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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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23 MAR 1983



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The Honorable Sam Gibbons
Chairman, Subcommittee on Trade
Committee on Ways and Means
House of Representatives

Dear Mr. Chairman:

You requested that we compare several Japanese and American firms to determine what, if any, differences exist in their approaches to achieving high productivity and product quality. This effort was also to respond to Section 203 of H. R. 4346, which if enacted, would require a General Accounting Office study of trends in Japanese productivity in selected basic and high technology companies. We chose the semiconductor industry for study, but after several months of negotiating to gain the support and cooperation of American semiconductor firms, we have not been successful.

This outcome is regrettable in view of your ongoing dialogue with this industry, as well as your deliberations on trade policy, particularly with Japan. And of paramount importance is the need to base policy options on objective analyses of company-level information.

We had planned to compare five Japanese and five American-owned companies in the United States in the same industry or with the same product lines. We had hoped to determine whether significant differences exist in (1) corporate structure, (2) capital availability and cost, and (3) production processes. While considerable study has been done in the first two categories, we wanted to determine to what extent any differences disclosed were within management's control and discretion to change. We intended, however, to primarily emphasize how manufacturing process design and operations compare. (Our study guidelines are contained in enclosure I.)

Concentrating on production processes would be valuable, because very little detailed information is available on actual production operations, and because production efficiency and product quality are the true test of management's competence. Moreover, comparative efficiency and product quality achieved at the company level were the crux of your request.

We selected the semiconductor industry for study because (1) this technology is at the core of the microelectronics revolution, (2) technological leadership in this industry is considered vital to our national security, (3) Japanese semiconductor competition

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has increased dramatically, and (4) we considered this industry to be among the most efficient in America. To gain the cooperation of the U. S.-owned firms, we solicited the help of the Semiconductor Industry Association (SIA). SIA has been most responsive in the past to a number of Government-initiated studies including our study of U. S.-Japan trade, and has testified many times before the Congress. We believed that this study might demonstrate that American semiconductor firms are competitive. SIA subsequently issued a request for participation from its member firms (See enclosure II.) The request stated that (1) our comparative analysis would be done with minimum interruption to the daily operations, (2) the information could be made available with minimum effort on the part of the companies, and (3) the study would be extremely important to the industry. As had been agreed to by the Subcommittee, we promised anonymity to all companies that participated.

Working through the Electronics Industry Association of Japan (EIAJ) and SIA from June through September 1982, we negotiated with two Japanese firms and three American firms. Both Japanese firms agreed to work with us. The three American firms, while agreeing that the study was needed, declined to participate. From October 1982 to February 1983, we continued negotiating through SIA to encourage U. S. firm participation. Meanwhile, EIAJ arranged for us to meet with additional Japanese firms, but we deferred committing other Japanese firms to the study, pending the outcome of our negotiation with American firms.

After deliberating our study proposal, SIA's Board of Directors met in February 1983 and formally declined to participate. (See enclosure III.) SIA's response, while very conciliatory, stated that the members were "extremely sensitive to answering questions or furnishing data which risk compromising proprietary information," and that some were "reluctant to divulge information concerning their cost of capital." Some felt that our study "would involve a substantial commitment of manpower at a time when U. S. semiconductor firms are attempting to cope with a recession and a serious competitive challenge from Japan."

SIA did offer to work with us if we would reformulate our proposal "to eliminate the unwarranted disclosure of proprietary operating information." However, the areas they considered most proprietary and sensitive were production yields and cost of production--the study of which we believed was essential to fulfilling your request. We had hoped our promise of anonymity would overcome their concerns about making this information available to us.

While the study depended entirely on voluntary participation, you will realize that without an analysis of these areas, we could not demonstrate the competitiveness of American firms, nor, as stated in the SIA request letter, could we "simultaneously debunk

the myth about Japanese management or production superiority." To compromise our study in this regard would have seriously limited its usefulness to the Subcommittee.

Nevertheless, our unsuccessful attempts do not lessen the importance of analyzing company-level information to enhance policy development and deliberations. We would be glad to explore with you whether further dialogue with SIA members might lead to some agreement on how to conduct the proposed study. Please let us know if we can be of further assistance.

