FROM NUMMI

The NUMMI case illustrates how favorable dispositions toward cooperative relations can enhance the viability of a joint venture. Moreover, learning that occurs simultaneously, or at least within acceptable levels, can enhance the stability of exchange-relationships. The NUMMI case study unpacks a number of processes that are essential in reducing competitive rivalry and fostering a degree of transparency between two partners. Figure 1 depicts the key elements underlying these processes and a framework for our ensuing discussion.

Figure 1: Learning Dynamics Revisited: The NUMMI Context



TRANSPARENCY: Transparency is the degree to which a partner can see through or interpret the actions/intent of the other partner. In order to enhance transparency and increase the opportunities for a joint venture to succeed, structural processes can be designed and implemented to meet this objective. Such processes include the following:

BEHAVIORAL ACTIONS

Set learning goals
Eliminate arrogance
Involving key people

DESIGN CONSIDERATIONS

Serial vs. parallel structures affect learning and trust
Understand information/diffusion flows

MONITORING AND COORDINATION ACTIVITIES

Information exchange
Learn to resolve conflicts

INSTITUTIONAL CONSIDERATIONS

Cultural values favoring trust
Concern for reputation

Learning is established when partners in an alliance are able to increase their levels of trust and collaboration, a sphere that is called the "collaborative membrane" (Hamel et al. 1989). By increasing on this collaborative membrane, firms are able to reduce their wariness of each other that might be prevalent at the onset of the partnership and eventually build trust. The learning dynamic that is salient here is the enhancement of transparency. As argued earlier, transparency is the degree to which the partner can see through or interpret the actions/intent of the other partner. To

enhance transparency, some key structural processes are needed. We discuss each of these processes and how they are illuminated by the NUMMI experience.

Behavioral actions

In the alliance literature (Park & Russo 1996), the stability of a strategic alliance is influenced by the degree of trust between partners. In general, trust is sustained by previous performance, a relatively open-relationship, and a concern for one's reputation. These are enacted by fundamental behavioral predispositions and actions that can include: setting learning goals, eliminating arrogance, and involving key people.

Within NUMMI, initial learning goals were clearly defined, as manifested in the original division of labor and assignments. Each learning goal capitalized on the distinctive strengths of Toyota and General Motors, with the specialization of each firm enhancing the fundamental goals of the joint venture. In this regard, employees were carefully selected and socialized to the goals and values of NUMMI. Of more importance, however, was how the firms modified some of these goals over the duration of the partnership as they became more comfortable with each other. There is evidence that the desire to accommodate each other trumped any insipient arrogance, and that management ensured that key decisions and actions involved key personnel.

The salience of learning goals is ably illustrated in a case study of Jamie Hresko who joined NUMMI primarily to "test" out what had been said about the company (O'Reilly 1998). After learning the job, Hresko proceeded to violate some of the production and safety regulations around error proofing, cycle time, and materials handling. He tried to extend his lunch break by two minutes and slackened off required quality checks. He was immediately sanctioned by other team members, but not the team leader. Hresko added that, even with the sanctions, there was a willingness among his co-workers to help him fix the quality problems, to cover for him if his excuse for lateness was important, and a check by another co-worker to ensure that his errors were not repeated. This focused on helping others and be within overall company goals left a considerable positive impression on Hresko.

Design considerations

In the learning literature (Hamel et al. 1989), learning depends on how well participating firms are able to understand how they are interdependent on each other. Any exchange of information and core skills will be influenced by whether contributions by participants can be made sequentially or in parallel. In a sequential exchange of tasks, one partner completes the task before transferring it to the other partner. This has been characteristic of many alliances featuring product design and development, mostly between U.S. firms in partnership with other local firms. While this schema is helpful in securing the benefits of specialization, it is not ideal from the

standpoint of access and transparency because learning is not facilitated. In contrast, parallel or simultaneous exchange of tasks occurs when each partner participates in each stage of the venture's development. While perhaps slower to develop, it is more effective in developing shared bonds through repeated interactions. Thus, it facilitates greater transparency.

