

Japanese Building Production: Four Models of Design Development and Delivery

DANA BUNTROCK
University of Illinois at Chicago

INTRODUCTION

In a 1993 UIA report on architectural practice in Japan, Weld Coxe and Mary Hayden stated that the extent of architectural practices which occurs in Japan "...runs the *entire range* of options found elsewhere in the world."¹ The nation's legal and professional context is surprisingly flexible, allowing practice to occur along a far wider band than seen in most other countries. Add to this the fact that there is no single accepted model for practice and it becomes possible for diverse options to emerge. A diverse range of firms offer architectural services; about 40% of all design is handled as part of design-build packages offered by construction firms and about 60% of design is done by independent architectural firms, ranging from small studios to large corporate entities. The participation of construction companies in architectural design has created a situation where both architecture firms and construction companies can offer the expertise necessary for design development. Because of this, the manner in which design development is delivered varies widely; in this paper I concentrate my discussion to four models of design development which include participation by independent firms.

PROFESSIONAL CONTEXT

The architect in America is expected to be expert in a variety of areas, including construction processes and sequencing, business practices, and the availability, performance, and cost of similar materials. The Japanese architect, on the other hand, defines his or her area of concern and expertise and relies on other members of the production team for support. Designers may utilize the contributions and skills of contractors, engineers, and manufacturers to a much greater degree than seen in the West, in a manner in which best complements the architect's skills and interests. These cooperative structures are a consequence of the way in which architecture and construction are defined (including educational factors) and the legal context (such as contracts and liability) in which practice occurs.

Japanese architects, while recognizing that they maintain

special concern for aesthetic and social issues, do not perceive themselves as part of a discipline distinct from engineering or construction practice. Even the word commonly used for architecture, "*kenchiku*," reflects this ambiguity; it can be translated as either "architecture" or as "construction."² The title *kenchikushi* is usually assumed to refer to a licensed architect, but is also used by some registered engineers and contractors. This overlap is reflected in the organization of most universities. While a limited number of fine arts universities do include architecture in their curricula, the majority of architects have been trained in engineering departments, and receive the same degrees as those who focus their studies on the scientific or technological opportunities of construction. Many architects feel that this may allow for a more shared sense of values between different members of the design team; others suggest that the traditional manner in which carpenters carried responsibility for both design and construction informed the organization of educational institutions and of practice.

American architectural practice assumes that employee turnover is common. Thus, the educational system is expected to prepare students for employment at a variety of firms by standardizing skills and knowledge. This standardization is reinforced by the accrediting process, which utilizes an extensive list of evaluation criteria, considering not only the coursework offered, but also matters such as the quality of the facility and faculty salaries.

In general, Japanese society does not consider the university the chief forum for training; the conventional view is that tertiary institutions are difficult to enter, but undemanding thereafter. *Kenchiku* students are expected to have learned some basic drafting and recently there is some interest in distributing computer literacy through the schools, but for the most part the expectation is that necessary skills will be acquired in the office. This reflects at least in part the Japanese tradition of learning by following closely the process of an expert; the new hire is encouraged to learn the particular design approach or manner of practice of their employer. The first day (always April 1 for recent graduates) is generally marked by a formal class which covers the

history and values of the firm, signaling the employer's concern for training new staff, but even in the case where a new staff member has prior experience, the assumption is that the approach to design or specifics of production unique to the office must be taught, although this may be somewhat more rapid when the employee has a familiarity with basic principles.

In reality, even though titles are shared, one is not able to move freely from the practice of architecture to engineering or contracting (or visa-versa) after the first job. Office-specific training is reinforced by low mobility; professionals will change employment at most three times during their careers. Because the architect is less mobile, there is reduced dependence on professional certification. Tadao Ando has attempted to define himself as unique because he does not hold an architectural license, but in fact this is not uncommon in Japan. The chair and former president of one of the largest corporate firms, Nikken Sekkei, as well as other widely respected architects hold no professional license.¹ Professional organizations are also less concerned with emphasizing the necessity of registration, instead concentrating on disseminating information and creating ties and relationships which will benefit members.