Sincerely yours,

Signed Charles A. Bowles

Comptroller General
of the United States

Enclosures - 3

The Subcommittee, in May 1981, asked GAO to delve deeper into the issue of comparative Japanese/American approaches to productivity and product quality, and to attempt to identify more specifically what the differences are, if any, at the firm level, and whether the differences are related to differences in government rules, regulations and policies. This GAO role was reinforced by the introduction of H.R. 4346, 97th Congress, July 30, 1981, to implement certain recommendations of the United States-Japan Economic Relations Group report. Section 203 of H.R. 4346 calls for a GAO study of Japanese productivity factors. In September 1981, the Subcommittee Chairman informed the Comptroller General that the current assignment would answer most of the concerns expressed in section 203, and that GAO would be called on to testify on its progress.

GAO's delay for over a year in implementing this assignment was not due to any lack of professional or technical competence. While senior staff needed for this job were not available, there was also concern, rightfully so, about (1) our prospects of gaining access to enough detailed company information to draw meaningful and documentable conclusions, and (2) the extensive staff resources that would be required, assuming access could be gained.

Following extensive discussions internally in the group, with the Assignment Review Group, and with the Comptroller General's academic advisory panel, the assignment was deferred to reconsider how it could best be accomplished, given that the Subcommittee clearly expects GAO to study and report on this issue.

With this backdrop, we are proceeding as originally conceived, but on a modified basis.

Program Guidelines for: "Comparative Japanese/American
Approaches to Productivity and Product Quality
(Code 910346)
Introduction

During the past several years, the Subcommittee on Trade of the Committee on Ways and Means has been particularly concerned about the problems of bilateral trade between the United States and Japan. Clearly, our exports to Japan have suffered from a perception of poor quality. Japanese electronic and auto goods, on the other hand, have commanded a premium because of their reputed high quality.

In August 1980, GAO held a roundtable discussion on comparisons between Japanese and American approaches to product quality. About 20 knowledgeable individuals from industry, labor, academia, and Government participated. The outgrowth was GAO testimony given in field hearings in San Diego on October 14, 1980, held by the Subcommittee.

Since that time interest and concern on the subject has broadened to include numerous congressional members and committees interested in formulating legislative proposals to enhance American competitiveness. There is counter concern on the part of the Trade Subcommittee that, while the intentions behind such legislative proposals may be well intended, they may be based on an erroneous belief that American enterprises are somehow disadvantaged by U.S. laws, rules and regulations, vis a vis those of Japanese counterparts. In addition, the mood in congress is increasingly toward protectionist legislation, and there is concern that too little unbiased analysis has been made.

Overall Objectives

Perform comparative analyses of Japanese and American owned companies in the United States to determine whether significant differences exist in corporate structure and production functions resulting in high or low productivity performance and product quality, and whether these differences are within management's control and discretion to change. Primary emphasis will be on comparative manufacturing process design and operations.

Modified Scope and Methodology

At the firm level, three fundamental areas will be compared: (1) the firms' organizational structure, e.g. how many tiers of management; and channels for communication in corporate decisionmaking; (2) how production operations are designed to maximize manufacturability of products as designed while minimizing scrap and rework "loops" and (3) the financial structure, e.g. does the availability of low cost capital--debt or equity--enhance a firms ability to invest heavily in capital equipment including automation to increase productivity and product quality.

Because considerable information already exists about comparative organizational structures through studies by several different sources, our work in this area will be limited to general profile information to validate conclusions reached in those studies.

Similarly, there is a considerable body of information about Japanese access to comparatively low cost debt capital. Our efforts will attempt to determine whether Japanese firms in the United States are also making use of low cost debt capital or whether they are supported by retained corporate earnings from their parent companies.

Our greatest concentration will center on production operations because specific detailed information in this area is not available from prior studies.

Working in concert with Professor Bill Ouchi of U.C.L.A., who is studying 140 Japanese firms and 683 American firms, we will compare general corporate characteristics, such as corporate structure (equity ownership and distribution), financial structure (debt to equity ratios), and marketing and business strategies. Inferences drawn from Ouchi's work will be tested at the firm level. Concomitantly, inferences drawn from our detailed work at the firm level will be tested by Professor Ouchi in questionnaires to his sample of 823 firms.

Methodology Trade-off

In developing detailed company profiles, the basic trade-off is between the "softness" of anecdotal information from a select few firms, versus statistically valid evidence from a sample size large enough to represent the universe. Scientific validity would require a sample size of probably several hundred firms, divided into several strata, and would require an estimated 25 to 40 staff days at each firm location--an estimated total cost of \$2 million to \$4 million.