The NUMMI case illuminates more facets of parallel processing, more so than the sequential exchange of information. First, the emphasis on a team-based organization with a flat hierarchy placed a premium on team interdependence and unity. Second, consensual decision-making facilitated a wider sharing of issues and information-exchange before a decision is made among key parties. Second, since both Americans and Japanese operated under one plant, it was essential that both had to learn together, be it from successful experiments, or from mistakes. To ensure that teams were tightly coordinated, each team received a small social budget that they could use for social activities (O'Reilly 1998). Thirdly, the NUMMI reward structure that relied on a flat wage structure served to reinforce the belief that the company's fortunes depended on everyone's collective effort (O'Reilly 1998).

Additional testimony of good design is reflected in NUMMI's process of conflict resolution. In such cases, NUMMI's employees, whether they are Japanese or American, jointly participate in resolving problems. The General Manager of Human Resources indicated that the real key to labor-management relations was the way people deal with each other on a day-to day basis. When a work dispute arises on the production line and cannot be handled there, a call for assistance is sent to the personnel office. Union officers and company personnel people are stationed together in that office, and one of each go together to attempt to solve the problem. Employees who are late or absent are counseled by their team leaders, and assistance offered to them to solve their problems (transportation, etc.) if possible. Disciplinary actions are taken only in chronic cases and only after consultation with union representatives (Meeting 1985, Research Methodology Appendix 1).

Coordination and Controls

In the control literature (Park & Russo 1996), the decision to cooperate or compete depends on the effectiveness of administrative incentives and controls. Incentives to cooperate can be intrinsic and/or extrinsic in nature; controls refer to organizational arrangements designed to direct attention and effort to consortium goals. Because it is critical to exchange information and resources on a continual basis, measuring performance outcomes on an interim basis becomes a critical feature of alliance management.

Within NUMMI there was a concerted effort to continuously monitor and control for actions to ensure that these were in keeping with the overall goals of the alliance. What facilitated the coordination was the adoption of Japanese management

techniques and practices (the Toyota Production System, JIT, *keizen*) that broaden awareness and focused attention to the goals at hand. Both General Motors and Toyota have stated that they have benefited from participating in the joint venture. On February 12, 2004, Fujio Cho, President of Toyota Motor Corporation, and G. Richard Wagoner, Jr., Chairman and CEO of General Motors Corporation, held a by-invitation-only meeting to celebrate the 20th Anniversary of NUMMI. The meeting was followed by a dinner with remarks by NUMMI President Yukio Azuma, Bruce Lee of the United Auto Workers, and various dignitaries. All stressed the benefits of the joint venture to each participant. In a press conference, Wagoner stated that "From the start, NUMMI has succeeded in bringing jobs and economic development to California, in showing that global auto manufacturers can work together and learn from each other, and in demonstrating the value of global trade and cooperation." Cho commented that "NUMMI was Toyota's initiation into North American production. We are very proud to build quality products with GM. Without their partnership 20 years ago, Toyota would not be where it is today" (Hokubei Mainichi 2004).

Institutional Considerations

It has been contended that, in cross-border alliances, its success will depend on how the values and institutions that are imbedded within the nationalities of each partner lead to potential cooperation (or competition) in the presence of potential competition between them (Hill 1995, Park & Ungson 1997). Cultural differences *per se*, in this context, are significant, but not absolute in determining the success and failure of an alliance. Firms from trust-based cultures that hold reputation in high premium are more likely to endure as partners in an alliance, when compared to firms that are from cultures where trust and reputation are not regarded as highly (Park & Ungson 1997).

