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Institute for
International Policy Studies

▪ Tokyo ▪

IIPS International Conference

“Reidentifying Japan for the 21st Century”

Tokyo, October 27-28, 2004

“Japan’s Manufacturing Strategy for the 21st Century”

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So far as the assessment of the manufacturing industry is concerned, analyses about the Japanese economy in the past decades took a weaving course through a repetition of overreactions. Overconfidence during the bubble economy period and absence of self-confidence in the 1990s derive from the same root. Assessment tended to be confused due to lack of consistent framework of their “field-based strategy” founded on real situations in the manufacturing field (GENBA). It goes without saying that excessive pessimism does not bring forth a constructive prescription. In short, macro- and micro- analyses of the Japanese economy tended to be totally divided throughout the 1990s.

As a result, economic and industrial diagnoses have become tangled with regard to at least three points. The first point is the intermixing of “competition-driven industry” (in particular, manufacturers who continued to build operational capability) with “competition deficient industry” (many in regulated industry/bid-rigging industries which became targets of the structural reform, or KOZO KAIKAKU). Biased media coverage and professional analyses on the former in good times and on the latter in bad times resulted in exaggeration of actual ups and downs of Japan's industrial competitiveness. The fact that the former remained generally stable in terms of competitiveness in the field has been discounted.

The second point is the “obsolete industrial classification” disregarding differences in product features. The real competence of Japanese manufacturers tended to be divided between those manufacturing “integral” products and those manufacturing “modular” products in terms of architecture (design concept). However, such minute analysis of product features was generally insufficient; discussions were mostly bound by the established industrial classification. We need to reconsider the established industrial classification, and re-establish an industrial theory by looking directly at the reality of product-process architecture in the manufacturing sites (GENBA) without institutional prejudice. In this context I put forward the “architecture-based industrial analysis” which tries to integrate theories of engineering, economics and business studies.

The third point is the frequently observed “intermixing of financial and competitive performance” The Japanese manufacturing industry in the 1990s was characterized by the wide gap between profitability and productive performance. The manufacturing field in many sectors continued to build operational capability assiduously, still leading the world in terms of productivity, defect rates, development lead time, and so on. However, companies' profitability was, in many cases, stagnant due to the strong yen, the recession, and strategic blunders of corporate headquarters. Many short-circuit arguments not based on data were spotted by overlooking this fact, concluding that they must have lost competitiveness simply because their profitability is bad.

The basic strategic prescription of all time is the “dual strategy” – objectively understanding one’s own strengths and weaknesses, exploiting and improving the strengths aimed at bringing out results (e.g., profit), and either reinforcing or avoiding the weakness. There were surprisingly many Japanese companies that did not have a clear idea of these basics, however. In order to develop a clear-cut “dual strategy,” you must directly look at the history of the company, identify the company’s unique “organizational capability” generated therefrom, and, for the time being, select “strong products” which “fit” this organizational capability. As a criterion for such product selection, I consider that inclusion of “architecture” which can be obtained through observation of the field (GENBA) or a viewpoint of design concept is effective. In the longer term, company efforts may be required to convert even ill-fitting products into its sphere of strengths either by acquiring new organizational capability or changing the architecture of the product.

If we continue to adhere to the existing industrial classification which is institutionally framed by industry associations and regulatory authorities, we may have difficulty devising an effective management strategy or industry policy. Going back to the actual field of manufacturing once, and re-looking at the actual product architecture and manufacturing capability without institutional prejudice would be the first step towards approaching more effective strategies and industrial policies. This process can be considered an attempt to infuse an engineering concept of architecture into social science fields of economics and business administration. My fundamental belief is that any learning concerned with manufacturing should be based on a “fusion of natural and social science.” In this direction, I have been conducting classes at the University of Tokyo in Technology and Operations Management, offering a graduate course focused on field-based researches, and furthermore, trying out “The University of Tokyo Manufacturing Management Research Center” as an opportunity of industry-academy-government partnership.

I consider field-based strategy to be an appropriate framework for Japanese manufacturers who continued to compete by using tactics from school athletic meets, which start from reinforcing the operational capability. A firm’s strategy shoulders the history of each company. It is certainly important to learn the American way of “profit-first,” objective-driven, and rational strategic theory. However, as it is a strategic theory based on the history of American companies, simply shadowing it may not help Japanese firms catch up with strategic capability of seasoned US blue-chip firms even after many years of efforts. We need to take into consideration a strategic theory based on the “school athletic meets” history which Japanese companies had shouldered in the last half of the 20th century. And that is what the field-based strategy is about.