The lack of concern with registration is possible in part because liability in Japan is relatively low and the culture is far less litigious when compared to the United States. This is because architects' responsibilities are defined differently. While American architects are responsible for health and safety, the Architects Act of 1950 defined Japanese architects as being responsible for the "quality of the building."⁴ Contractor warranties are also more limited, and are said to fall in line with other common law, as opposed to civil law, countries. For these reasons, liability insurance is inexpensive and appears to be rare. Many of the results of liability concerns found in the U.S.—extensive pre-bid detail documentation, detailed specifications outlining quality and specific acceptable products or materials, and tightly written contracts — are simply not part of practice in Japan.

In an American office, pre-bid detail documentation accounts for around 40% of a typical set of drawings. By contrast, the documents produced in a Japanese office and used by contractors to prepared bids are simple; most will be drawn at 1:100 (roughly approximate to 1/8" = 1'0") and details account for perhaps 5% of these drawings. I have rarely seen specifications used; when they exist, they are quite thin. There are no professional specifications writers. But it is differences in contract law are by far the most significant.

Fumio Matsushita, legal counsel for Nikken Sekkei, described the Japanese attitude toward contracts in these terms: "[The Japanese] do not think a written contract is really binding upon the parties to it... negotiations do not precede, but follow, the conclusion of a contract and continue without end."⁵ Japanese legal norms also include the assumption that either party may renegotiate a contract if costs have been affected by changes outside their control

(including changes in wages and commodity prices) and if twelve months have passed. Additionally, legal deadlines are more flexible and work can always be shifted into the next stage of production if necessary.

These differences — shared educational background, difficulty in distinguishing between architecture and construction, and the legal context — encourage architects and contractors to work together in a cooperative, rather than an antagonistic fashion. As a result design development is done during, rather than prior to, construction and the determination of who will be responsible for design development, detailing, and construction management is less clearly defined.

FOUR MODELS FOR DESIGN DEVELOPMENT

On average, roughly two thirds of a Japanese architect's time is spent in design and one third in construction supervision.⁶ However, the amount of time and the nature of construction supervision varies widely depending on the approach taken. Among independent architects there seem to be four chief models of managing the construction process, each defined here by the level and manner in which architects exert control. These models range from the architect supplying conceptual design and the contractor being responsible for all areas of execution, to the architect commanding such a high degree of customization that he or she is able to impact areas of the manufacturing process as well as on-site construction.

"...there is a new kind of practice in Japan. They do a different kind of hand-off. The architect is the conceptualizer and maybe goes through schematic design. The contractor has the responsibility for design documents, and he builds from his design documents."⁷

- Peter Eisenman

Foreign architects who have worked in Japan are perhaps most familiar with the process whereby architectural design is clearly split from development and production. Usually the architect produces only a conceptual set of documents and the contractor is responsible for executing design development and managing construction. This approach is not limited to foreign architects, but the reasons for its employment, and the quality of design development, vary widely. In the case of foreign architects' work, it is expected that the designer would find it difficult to work in Japan, due to language and cultural difficulties.⁸ By having a contractor manage the construction phase not only are these difficulties overcome, but the contractor has the added bonus of increasing prestige and motivating in-house design staff through the relationship to a world-class architect. For these reasons, the contractor aims for excellence; foreign practitioners generally suggest that the level of development and the quality of construction are higher than they have experienced at home.⁹

By contrast, many Japanese architects try to avoid this

model. They are most often encouraged to consider it as a cost saving measure, and the assumption, often correct, is that the caliber of design development and construction detailing will be reduced by the contractor for budgetary reasons. Thus, the design architect has little control over the final result, yet may find the reputation of the firm is affected by a project which is obviously of their oeuvre. One example of this problem is the "Physic 2B" building, designed by Edward Suzuki and prominently located on the heavily-traveled Yamanote line in Tokyo. Although it will not be found under Suzuki's name in guidebooks, it is clearly recognizable as one of his works, and indeed, is a rather clumsily developed project for which he generated the concept.¹⁰

"...by sending the drawings and instructions to the site by telefacsimile, the construction of [the Karaza Theater] is easily accomplished anywhere. By reducing architecture to information we can transmit it to any location around the world.""