In the NUMMI case, the objectives of Toyota were affected by the basic values in Japanese society, the place of private enterprise in the nation, and the background and experiences of the leaders of the organizations. Japanese society has traditionally emphasized the primary importance of the group over the individual, and a hierarchy of groups with successively higher groups being more important than those at lower levels. After the Meiji Restoration of 1868 and the opening of Japan to the outside world, private enterprises expanded rapidly. They existed for the purpose of supporting the nation, rather than for providing goods and services for the people (as was the case in the West). Businesses were seen to serve in some ways to replace local organizations as the focus for loyalty and responsibility above the family and below the government (Duerr 1991). After an initial postwar-period of severe economic hardship, the Japanese government, larger businesses and labor all shared the objectives of economic growth and stability to help the nation to find its proper (greater/more respected) place in the world.

Despite the contrasting institutional backgrounds surrounding GM and Toyota, there is good evidence that values favoring cooperation over competition prevailed because both parties comprised and accommodated the *best* features of their institutional values. To wit, Toyota's basic approaches highlighted the following: (1) developing cooperative management-labor relations; (2) carefully selecting workers; (3) providing extensive training to workers; (4) stressing teamwork and the responsibility of the individual to the work group; (5) assigning responsibility for, and providing control over, quality and safety to workers at each operation; (6) implementing Toyota's 'lean production system' based upon the foundation of the first four key factors, and (7) applying the foundations for effective consensus building.

APPLYING LESSONS LEARNED AND EVALUATING THE BENEFITS

In this section we present the specifics of NUMMI's record and develop implications about lessons learned based on field interviews. Taken in the aggregate, NUMMI has become 40 percent more productive than the average American automobile manufacturing facility (Meeting 1988, Research Methodology Appendix 1). Researchers at the Massachusetts Institute of Technology estimated in 1988 that productivity at the NUMMI plant exceeded that of all American-owned U.S. automobile plants, except for Ford's Taurus facility with which it was approximately equal.

Labor relations have improved dramatically. At the end of the time when GM had been running the Fremont plant there was a backlog of over 1,000 grievances and 60 dispute firings. With absenteeism at over 20 percent, there were many days on which the plant could not start on time because not enough workers had showed up (International Labor… 1986). In the first two years under NUMMI management, attendance was at 98 percent with most of the absences occurring for excusable reasons. Only one grievance was not solved informally (International Labor… 1986). Absentee rates are still low by U.S. standards, though higher than at Toyota plants in Japan. Labor relations remain very good.

Even so, there were serious problems in marketing. Falling sales of the Chevrolet Nova resulted in a need to cut back production at NUMMI in the 1980s. Four problems have been suggested as accounting for Nova's poor sales: ineffective advertising (Treece, Zellinger & Walecia 1989); "experience with small Chevrolets has imbued customers with brand disloyalty that's hard to overcome" (*Consumer Reports*, 1986: 81); somewhat dull styling; and the fact that the Nova seemed somewhat expensive when compared with other small Chevrolet cars.

The introduction of a new Geo Prizm (for General Motors) did not sell as well as expected while the simultaneous introduction a new model of Toyota Corolla with similar styling and identical quality sold more than expected. Though both models had the same basic body and were produced on the same assembly line by the same workers at the same time, consumers simply believed that Toyotas were better cars. An article in *Fortune* in 1988 noted that "It may take years to turn around GM's reputation for bad quality and uninspired design" (Moore 1988).

Production of Toyota compact pickup trucks began in 1991 and redesigned models of the Tacoma were introduced in 1995 and 2004. The last Geo Prizm was built in 2001, and production of the Pontiac Vibe started in 2002. A right hand drive model of the Vibe named the Voltz, built for Toyota to export to Japan, also went into production in 2002. Sales in Japan were disappointing and the model was discontinued. The marketing situation for General Motors automobiles produced at NUMMI remains cloudy as the company continues to lose market share. At NUMMI, only 20 percent of current production is for the Pontiac Vibe, with the other 80 percent taken up by Toyota Corolla and Toyota Tacoma (Factory visit 2004, Research Methodology Appendix 1).

