Breakout 6
Green Building Valuation & Consulting

Some management appraisals of Green building Development in new sustainable property and Construction market

Presented by

Koji Ota
Japan
Dr. (Eng.) M.Sc. (Arch. London) M.Sc. (Eng.) B.E.
Visiting Professor, Nippon Institute of Technology (Japan)
Director International Committee Member of BSIJ (Japan)
International Committee Member of PMAJ (Japan)
Email: otako@kajima.com

Bali International Convention Center
27 – 30 September 2010
Some management appraisals of Green Building Development in new sustainable property and Construction market

ABSTRACT
In this 21st century, Construction market in Asia and Pacific region is embarking on a new era. There are several factors, but remarkable issues are the progress of making world-wide borderless economy and the rise of the countries in Asia.

Asia region has become the focal point the world construction market in the globalization. Moreover, the rapid advancement of IT revolution and the engineering innovation are also bringing great changes to the environment of our Asian Pacific construction industry.

Babble economy in Japanese construction market is over; many construction projects have been postponed or cancelled. Therefore, new demands have to be created by new sustainable property and construction market, such as CRE (Corporate real estate), PRE (Public real estate) and Environmentally-friendly real estate.

In the light of the above, this paper explains some aspects of green building in sustainable construction in Singapore; life cycle, building environment, natural resource and technology fusion. Management of “Green building development” in the new market is proposed by Japanese management (P2M) method as a case study and introduces with new technology, financial issues, IT solution, etc.

Then this paper proposes some management how to add the value to the green buildings in sustainable property by means of project and program management.

Keywords: Life Cycle, Built Environment, Natural Resources, Technology Fusion, P2M (Project & Program management), Value Creation,
1. Japanese Energy
Now, Japan is trying to save energy dramatically within two decades because CO2 needs to be reduced by 25% by year 2030. Building and factory are constructed and renovated to meet Green policy, which has impacted construction and real estate industry.

1.1 Energy Consumption in Japan (Fig1, Fig2, Fig3)
Energy consumption in Japan can be divided into three sectors, namely, the commercial (including residential), the transport and the industrial sectors. In the industrial sector, the amount of consumption has remained roughly the same level after the oil crises. In contrast, in the commercial and residential sector as well as the transport sector, the amount has sharply increased. The relative proportions of the industrial: commercial and residential: transport sectors changed to 2:1:1 (year 2005) from 4:1:1 at the time of the oil crises.

(1) Commercial/Residential Sector
The Residential sector consumes energy more than twice as much as it did at the time of the first oil crisis. While energy-saving technologies developed after the oil crisis improved the efficiency of home appliances, gas apparatuses and so forth, aggregate, energy consumption has been increasing due to in the social structure such as rise of aged population and use of larger electric appliances, etc. At the same time, the commercial sector, consumes almost three times as much as energy as it consumed at the time of the first oil crisis because the total floor area of offices has increased together with the advances in OA and M&E equipment.

(2) Transport Sector
The transport sector now consumes twice as much as energy which did at the time of the first oil crisis. The main reason seems to be the higher rate of automobile ownership.

(3) Manufacturing industry accounts for 90% of the industrial sector, consuming about 45% energy used by all sectors. Energy consumption in manufacturing industry increased only slightly, despite the fact that its economic scale more than doubled after the first oil crisis in 1973.

Fig. 1 Energy consumption in Japan
Burning fossil fuels result in emission of Green house gases. Therefore, Japan’s policy of focusing on energy conservation and diversification is extremely useful for controlling of the amount of emissions on a global basis. Japan has seemed to be diligently cultivating technology and know-how for energy conservation and has steadily obtained results. It is important not only for Japan but also for the entire world that Japan, with its leading-edge knowledge, provide a positive contribution to international society to promote emission reduction across the world in addition to making the maximum effort to reduce its domestic green house gas emissions.

Fig 2 World Energy consumption

2. Management model of Green Building learning from a case study in Singapore

The Green Mark Scheme of Building and Construction Authority in Singapore (BCA) was launched in January 2005 as an initiative to move Singapore's construction industry towards more environment-friendly buildings. It is intended to promote sustainability in the built environment and raise environmental awareness among developers, designers and builders when they start project conceptualization and design, as well as during construction.

2.2 Criteria and scoring system (BCA home page)

BCA Green Mark is a green building rating system to evaluate a building for its environmental impact and performance. It is endorsed and supported by the National Environment Agency. It provides a comprehensive framework for assessing building performance and environmental friendliness. Buildings are awarded the BCA Green Mark based on five key criteria:

- Energy Efficiency
- Water Efficiency
- Site/Project Development & Management (Building Management & Operation for existing buildings)
- Good Indoor Environmental Quality & Environmental Protection
- Innovation
Under the Green Mark assessment system, points are awarded for incorporating environment-friendly features which are better than normal practice. The assessment identifies designs where specific targets are met. Meeting one or more indicates that the building is likely to be more environmental friendliness than buildings, where the issues have not been addressed. The total number of points obtained provides an indication of the environmental friendliness of the building design.