The basics of this framework are to focus on the field concept of “design information,” out of which “organizational capability of manufacturing” and the concept of “product-process architecture” are derived. To begin with, I believe that we should ascertain the invisible flow of “design information” rather than the flow of materials when we analyze the mechanism of

production and development of a company. A company with effective “organizational capability of manufacturing” – for instance, Toyota – is after all a company who has outperformed its competitors in terms of smooth transfer of design information from the stage of development, production, purchasing, distribution, and to the customers.

Each operational unit making adjustments closely and thereby achieving this goal through effective teamwork – I call it “integrated manufacturing.” The Toyota method is a typical example of it. It does not apply only to Toyota as many more companies equipped with such organizational capability exist in post-war Japan compared with other countries. Behind the scene lies a postwar history of the Japanese manufacturing industry, which continued over a long period of time to grow by valuing, securing and reinforcing labor, production equipment, and subcontractors which were chronically in short supply. Broadly speaking, history nurtures “organizational capability” in each country.

Products that are compatible with “integrated manufacturing” are, in most cases, products designed and manufactured based on “integral” architecture. They are the products whose function and performance cannot be properly realized unless parts and production processes are specifically designed, mutually adjusted, and optimized for each product design. Typical examples of products with integral architecture include passenger cars, luxury motorbikes, light and compact home electronics products, gastric camera, precision machines, certain specialty steel, functional chemical products, game software, and animation films, which exist in many categories beyond the current industrial classification. Many of the Japanese products with strong international competitiveness seem to fall into these categories.

As explained above, my concept of the “architecture-based comparative advantage” is to attach appropriate importance on history and foresee products whose production locations are likely to remain in Japan by focusing, as a major clue, on the fit between organizational capability and product-process architecture. I expect that an integrated framework of engineering and social science will make the conventional comparative advantage theory of international trade more convincing. As a matter of fact, the above-mentioned Manufacturing Management Research Center is now preparing for actual measurement of architecture of various products in cooperation with the Ministry of Economy, Trade and Industry and other institutions.

The “field-based strategy” as I explained above has at least two pointers. One is that we need to maintain the “school athletic meet” strength of Japanese companies which is focused on reinforcing the operational competence of their manufacturing sites through capability-building competition that builds ability. In this regard Toyota heads the list as is expected; we have so much to learn from that company. However, there seems to be numerous failure examples due to superficial introduction of Toyota Production System, which is eventually followed by fadeaway after discovering that results are not forthcoming. Learning from this company does not mean literally and superficially

introducing the Toyota method itself. The organizational capability of Toyota as a company encompasses not only the above mentioned “organizational capability of day-to-day manufacturing,” but also “capability of continuous improvement” to change daily and “evolutionary learning capability” to make more fundamental progress in the mechanism as a whole. All such capabilities are multilayered and unless the overall mechanism, including the evolutionary capability, is learnt comprehensively, it will not be rooted in its entirety. The final deciding factor will be whether or not the corporate culture of tenacious follow-ups and company-wide diffusion of new organizational routines will take root. In addition, the Toyota method as we see it is materialization in a particular product called the automobile, and the methods will naturally vary in different products. Superficial transplant of the whole mechanism will lead to a failure in this context as well. In brief, companies need to learn from this company with broader and deeper perspectives.

The second pointer is that even if the field has an integrated manufacturing capability, producing integral products which are highly competitive, the company may not necessarily be profitable. On the contrary, we must recognize the fact that in Japan many manufacturers have had strong production and development sites but they were not proportionately profitable as a company. We should be careful not to mix up the competitiveness of the manufacturing sites and profitability of the company. Hence, an additional organizational capability of strategy formulation that bridges the high level of manufacturing performance and profitability needs to be strengthened.

For instance, although Nissan had suffered from low profitability until recent years, the company was among the top group internationally in terms of productivity of plant and development. It was a typical example of “strong factory, weak headquarters.” The company’s so-called “V-shaped recovery” is a result of having acquired a good balance as a “strong plant, strong headquarters” in partnership with Renault and under the direction of President Carlos Ghosn who should be called “Mr. Headquarters Management.”