Both General Motors and Toyota have stated that they have benefited from participating in the joint venture (Meetings 2004, Research Methodology Appendix 1). The experience of Toyota at NUMMI has helped the company in realizing its primary objective. It has made some adjustments to the approaches it used in Fremont while keeping others the same:

- Its next factory was established as a wholly owned subsidiary, and located it in George town, Kentucky where it could hire a non-union workforce.

- Having found that it could achieve high productivity and quality with a moderate level of automation, it decided that it could do even better by investing in a higher level of automation for its new plant.

- Its favorable experience in Fremont has been followed with the implementation of similar policies in selection, training, sharing of information, and the use of the team approach in Georgetown.

Toyota made the greatest possible use of the experiences gained by the executives and managers initially assigned to NUMMI. Most of them were transferred as a group to the Georgetown factory. The personnel manager was later transferred from Kentucky back to Japan, where he was eventually put in charge of worldwide personnel relations for Toyota. The company did learn to work effectively with American suppliers or, to put it another way, American suppliers learned to work with

Toyota. With the experience and confidence gained at NUMMI, Toyota went on to open other factories overseas elsewhere. Toyota now holds 43 percent of its long-term assets, including production facilities, abroad (Suemura 2004).

Toyota's share of the American market has been increasing steadily since it began manufacturing in the U.S. From 1993 to 2002, its share of the passenger market increased from 7.4 to 12.8 percent, and its share of the sports/utility market increased from 4.1 to 9.2 percent. In 2003 its worldwide vehicle sales passed those of Ford Motor Company to make it the world's second largest automobile manufacturer. Its market share is continuing to expand and Toyota plans to begin producing large trucks in the U.S. in 2006 (*The Nikkei Weekly* 2005). The company now produces in North America 60% of the cars it sells there, and earns more than 70% of its profits in the U.S. (*Financial Times* 2004). It is the world's most profitable automotive company and its market capitalization is greater than that of GM, Ford, and DaimlerChrysler combined.

General Motors only partially achieved its two objectives of learning the Toyota production system and obtaining high quality automobiles for its Chevrolet Division. General Motors found it difficult to apply what it had learned from the joint venture to other GM plants. Even though GM also produced high quality small cars, the image and marketing problems did not allow it to achieve high sales volume. General Motors' managers who received training from NUMMI were not able to transfer the knowledge back to their home plants due to largely to their weakened position as an individual change agent who is not operated as a team in their home plants. The resistance from the home plant was too strong. GM later corrected it by sending the managers back as a team (Interview 1990a, Research Methodology Appendix 1).

GM also applied experience with NUMMI in an innovative small-car project named Saturn. Saturn was a success in achieving a high level of labor management cooperation, gaining sales to people who previously had purchased Japanese or European cars (70 percent of first time Saturn buyers had previously owned foreign-nameplate automobiles), and achieving high customer loyalty. But that loyalty did not transfer to other GM cars and the version designed for the Japanese market was also a failure. It is planned that Saturn will work closely with other GM divisions on engineering, designs, sharing of platforms and parts, and sharing production capacity. This will make it a more integrated part of General Motors, at the possible cost of losing its unique identity (Taylor III 2004). It will also begin to produce a wider range of models, making trading up feasible within the Saturn brand. While what General Motors learned at NUMMI has helped them to make substantial improvements in productivity, they still lag behind Toyota.

General Motors' problems include more than just the productivity and quality issues that the experiences with NUMMI are helping to overcome. The company has

had a general downtrend in market share for the past 40 years, but its policies have not reflected that fact. In spite of its history, it has continued to make predictions and base its policies on an assumption that it will regain market share. This led it to a contract agreement with its labor unions that rendered plant closings and layoffs to be extremely costly. For example, the closure of the Oldsmobile division in 2004 cost the company about one billion dollars (Welch & Beucke 2005). The company still has too much assembly plant capacity for its volume of sales. Additionally, the large number of brands at GM divides the funds for product development and marketing too thinly, and having similar vehicles for different brands reduces distinctiveness. The company presently plans to reduce the number of models offered in six of its divisions, leaving only Chevrolet and Cadillac offering a full lineup of vehicles.