2.2 Benefits of Breen Mark (BCA home page)

BCA Green Mark provides a meaningful differentiation of buildings in the real estate market. It is a benchmarking scheme which incorporates internationally recognized best practices in environmental design and performance. This can have positive effect on corporate image, leasing and resale value of buildings. Benefits of BCA Green Mark include:

- Facilitate reduction in water and energy bills,
- Reduce potential environmental impact,
- Improve indoor environmental quality for a healthy and productive workplace,
- Provide clear direction for continual improvement

The total number of points obtained, provides an indication of the environmental friendliness of the building design.

2.3 Key Management of Green Building

The Green Mark Scheme of Building and Construction Authority in Singapore (BCA) was launched in January 2005 as an initiative to move Singapore's construction industry towards more environmentally-friendly buildings.

It is intended to promote sustainability in the built environment and raise environmental awareness among developers, designers and builders when they start project plan and design, as well as during construction.

This is a case study of green building, which has been completed in Singapore and has been applied for BCA green Mark. This green building awarded as gold, has been observed from the point of views of 4 key management elements, which are life cycle, built environment, natural resource and technology fusion management as follows; (Fig 6)

(1) Life cycle

Life cycle management seems to contribute to save energy and infrastructure expenses from the construction to operation in Buildings, which means long term sustainable construction to meet Environmentally-friendly buildings.

(2) Built environment

Built environment management is planned not from the green issues but also from Living comforts, noise, light, odor, temperature and winds, which are value up to spend life in living and working spaces. At the same time, Built environmental study is not only one building devices but also neighbors building and circumstance such as open space, car park, road access, housing in town plan as a whole.

(3) Natural resource management

There seems to be different types of energy natural resources, which means not only electricity and gas but also solar, wind and earth heat, etc. This combination of different natural resources is complied with building design and building utilization in use including maintenance, and offers best value of real estate to clients including environmental friendliness.
(4) Technology fusion

Ecological innovation seems to be produced from various types of industrial fields and companies. The individual technology needs to be coordinated by professionals in proper manners. Building engineering has been developed well last one decade in Japan and currently, those new technology and devices are combined by methods of technology fusion for the purpose of environmental friendliness, which contributes to value creation.

2.4 A case study of building project in Singapore

This is a case study of green building, which has been constructed in Singapore and has been awarded as Green Mark Gold from BCA. Innovation in this green building has been performed from the point of views of 4 key management elements, life cycle, built environment, value creation and technology fusion in P2M. (Fig 5)
3. New Japanese property and construction market

3.1 Construction Investment and Environmentally-friendly Real Estate
Japanese construction boom was over in 2008, and currently, building and housing demands have been stagnant. In property market, financial crisis has affected real estate business, developers and contractors and current construction investment in 2010, it is expected 40 trillion yen (US $0.9 trillion) per annum, which was almost half of 85 trillion yen (US $1.9 trillion) in 1982. (1 US dollar =85 yen)

On the other hand, in Japan, the value of real estates totals 2,300 trillion yen (US $27 trillion), accounting 24% of total assets, 8,428 trillion yen (US $99 trillion) as of year 2007.

In this slumped market, construction and real estate business need to move new markets, in stock real estates market, such as Environment-friendly Real-Estate(ERE), Corporate Real estate (CRE) and Public Real Estate (PRE). These new markets also need to apply new management methods.

In particular, globally, environmental issues have become important in construction industry and, new and old buildings are required to adapt environmentally-friendly devices. In response to these requirements for built environment, Japanese government promotes to more environmentally-friendly buildings. It intends to promote sustainability in the built environment among developers, designers and builders from the inception of the project through to the end of the construction and beyond.

3.2 CRE (Corporate real estate) and PRE (Public real estate) in new Japanese market
In property market, financial crisis has affected real estate business and developers and contractors. Japanese Ministry of Construction stimulates the property market by promoting sustainable growth strategy, namely CRE (Corporate real estate) and PRE (Public real estate).

CRE is real estate owned or leased by a corporation for purpose of conducting business activities and PRE is real estate owned or leased by public sector. Japanese Ministry of Construction has been released Guidebook of CRE/PRE and promotes more efficient use of land and building.