The anecdotal approach, though lacking conclusiveness, could involve as few as 10 firms, roughly of the same size and product lines, and divided only by Japanese-owned and American-owned companies. Staff resources, using two senior professionals with experience in private enterprise operations and possibly one staff assistant, could run an estimated 30 staff days per firm (15 to 20 days on-site and 10-15 days summarization), for an estimated cost of \$100,000 to \$150,000. (Neither estimate includes report preparation, processing or travel cost).

We have opted for the anecdotal approach, not only for the difference in time and cost, but also because:

- (1) Finding 10 firms to cooperate with us to the extent necessary will be difficult; finding several hundred is deemed impractical if not impossible.
- (2) Using senior professionals with experience in private enterprise operations will tend to gain acceptance and creditability in 10 firms, whereas a large number of inexperienced staff in several hundred firms would create credibility problems as well as a general nuisance to the firms cooperating.
- (3) While the final results will not be statistically supportable, "indications" of significant differences between Japanese and American approaches found in 10 firms likely would not change by looking at several hundred.
- (4) The work by Professor Ouchi, which is statistically valid, addresses macro elements such as corporate financing, equity distribution, debt-equity ratios, strategic marketing and business planning, etc. To the extent our combined "findings" are corroborative, statistical validity is greatly enhanced and both studies become more useful in aiding the Congress in policy and legislative deliberations.

The key to success at the firm level lies in indepth probing to fully understand how the macro elements affect firm management decisions and operational scenarios.

Program steps

- I. Identify Japanese and American firms, gain their agreement to participate, and arrange agreeable dates for our visits.
- II. Meet with top company management (CEO, department heads, labor representatives, and hopefully the chairmen of the boards of

directors) to lay out precisely what we are doing and how we plan to do it.

III. Flow-chart major functions of firms' operations. This is a critical step in the study and will be done by firm personnel. Most firms will have already done much of this work for their own purposes in production scheduling, line balancing, and overall management. GAO will provide guidance to firms that require it.

A. Using the flow-chart method of analysis, we will determine exactly what activities are performed within key functions, and how much time and cost is generated within each activity. For comparative purposes, key ratios will be developed, such as cost of activity "X" to total cost of product "Y", or gross sales product "Y", or total value added to product "Y", etc. Major differences in cost and time per activity among firms will be a strong indicator of systemic causes of productivity and quality differences. In fact, we should expect that certain activities found in some firms will be totally absent in others.

A1. The first flow-charts will portray management's perception of a product's life cycle--from R&D, to product design, to process design, to material ordering and purchasing, to production, to marketing and distribution, to customer feedback, to redesign (if any). Management's knowledge of these processes, including finite activities and costs generated in each process, should be very illuminating both to us and to the firms.

A2. We will then provide guidance to firms, as required, to verify the accuracy of the flow-charts in all activities in each of the functional areas enumerated above, from which we can develop key ratios for comparative analysis.

IV. General company profile information will be obtained, including financial and capital structure, debt and equity information, monthly cash-flow information, sales and market-share information, products marketed, employees, etc. Along with general profile information, several probing questions will be asked. Following is a sample.

A1. When an unforeseen quality problem surfaces, who has authority to shut down the production line?

A2. Despite a specified contract delivery date, would production be held up to correct quality problems, even if this means working overtime and/or late delivery on the contract.

A3. Does the CEO or plant manager tour the production facility regularly to see personally that operations are running smoothly? Does he "Know" the product? Does he know the employees?

A4. Is high motivation and morale observable among managers and employees?

A5. Do all employees participate in identifying production and quality problems, and in decisions to change processes to improve productivity and quality?

A6. Does the company have a productivity and/or profit-sharing program?

A7. Do the product design and manufacturing process design departments work in close harmony to assure cohesive product and process design?

A8. Are communications between the manufacturing and purchasing departments sufficient to identify vendor quality problems?

A9. How does the company keep track of the cost of quality such as the cost of scrap, rework, trouble-shooting, failure analysis, retest, reinspection, customer returns, warranty costs, cost of recalls, product liability, litigation, extra energy and material cost, etc.?

A10. Does the company attempt to resolve vendor quality problems by arranging for direct interaction between the respective engineering and manufacturing departments (rather than between purchasing and sales departments or by resorting to litigation).?

A11. Does the company share openly with labor (1) company financial and business information, (2) sales and profit information, (3) strategic planning for growth, (4) capital investment and operating plans to carry out the strategic plans, etc.?

V. Summarization, analysis, and close-out conference.

A. We will summarize data collected in a proforma format.

B. Key variables will be highlighted, based on the flow-chart analysis and follow-up probing, to develop the "findings" for each firm. These results will be arranged in presentation form for discussion and reporting purposes.