The experiences in NUMMI have been valuable to General Motors in its efforts to improve productivity and quality, particularly its acquired knowledge of lean production systems (Inkpen 2005). Even so, GM apparently underestimated the seriousness of the challenges posed by Japan's automobile manufacturers. For many years it based important policies on an assumption that it would regain market share. It now faces a possible continuing decline in market share coupled with high fixed costs resulting from past policy decisions.

CONCLUSION

Classical theories of foreign direct investment (FDI) assume that exploiting significant ownership advantages of the firm is a major driver for investing abroad. However, the Japanese internationalization initiatives demonstrate different and diverse motivations for going abroad, which can lead to a further development of FDI theories. Specific to the case of NUMMI, this paper demonstrates that a further theorization can be made on explaining different motivations of wholly owned subsidiaries and joint ventures among the Japanese firms.

By unpacking learning dynamics that underlie successful partnerships, this paper also presents how good management and structural processes, as in the case of NUMMI, can stabilize an alliance. While any alliance is fraught with problems relating to competition and coordination, the proper use of behavioral, design, controls, and institutions can alleviate such problems. In the case of NUMMI, these processes form elements of a learning model that can provide templates for the management of future alliances.

Finally, the jury is still out on how much each of the parties in NUMMI will be able to leverage learning into future endeavors, although the evidence to date appear to favor Toyota. Clearly both parties have benefited. Toyota has already used this knowledge and the confidence it gained in its worldwide expansion of manufacturing facilities. Toyota has greatly increased both worldwide market share and profits,

becoming the world's second largest automobile producer and the most profitable. Toyota did substantially reduce trade friction resulting from automobile imports by the U.S., though some concerns remain regard international trade in parts. While General Motors did gain from the joint venture, particularly its accumulated knowledge about lean production (Inkpen 2005), because of both past policies and current problems largely beyond its control, it has not been able to leverage this learning as effectively. Though it did learn and apply much from the Toyota production system, it has yet to fully replicate the system in any existing plant. Workers and managers at existing GM plants have such a long history of confrontational relations, and such a distrust of each other, that a system based on mutual trust and cooperation limited the implementation of lean production on a wider scale.

REFERENCES

Collective Bargaining Agreement. 1985. *Collective Bargaining Agreement Between New United Motor Manufacturing, Inc. and International Union, United Automobile.*

Community Relations Department. 1990. *New United Motor Manufacturing, Inc.* Fremont, California: New United Motor Manufacturing. March.

Consumer Reports. 1986. "Four Small Cars." February. 126.

Dawson, C. 2001. "Saying Sayonara." *BusinessWeek.* September 24. 108-109.

Duerr, E. and M. Duerr 1998. "Det Japanske livstidsansaettelsessystem – betydningen for konkurrenceevnen." (The Japanese Lifetime Employment System). *Økonomi & Politik* (Denmark) 71 (4): 12-23.

Duerr, M. 1991. "Business-Government Relations in Japan and the United States." *SFSU School of Business Journal:* 45-52.

Dymstra, W. A. 1988. "Successes and failure of joint ventures in developing countries: Lessons from experience." In F. Contractor and P. Lorange (eds.). *Cooperative Strategies in International Business.* Lexington, MA: Lexington Books.

Financial Times. 2004. "Toyota's winning ways bring success in the US." January 20. 6.

Gelsanliter, D. 1992. *Jump Start: Japan Comes to the Heartland.* New York: Kodansha International.

Hamel, G., Doz, Y. & Prahalad, C. K. 1989. "Collaborate with your competitors and win." *Harvard Business Review* 67.