Fig.6 shows that CRE accounts 490 Trillion yen (US $ 5.8 Trillion : US 1$=85yen) and PRE estimates 470 Trillion yen (5.5 Trillion : US 1$=85yen) in Real Estate in Japan.(2008)

3.2.1 CRE/PRE Strategies (Fig6, Fig7)
There seems to be three issues from the point of CRE/PRE strategy as follows:
(1) New land Public policy
   ① Land evaluation needs to include risk
   ② Corporate real-estate investment needs to be managed
   ③ Under-valued and un-utilized lands in corporate property, need to be properly transacted.
(2) Public Sector Issues
   ① Financial deficits in local authorities need to be improved
   ② New public accounting systems have been adopted by Local Government
   ③ Third sector management needs to be restructured and Under-value and un-utilized lands in corporate property, need to be properly transacted
(3) Corporate Management Issues
   ① CRE and PRE are required to optimize the corporate value in terms of fixed asset.
   ② International Corporate accounting systems are applied, affecting the value of domestic traditional land and property.
③ Qualities of the property need to be accounted in corporate property value. Examples are extent of being earthquake-proof, asbestos removal cost in buildings and contaminated soil removal cost of site.

(4) CRE/PRE proceeding is as follows:
① Evaluate appropriate land prices and facilities (building and housing)
② Plan value of effective use of un-utilized land and buildings
③ Encourage construction industry and land market
4. Management of Green building in new property and construction market in Japan

Japanese construction Boom was over in 2008, and building and housing demands have been stagnant. In this slumped market, construction and real estate business need to move new markets, such as Environment-friendly Real-Estate (ERE), Corporate Real estate (CRE) and Public Real Estate (PRE). These new markets also need to apply new management methods.

Currently, there are some different features of demands in construction and real estate industry:

1. Buildings and housing in construction industry seems to be required to take care of environment, which decreases carbon emission and control contaminated soils, etc.
2. Land and building utilization in Public and Private sector are reviewed by total assets value, which fixed assets are evaluated by international accounting standard.
3. Therefore, construction and real estate industry are integrated by overall management approaches, such as program and project management.

4.1 New types of project management (Project & Program Management: P2M)

Traditional project management seems to be developed in 1980, which is focused to control time, quality, cost in process product and well known management as construction in property.

In Japan, Project Management has been studied and issued as “Project and Program management called as “P2M”, supported by government sponsorship in 2000.

P2M is designed as a standard form of the Japanese-version project management and is applied to sophisticated and complicated Project. It consists of two management areas; corporate management called “program”, and project management.

It aims to restructure paradigm shift to generate new values and a system for method of thinking as a basic stance. This standard interpretation of project management is a system of thoughts, wisdoms, procedures and methods to steadily realize values on a specific theme with a team organization during a limited period.

P2M probed into a region of program management, which had been hardly described in the world standard. This seems that complex problems in today's society could be solved only by consolidating them into a program.

This P2M is involved three areas: Scheme, system and service models and 11 management elements. (Value, Strategic, Relationship, Information, Risk, Resource, Project Goal, Organization, Systems and Finance management)  (Fig 8)
4.2 Value creation in Japanese sustainable construction

There are four key elements, life cycle, built environment, natural resource and technology fusion to study Japanese sustainable construction, based on a Singapore case study of a Green building. These four elements seem to be supported by different types of aspects such as new engineering, financial and IT solution, from the points of views of P2M (project and program management: Fig 9).

(1) Life cycle
There are six elements to analyze building lifecycle, which consist of functional, ageing, information technology, energy saving, earth quick appraisal by IT solution. These evaluations have been linked together and show the index, which helps for building owners to spend the cost for up-value of property to meet green mark requirement.
(Fig10, Fig11: Reference from Kajima)
(2) Natural Resource Management

It is important for sustainable property management to operate the building in an energy-efficient manner. In response to such needs, ESCO (short for Energy service Company) has established itself as resource management in business model. ESCO was born in 1973 in the U.S.A after oil crisis. In Japan, it quickly gained popularity during after the last half of 1990.

Japanese Government has been helping ESCO business to diffuse by financial incentives, whereby conversion of old buildings into energy-efficient green buildings is encouraged.

One of typical ESCO business models is to offer a total solution where utility charges are reduced and the saving covers the investment and ESCO’s fee/profit. ESCO takes the risks and guarantees certain results for the client. Such total solution may include the following item. (Fig12, Fig13)

(a) Improvement to energy-consuming facility

Main targets are M&E equipments such as lighting and air conditioning. Systems are to be made efficient by adding and replacing the equipments by means of more sophisticated control in Bill Management Systems.

(b) Operation

The overall operation of the building is to be revisited. Targets areas include contact with the utility companies, maintenance regime, daily control of air conditioning and etc.

(c) Introduction of new energy resource

Possible new sources include co-generation, micro gas turbine, fuel cell, solar power, solar heat, wind power and small hydraulic power plant.