- C. Close-out presentations will be made to top management of each firm, showing how each firm compares to summary data of the other 9 firms.
- D. Based on the "findings" of our detailed analyses, we will work with Professor Ouchi in drafting questions for firms in his sample. The purpose will be to determine the extent to which findings at the 10 firms are prevalent in all 823 firms.

VI. Reporting.

- A. The combined results of the Ouchi study and ours will form the basis of our report to the Subcommittee.
- B. Depending on the outcome of the combined studies and the desires of the Subcommittee, we will plan to host a roundtable discussion similar to that held in August 1980. This should be appropriate and useful in rounding out our report. A primary purpose of such a forum, in addition to further ratification of our findings, will be to discuss possible policy implications and alternatives. Participants, therefore, must include top industry representatives, both American and Japanese; top labor representatives; top level administration officials from the office of U.S. Trade Representative, Department of Justice, and Department of Labor; one or two key congressional committee members, particularly Chairman of the Trade Subcommittee who requested this effort initially, and the Comptroller General. We also expect to invite at least one top level official from the Japanese Government.
- C. Whether we will be able to relate our findings to existing or proposed legislation simply is not known at this time.

SEMICONDUCTOR INDUSTRY ASSOCIATION

Memorandum

November 19, 1982

TO: SIA Board of Directors
Trade Policy Committee

FROM: Tom Hinkelman

SUBJECT: GAO Study

The Trade Subcommittee of the House Ways and Means Committee of Congress has asked the General Accounting Office to compare Japanese and American approaches for achieving high productivity and high product quality among firms operating in the United States. The GAO, in turn, has asked the SIA for assistance in identifying American firms in the semiconductor industry willing to participate in the study. (GAO has already received commitments by two Japanese firms and expects at last three others to commit shortly.)

This study should be extremely important to our industry to demonstrate that American firms are competitive and simultaneously to debunk the myth about Japanese management or production superiority. As you will note beginning on page 3 of the attached study guideline, the study will concentrate on three key elements: your organizational structure; your production process; and sources of capital. The guideline also gives some of the background leading to this study.

SIA member firms have a great deal at stake in the outcome of this study because of the obvious government policy implications. For this reason, we are soliciting your support.

The study team of two senior GAO staff is experienced in private sector operations and promises to do the comparative analysis with minimum interference in your operations. The information being requested is straight forward and should be available with minimum effort.

Examples of work done recently by the study team include a study of the venture capital process in the United States which was highly praised by the industry and a study of robotics and automated manufacturing, now in draft. (If you are interested in receiving these documents, the team has agreed to provide them on request).

To participate in this important effort, you should contact either team members directly, Ed Fritts or Herb Millstein, (202) 275-1584, by December 3, 1982. They will make final selections based on best matches to participating Japanese firms. The Trade Subcommittee has promised anonymity to all participating firms.



Tom Hinkelman

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Enclosure
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February 17, 1983

Herb Millstein
U.S. General Accounting Office
Room 6027
AFMD/NPG
441 G Street, N. W.
Washington, D.C. 20548

Dear Herb:

We have seriously considered your proposal to study the U.S. companies' practices concerning financing, manufacturing, quality and management style in the context of the U.S.-Japan competition in semiconductors. Unfortunately, much of the data which you seek is considered proprietary by most or all SIA firms, who are reluctant to risk compromising that information.

As you know, SIA member firms pride themselves on their competitiveness, which is based on innovation processes and products of their own creation. They are extremely sensitive to answering questions or furnishing data which risk compromising proprietary information. They feel that the circulation of this information could dilute the competitive edge which is based on these proprietary technologies and which they have developed at considerable expense and financial risk. Some firms are also reluctant to divulge information concerning their cost of capital.

The proposed study is wide-ranging. A number of firms have expressed concern that the provision of information in response to your proposal would involve a substantial commitment of manpower at a time when U.S. semiconductor firms are attempting to cope with a recession and a serious competitive challenge from Japan. In this connection, I note that U.S. semiconductor companies are already making a significant commitment of resources to assist the government in formulating and implementing policy. The industry will assist the U.S. government in implementing the trade monitoring and sectoral analysis programs agreed to by the U.S. and Japan in the recently concluded High Technology Agreement. In addition, as you know, the Department of Defense is embarking upon a major study of the international competitiveness of the U.S. semiconductor industry.