Hill, C. 1995. "National institutional structures, transaction cost economizing, and competitive advantage: The case of Japan." *Organizational Science* 6 (1): 119-131.

Hof, R. and J. Treece. 1989. "This Team Has It All Except Sales." *Business Week.* August 14. 79.

Hokubei M. 2004. "Toyota, GM Celebrate 20th Anniversary." February 12. 1.

Hoovers. 2004. http://www.hoovers.com/nummi/. 9 November. 1.

Inkpen, A. 2005. "Lerarning through alliances: General Motors and NUMMI." *California Management Review* 47 (4): 114-136.

International Labor…. 1986. Quoted in "International Labor Organization Case Study." prepared jointly by New United Motor Manufacturing, the United Auto Workers, and the U.S. Department of Labor for presentation to the 1986 International Labor Organization Conference. Republished by NUMMI Community Relations Department (1990).

Kogut, B. 1991. " Joint ventures and the option to expand and acquire." *Management Science* 37: 19-32.

Moore, T. 1988. "Make-or-Break Time for General Motors." *Fortune*. February 15. 35.

NUMMI. 2004. http://www.nummi.com/. 9 November.

"NUMMI is…". 2004. New United Motor Manufacturing, Inc. Fremont, California.

O'Reilly, C. 1998. NUMMI. Stanford Graduate School of Business Case HR-11.

Park, S. H. and M. Russo. 1996. "When competition eclipses cooperation: An event history analysis of alliance failure." *Management Science* 42: 875-890.

Park, S. H. and G. Ungson. 1997. "The effect of national culture, organizational complementarity, and economic motivation on joint venture dissolution." *Academy of Management Journal* 40 (2): 279-307.

Prestowitz, Jr., Clyde. 1989. *Trading Places*. Basic Books: New York.

Reich, R. and E. D. Mankin, 1986. "Joint ventures with Japan give away our future. *Harvard Business Review* 64 (2): 78-139.

San Francisco Chronicle. 1990. "Defective Part Causes Shutdown at NUMMI." September1. B1.

Smith, F. 1989. "The Auto Trade Dispute between the U.S. and Japan, and Its Effect upon the American Consumer." *The JAMA (Japan Automobile Manufacturers Association) Forum*. February: 14-15.

Suemura, A. 2004. "Earnings results show global firms reaping rich rewards." *The Nikkei Weekly*. November 22: 32.

Taylor III, A. 2004. "GM's Saturn Problem." *Fortune*. December 13: 119-127.

Treece, J., W. Zellinger and W. Konrad. 1989. "Detroit Tries to Rev Up." *Business Week*. June 12: 81.

Tsurumi, Y. 1984. *Multinational Management, Second Edition*. Cambridge, Massachusetts: Ballinger.

Wallack, T. 2005. "Steering toward success." *San Francisco Chronicle*. January 4. D1.

Welch, D. and D. Beucke. 2005. "Why GM's Plan Won't Work." *BusinessWeek*. May 9: 85-93.

Wong, K. 1989. "The Japanese Challenge: Japanese Direct Investment in the United States." in Kozo Yamamura (ed.). *Japanese Investment in the United States*. Society for Japanese Studies. University of Washington, Seattle, Washington.

APPENDIX 1: RESEARCH METHODOLOGY-PRIMARY AND KEY SECONDARY SOURCES

Interviews, meetings, factory visits by the authors **(listed by date, latest dates first)**

Interview. 2005. Telephone call received from Taiji Sato, Coordinator, Legal/General Affairs, New United Motor Manufacturing, Inc. July.

Factory visit. 2004. Visit to the NUMMI plant in Fremont, California, discussion in conference room with Yuki Azuma, President, and Taiji Sato, Coordinator, Legal/General Affairs, New United Motor Manufacturing, Inc., followed by plant tour. October 18.

Interview. 2004. Discussions with an applicant for a job at NUMMI in September 2004.