To the best of my knowledge, Toyota Motor Corporation has achieved an approximate 1 trillion-yen cost reduction in the space of 10 years after having initiated a full-scale rationalization of product design since 1993. However, tremendous efforts of the “backroom manufacturing staff” got the least attention in those days due to a delay in reflection of such efforts on profit due to the strong yen and other factors. Yet again, here is an example of the intermixing of profitability with competitiveness. Such critical oversight occurs if you judge a firm’s actual capability and competitiveness solely based on its profitability. At the same time, a reverse overvaluation may occur. For instance, if the above situation is true, a simple question should arise at the time that a one-trillion yen profit was recorded: “why is the company making only one trillion yen profit when it has succeeded in achieving one trillion yen cost reduction solely through improvement in design?” However, such voice was not heard among the mass media. Even Toyota was not making a level of profit in proportion to its extraordinary productive performance.

As seen above, a company's overall strength should be evaluated in a balanced manner based on measurements of profitability as determined by the capital market, market performance (such as price) as evaluated directly by customers, and productive performance (productivity, etc.) that reflects actual capability of the plant and development team.

From the standpoint of field-based strategic theory focused on design information, part of the reason for falling into the "strong factory, weak headquarters" situation is quite often poor positioning strategy regarding product-process architecture. The company is highly competitive as it trains its field and makes integral products, but its customers are also implementing integral architecture businesses, and therefore demand customized (product-specific) design, which frequently results in limited production volume, limited negotiation power, and an unprofitable business on the former side. The positioning in which a company practices integral architecture and its customers also practice integral architecture epitomizes "Japan as the major power of integral architecture." Ironically, as too many companies are good at implementing integral architecture, Japan as a whole is excessively integral architecture-oriented. Their manufacturing operations are shaped up and strong, but they are not as profitable as they deserve.

If we look at companies currently making exceptionally high profits in Japan, many are positioned in the borderline intercrossing area of the "integral architecture" and "modular architecture." Integral architecture-based products are sold to companies manufacturing modular architecture-based products, or vice versa. Companies including Shimano, Inc., Mabuchi Motors Co., Ltd., KEYENCE Corporation, Rohm Co., Ltd., for example, are considered to have tactfully positioned themselves in such borderline area, thereby raising profitability.

This may sound rather paradoxical, but in short, based on the historic premise that there are many companies that have established "integrated" organizational capability in Japan, each one of the Japanese companies tends to have strong "integral" products. However, if all companies start introducing integral architecture, they become more demanding to each other. Although the organizational capability may be reinforced, costs in designing complex integral products and cost for dealing with complex customer interface will restrain profitability. Hence, they tend to become a "competitive but unprofitable company."

Under such circumstances, what is now required of Japan is a "modular business architect" who cuts a grid lock of highly intertwined integral businesses into manageable modules, patches them up again, and builds a more profitable business model as a whole. If I may call such architect of modular business a "producer," and coordinator of integral artifacts a "director," we can say that although Japan has a great number of efficient directors, it has relatively fewer efficient producers. Paradoxical as this may sound, I would like to say in encouragement: "Come out all producers in Japan and improve profitability of the integral businesses of Japan."

As you can see from the above, manufacturing companies in Japan on the whole need a sturdy

strategy which can link its operational competitiveness with profitability. I believe, however, that it does not mean dependence solely on the strategic theories of Western origins. A strategy carries history on its shoulders. If Japanese companies have actually come thus far by reinforcing the organizational capability of their manufacturing operations, we should not swim against the tide, but value the “strategy for architectural positioning” which tries to capture the reality of their manufacturing sites. And it means infusing the engineering idea of design and architecture into the field of social science which encompasses strategic theory and economics.

These are the reasons for my belief that manufacturing education based on the integration of social and natural science is needed in college education, corporate education and community education. We also are shifting our emphasis in education towards that direction. It is after engineers with understanding of strategic approaches and non-engineers who are able to have substantial discussion with engineers start working in close partnership like two wheels of a car throughout the entire hierarchy of the corporate organization that many of the Japanese companies will realize “strong plant, strong headquarters” in the 21st century.