Herb Millstein
February 17, 1983
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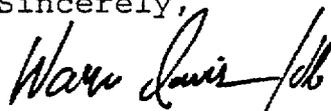
The industry's reluctance to divulge proprietary information should not be construed as an unwillingness to cooperate or actively work with the U.S. government--indeed, the semiconductor industry's efforts in this respect have been considerable. As you know, we have been very active in documenting the parameters of competition in the newly published report, "The Effect of Government Targeting on World Semiconductor Competition, A Case History of Japanese Industrial Strategy and Its Costs for America." We seek constructive free trade remedies for the structural problem with Japan and other foreign market distorting problems, exemplified by our intensive advisory support for the U.S.-Japan High Technology Working Group, and our work on drafting the High Technology Trade Act, which has been subsumed in the Reciprocal Trade and Investment Act of 1983, S. 144.

SIA is willing to cooperate with your study and the Defense Study, as we have cooperated in past years in the U.S.-Japan Wisemen's Study, the ITC 232 Study, the Commerce Study, the FTC Study, the GAO Study of U.S.-Japan Trade, the OTA Study on electronics competitiveness, studies by the Georgetown Center for Strategic and International Studies, the Charles River Institute Study and many, many more, including the Department of State (Gresser) Study. We have also testified at least two dozen times before the Congress, primarily the Senate Finance and House Ways and Means Trade Subcommittees.

If you will reformulate your proposal to eliminate the unwarranted disclosure of proprietary operating information, we will be pleased to respond and further contribute to the body of literature concerning the U.S. semiconductor industry's efforts to sustain its world leadership position. We are a product of our continued excellent performance in the labs, the factories, and the marketplace, and we are encouraged by the new awareness of the importance of our industry, acknowledged in the President's State of the Union address, in terms of important future public policy initiatives.

Please keep in close touch with us, and I assure you we will cooperate with you to an extent unparalleled by other U.S. industries.

Sincerely,



Warren E. Davis
Director of Government Affairs

Memorandum

15 MAR 1982

TO : Comptroller General

FROM : Acting Director, AFM Division - W. D. Campbell SUBJECT: Comparative Japanese/American Approaches to
Productivity and Product Quality (Code 910346)

Attached for your signature is our response to the request from the Chairman, Subcommittee on Trade, House Ways and Means Committee, to compare what, if any, differences exist in how Japanese and American firms achieve high productivity and product quality.

Despite our disappointment with the Semiconductor Industry Association (SIA) members for rejecting our study, we believe the letter is objective. If anything, the balance swings in SIA's favor. For example, its sensitivity to answering questions or furnishing data of a proprietary nature is inconsistent with our promise of anonymity. The two Japanese firms were also concerned but agreed to work with us as long as we promised anonymity. Also, SIA's sensitivity to cost of capital seems inconsistent, since its members provided this information to Chase Financial Policy, a Division of Chase Manhattan Bank, for an SIA-sponsored comparative Japanese/American cost-of-capital analysis.

Moreover, the Association's concern over committing company resources to the study is inconsistent with SIA's request letter to the American firms stating that our analysis would be done with minimum interference and that the information should be obtainable with minimum effort. This information is an integral part of company management's total visibility of its operations. And those companies that did not have this information probably need it. To this extent, our study might have been quite useful to them by helping them see their own operations in a different light. In fact, one of the Japanese companies wanted to participate for this very reason.

Privately, SIA officials acknowledged the weakness of their arguments. Their letter response to us, of course, represents their official position. They also acknowledged the philosophic inconsistency of touting themselves as highly productive and well-managed, while denying our efforts to prove it. Nevertheless, without making our analysis at the company level, anything we could say would be conjecture and therefore inappropriate. Furthermore, as indicated in the last paragraph

of the letter, we want to leave the door open for the study in the event SIA members change their minds, or are "persuaded" to by Chairman Gibbons.

Because the Trade Subcommittee is deeply involved in trade policy issues with SIA, it is possible that we will be called to testify on our attempts to elicit SIA participation in this study. In fact, our logic for enclosing the study guidelines with the letter was that (1) they provide background for the study, its importance, and methodology, (2) SIA members received copies as part of our negotiation attempts, and (3) in the event of hearings, they form the basis for Subcommittee questions about our efforts for which all parties are familiar--the Subcommittee, SIA, and GAO.

Attachment

cc: Mr. B. L. Usilaner, AFMD
Office of the Director, AFMD
Director, OCR
Mr. C. E. Fritts, AFMD