Meetings. 2004. Remarks by Fujio Cho, President, Toyota Motor Corporation; G. Richard Wagoner, Jr., Chairman and CEO, General Motors Corporation, Detroit, Michigan, at Twenty Years of Teamwork, 150th Anniversary of U.S. – Japan Trade Relations Symposium, and Yokio Azuma, President, New United Motor Manufacturing, Inc. at NUMMI 20th Anniversary Dinner, San Francisco. February 12.

Interview. 1990a. Telephone call received from a GM executive, formerly a general manager at NUMMI, who had returned to GM's Detroit headquarters. He had received a draft of an earlier paper by this author, forwarded by a consultant to whom I had given it. The GM executive spoke to the authors of this paper for over an hour, giving his insights and observations. He requested that he not be identified by name. August 2.

Interview. 1990b. Discussion with Mr. R.G. Daniels, Area Marketing Manager-West, Chevrolet Motor Division General Motors Corporation, Thousand Oaks, California, held at NUMMI reception at Mark Hopkins Hotel. May 18.

Interview. 1990c. Interview with Mr. Kan Higashi, President, New United Motor Manufacturing, Inc., at the NUMMI plant in Fremont, California May 16. (Mr. Higashi was Executive Vice President of NUMMI from February 1984 to September 1986, when he became President and CEO. On May 19, 1990, he left NUMMI to become Senior Managing Director of Toyota Motor Corporation in Japan.

Meeting. 1988. Information provided at the First Annual Meeting of the Association of Japanese Business Studies, Philadelphia, Pennsylvania. January 8 and 9, 1988.

Meeting. 1985. Meeting with Mr. D.W. Childs, General Manager, and Jim Cain, Director, Human Resources Department, New United Motor Manufacturing, Inc., San Francisco, California. September 12.

Meeting. 1984. Meeting with Mr. Isao Yoshino, Section Manager of Education and Training Department, and 15 other representatives of Toyota management, at Toyota Motor Corporation, Toyota City, Japan. March 28.

Interview. 1983. Discussion with Mr. Howard Owens, Assistant Regional Director, UAW Region 6, during his participation in a seminar on "Japanese Management in America: Its Impact on the American Workforce," San Francisco.

There are many articles and books that discuss specific aspects of the Toyota management system, its modification and implementation at NUMMI, and its applicability in other companies. In his 2004 book, *The Toyota Way* (McGraw-Hill), Professor Jeffrey K. Liker of the University of Michigan discusses the principles of the Toyota way and its applicability in other industries. Nick Oliver of the University of Cambridge and Professor Barry Wilkinson of the Cardiff Business School, in their book, The *Japanization of British Industry,* Second Edition (Blackwell 1992) provided a detailed analysis of the practices, policies and experiences of Japanese-owned companies that manufacture in the UK, and of the emulation of their approaches by British companies. Tony Elger, Lecturer in Sociology at the University of Warwick, and Chris Smith, Lecturer in Industrial Relations at the University of Ashton, edited *Global Japanization* (Routledge 1994). It presented 12 research studies, generally critical, of means of control and labor responses in Japanese transplants and local emulators of Japanese approaches. Michael A. Cusumano's *The Japanese Automobile Industry* (The Harvard University Press 1989) provided a detailed study of the development of the Japanese automobile manufacturers' managerial and technical systems within their historical, societal, and economic contexts. There are a large number of journal articles dealing with various aspects of the NUMMI experience, and the experiences of other Japanese-managed companies and their local emulators. Topics include, but are not limited to: the conditions under which management-labor cooperation works, employee involvement, cultural transformation; adapting Japanese management styles and leadership techniques to other cultures; comparative decision-making processes; productivity and quality improvement; the use of lean production, the just-in-time system and flexible production in various environments; the differences in supplier relationships and methods for improvement; and organizational learning.

[i] Since this list can be rather extensive, a summary is provided in Appendix 1, Primary and Secondary Resources.