- Tadao Ando

The model most similar to American practice is one in which management of building production remains with the architect and is sited primarily in the office, using drawings as a primary method of communicating to the contractor. Design development is the responsibility of the architect, although since it occurs concurrent with construction, there are still opportunities for consultation with other relevant members of the production team, and weekly meetings with the contractor are the norm. Because the architect continues to maintain control over building production, these buildings are generally well-built.

In Japan, this model is often employed for small projects which are relatively close to the home office, thus do not warrant a separate, site-based office. Nevertheless, Tadao Ando seems to favor it in larger projects as well. For example, Ando's project architect in charge of construction of the *Chikatsu Asuka* Museum remained based in the Osaka office through completion of the project, even though going from the office to the site required over a one-hour commute.¹² Part of the reason for this is obviously Ando's limited palette of materials. There is little flexibility when using unfinished concrete, especially when the surface finish is one which is defined by its formwork. Planning the pour takes place in advance and generally off-site—regardless of the designer—simply because of the level of calculation involved.¹³ But this model is considered useful in any firm where there are questions about the ability of the project architect to maintain the desired level of control over the process—by returning to the office daily, staff can consult frequently with others, particularly the head of the firm. Thus, it is often used where the project architect has less than ideal experience or confidence in managing design development.

Another advantage of this model is that it is considered less expensive to both the architect and the contractor. Site-

based facilities for the architect are minimal, and the architectural firm can simultaneously utilize the staff member in the planning or proposal stage of other projects.

I have seen an interesting variant of this approach employed by Kunihiko Hayakawa for a site in southern Japan. Hayakawa felt that the contractors on the project, who were all small, local firms, would not be able to produce work of the same quality he commands in Tokyo. Thus, a greater level of responsibility for detailing construction fell to Hayakawa's staff member, who was slugged, but, for economic reasons, working alone. Hayakawa and the staff member sent detailed faxes to each other on a daily basis and courier packages with photographs and drawings were sent frequently. In this manner, Hayakawa was able to maintain close control over the project.¹⁴

"The Japanese building construction site is not just the place where a structure is erected but also where the construction process is managed and final designs are completed. Many tasks that are usually tackled at the home offices in the U. S., including construction planning, drafting of many details and checking shop drawings, are performed on the building site."¹⁵

- Anthony C. Webster

In both of the remaining models, decision-making is shifted to the construction site around the time foundation work is completed. The contractor supplies a prefabricated office for staff from the architecture and engineering offices, as well as for the contractor's and subcontractors' staff. Professionals commute daily to the construction site, often working from early morning until quite late at night. Depending on the scale of construction, the project architect may be accompanied by additional members of the architect's staff; three to five people from a single office is probably the norm, although a relatively simple project may only require the attention of a single individual and a large project may require as many as twenty architectural staff on site. Since all relevant members of the production team are located on site, the use of three-dimensional models and mock-ups as a form of communication—between architect and consultant, architect and contractor—is more often employed and meetings between relevant staff are more frequent.

As decision-making is site-based, this model offers opportunities for fine-tuning than in those models described earlier. The architect is able not only to respond to natural qualities such as views or light, but also respond to construction which is already underway, adjusting for actual conditions. The opportunity to react to an existing construction and call for what we would consider changes is generally considered part of the process of construction in Japan. Adjustments to the size or finish of materials which have not yet entered production are not considered changes, and because contractors have adopted the "just-in-time" system from manufacturing, architects can make decisions on many areas relatively late in the process. Minor modifications—such as chipping out concrete to accommodate forgotten areas,

enhance or adapt design, or correct failures in the pour – are referred to as changes by the contractor (but not the architect), but such expenses are bundled into the original bid.

The difference between this model and the one which follows is really the degree to which the architect shares control over the design development process with other members of the production team, and thus is able to exploit team expertise, manufacturing opportunities, and new technologies. Younger architects, who have understandable concerns about their ability to negotiate effectively with contractors having more experience, generally carry out decision-making independently or in limited consultation with other members of the production team. Thus, for example, the manner in which manufactured products are modified tends to be conservative. Generally designers limit modifications to components such as handrails, door pulls, skylight and window shapes, panel elements, and prefabricated stairs, since these alterations can result in significantly different aesthetic qualities without affecting performance criteria. Nonetheless, the opportunity to work on site tends to yield a greater awareness of techne and a cohesiveness between all members of the production team.

"...subtlety of detail is explained by the Japanese industrial context. Industrial production, as organized in Japan, allows constant adjustment in the course of manufacture. Almost any prefabricated element can be modified, in its technology of construction or in its dimensions, at the moment of ordering or even in the course of manufacture."¹⁶

- Sere Salat

By far the most interesting model for the Western architect, though, is that which encompasses the work of most of Japan's best known architects, including Maki, Isozaki, and Kurokawa. These architects are able to work with producers to customize virtually any building material found on site, from window mullions to metal panels, changing aspects such as the material used, profile, and manner in which connections are made. Experienced architects, with the firm support of clients, can produce buildings where virtually every manufactured component has been customized.

In many cases, this collaboration may even precede taking bids for a project. Maki relies on manufacturers to test his ideas for materials during schematic design. For a church under construction during the summer of 1995, for example, Maki's office was considering etched glass for the west wall of the sanctuary. The major glass manufacturers discouraged the office from pursuing this strategy, but the Figula Company was able to provide samples and estimates for much of what Maki's office was considering. In one case, though, a sample was produced, but no estimate—even Figula had reached its limit."

Architects in this model do not simply direct the production team, but allow all members, including the contractor and manufacturer, to propose ways in which desired effects can be achieved. Representatives from the architect's office,

the contractor, and some consultants will commonly go together to manufacturing facilities to observe the plant and what flexibilities exist; subcontractors specializing in specific materials or techniques may be exhaustively consulted. This level of collaboration can be very demanding. Shop drawings are used extensively to revise and refine a design—I have counted as many as 2400 sheets of approved shop drawings on an unfinished ten-story building—and models and full-scale mock-ups are also quite common. (As the distinctions between the role of architect, contractor, and engineer break down, the use of models and mock-ups is increasingly common.) Large prototypes of even simple elements, which have been utilized on earlier projects and can be observed in *situ*, are still required of manufacturers or subcontractors. Isozaki, for example, describes the necessary mock-ups of a concrete panel as requiring that the contractor "...vary the type and size of stones in the aggregate, the proportions of the mix, and the surface finishing."¹⁸ Surprisingly often, these prototypes are initially found unsatisfactory and rejected.

This model is clearly one which is not universally suitable; under these conditions, construction costs are certainly greater. Nonetheless, the process allows experienced architects working on important facilities to offer a level of production and design which emphasizes the importance of the building. Additionally, such innovation offers the advantage of allowing those with relevant expertise to determine the best way to fabricate and construct a detail. In this way new materials can and often are developed for the larger market, allowing architects as a group to influence the palette of materials available to all.

CONCLUSION

In a symposium celebrating the establishment of the Center for the Study of the Practice of Architecture, panels returned repeatedly to the question of how design and production are managed.¹⁹ For many of the panelists, the increasing complexity of practice left architects with little choice but to limit their participation to either design or production activities on most major projects, although which role was selected might vary from project to project. In general, this division of skills was achieved by establishing a team, with a design architect and a production architect working in a fashion not unlike the first model I outline above. However, the range of approaches under which design development is carried out in Japan suggests that there is a wider set of options; while teaming up with complementary architectural firms is favored in the U.S., in a supportive context, architects may work with a larger production team which includes contractors, manufacturers, and professional consultants. The level of involvement in production, from one where the architect makes virtually no decisions about execution, to one where architects influence extends to manufacturing, is extremely flexible.

What, then, determines the decision to choose one kind of approach over another? These four models, I would suggest,

define a range of activities which demand increasing involvement and expertise on the part of the architect. Practitioners who tend towards the first two models are often unwilling or unable to dedicate the time, staffing, and commitment to negotiating the production process. This is exacerbated by the relative inflexibility of the Japanese architectural firm; it is only with great difficulty that one will decide to lay off permanent employees, as doing so makes adding staff later much more difficult. Various forms of temporary staffing do exist, but such staff are rarely able to handle the responsibility of design development and in my experience are not dispatched to the job site. Thus, expanding to take on a larger project is not necessarily as feasible as it is in the United States.

The choice between the latter two models seems to reflect less a question of commitment to the production process than confidence in the strength of one's negotiating position. Although this would require further study, it seems that the final model outlined above is generally available only to a limited set of architects who have both practical experience and the strong support of clients. In this case, the ability exists to **successfully** manage a more varied design team.

Finally, I would note that the first and second models appear to often be hermetic, in that they only rarely allow the architect employing them to move to a greater level of control of design development. In particular, the successful architect using the second model may find it increasingly difficult to manage large-scale projects or greater numbers of projects. By contrast, observing the work of rising architects yields a **number** of practitioners who move smoothly from the third to the fourth model, as experience on site allows them greater confidence in managing the contributions of other members of the production team.

NOTES

¹ Coxe, Weld, and Mary Hayden, "UIA Project Work Group: Trends in Private Practice. Report from Japan." Unpublished report dated March 20, 1993: p. 12. Emphasis mine.

² *Kenchikudaijiten* (*Encyclopedia of Architecture and Building*) 1993 edition, s. v. "kenchiku."

³ Information on the chair of Nikken Sekkei is given by Webster, Anthony C. *Technological Advance in Japanese Building Design and Construction*. New York: ASCE Press, 1994.89. The chair of Dai'ichi Kobo, Tei'ichi Takahashi, is also unlicensed.

⁴ Matsushita, Fumio. *Design and Construction Practice in Japan: A Practical Guide*. Tokyo: Kaibunsha Ltd., 1994. 65.

⁵ *Ibid.*, 59.

⁶ *Ibid.*, 80.

⁷ Eisenman, Peter, Interview with Gordon Simmons. *Practices* I Spring 1992: 8.

⁸ This parallels the use of production architects as "local architects" as described by Dana Cuff in "Divisive Tactics: Design-Production Practices in Architecture." *JAE* 4514 (July, 1992): 204-212.

⁹ See, for example, Frank Gehry's comments in "Frank Gehry: Wing and Wing," Interview with Hiroshi Nakao and Heiichiro Tsukamoto. *Any* 6 (May/June 1994): p.42. Mark Mack has also communicated to me during a personal discussion in May 1995, his positive impression regarding execution of his work in Japan.

¹⁰ Suzuki, Edward. Personal conversation. Tokyo, Japan. June 1989.

¹¹ Ando is quoted in Frampton, Kenneth. "Tadao Ando and the Cult of Shintai." *Tadao Ando: the Yale Studio & Current Works*. New York: Rizzoli. 9.

¹² Mizutani, Komei (Tadao Ando Architects). Personal conversation. Kawaminami, Japan. 14 May 1994.

¹³ Ando is notoriously reticent about his construction process. He has, however, frequently exhibited and published his working drawings, which reinforce this point; they are of a larger scale and greater detail than is the norm in Japan.

¹⁴ Hayakawa, Kunihiko. Personal interview. Shimonoseki, Japan. 4 July 1995.

¹⁵ Webster, 37. In his book, Webster is primarily addressing the design-build side of the industry, although he does not make a clear distinction between design-build and work by independent architects.

¹⁶ Salat, Sere with Françoise Labbé. *Fumihiko Maki: An Aesthetic of Fragmentation*. New York: Rizzoli, 1987. 101, footnote 2.

¹⁷ Tomuro, Reiko. (Maki and Associates) Personal interview. Tokyo, Japan. 18 July 1995.

¹⁸ Arata Isozaki: *Construction Site, The Japan Architect* 12 (Winter 1993-4):150.

¹⁹ See *JAE* 4514 (July 1992).