(d) Disposal of waste

Recycled system, clean disposal and biomass electricity, can be considered.

(e) Improvement of production facility (for industrial clients)

Target areas include air system (compressors), steam system (boilers), air-conditioning system (especially for clean rooms), and heat recovery system need to be improved.

(f) Efficient use of water

Use of constant flow valves can save water. Well water and under-ground water can be harnessed. (Reference for shodensha)
(3) Built Environment

There are three areas to maintain and to improve continuously in built environment, which are soil contamination of building and factory site, building energy monitoring, and earthquake risk management based on a case study in Singapore.

(a) Contaminated soil removals (Fig.14)

Contaminated soil removals from site, is required to be counted as deficit in corporate fixed property balance sheet in Japan. In other words, land contamination and contaminated underground water affect the property business. Recently, soil renewal technology has been developed well enough to accurately estimate the extent of soil contamination, which efficiently removes and contain the contamination. (Reference from E.R.S)

(b) BEM (Building Energy Management)

In terms of inside of buildings, BEM (building energy management) has been utilized to monitor and control equipment in the building, which minimizes its energy consumption. (Fig.15: Reference from Kajima)

(c) Earthquake risk management (Reference from E.R.S)

Earthquake risk assessment systems are also developed based on some specifies of the building such as location, structural/M&E design, which simulates response to the seismic movement. This evaluation can estimate the damages to the building and infrastructure, which helps the client to establish recovery plans for his offices and factories. (Fig.16, Fig.17)
(4) Technology Fusion
There are many types of latest technologies to relate to green buildings. For examples, technology fusion of land survey and IT solution enables quick production of updated drawings and reconstruction of missing as-build drawings of old buildings. Latest survey technique utilizing 3D laser measurement linked with 3D CAD software, can produce drawings in short period with accuracy. These solutions have saved vast number of man-hours and very high costs, which were previously inevitable.

The point cloud data output by the scanner composed of more than some billion dots 3D location data is quite huge to handle with personal computer. Therefore it has only very limited uses so far. However, current brand new software has been developed with using CFD (computational fluid dynamics) data processing algorithm and changes the current situation.

The software can handle such large scale data very smoothly even with laptop computer, which has the following functions: walk through view, ruler, interference check, automatic multiple shot registration. This new type of the software can generate as-build CAD data with recognizing the figure and the surface of the object based on the read point cloud data automatically, which provides CEQS with what they want easily.

Low cost, instant and accurate survey utilization makes the hurdle small for building owners to estimate the value of their estate and to start to improve their building total performance. (Fig 18, Fig 19, Fig 20:Reference from Fuji Technical Research)

5. Conclusion
Professor O’Hara (2006) advocates the new version after P2M, is named Kaikaku (innovative reforms). Kaikaku is defined that it may encompass 3Ks of Kaihatsu (development) and kaizen (improvement) and Kakushin (innovation), or more exactly the synergetic unity to be challenged and linked to corporate level strategy. When these management activities are applied for sustainable property and construction, a tentative proposal of “Value creation” instead of “Kaikaku (innovation reform)” shows fig 21.

This activity is proposed as corporate management in Program management to sustain value-added, based on some case studies in new property and construction market, such as CRE (Corporate Real Estate) and PRE (Public Real Estate) with environmental friendliness.

(1) Development
Land and building as fixed assets, are owned by Corporate property and these properties are evaluated by 5 project activities called RPDCA in Project management; Review (monitor of utilized and evaluate the current property condition), plan (plan the better value), Do (construction/renovation), Check (monitor operation) and Action (review again).
(2) Improvement

Each building and land is utilized as better assets and, the company is improved as not individual asset but total asset value in corporate real estate. A company has been developed by several projects through sustainable work loop, which results into improvement of total property value in corporate management.

(3) Value creation

Value creation has been preformed by restructured assets successfully in corporate real estate strategy through whole sustainable activities, which is supported by 4 activities; life cycle, built environment, natural resource and technology fusion.

Fig.21 A proposals of Value creation activities by P2M in sustainable property and construction

References
1. PMCC, (2001), A Guidebook of Project & Program management, Tokyo, Japan
2. Ohara S, (2006), Kaikaku P2M, Annual Symposium, Association for International P2M, Tokyo, Japan
5. Ota K (2006), Construction arts in complicated commercial building, in house research paper, Kajima, Tokyo, Japan
6. Ota K (2006), Innovation by P2M in Construction management, International Association of program and project management, Tokyo, Japan
7. Ota K (2007), Value Improvement (Kaizen) of commercial building Construction in Japan, the 11th Pacific Association of Quantity Surveyors Congress, Oakland, New Zealand
8. Ota K (2009), New Project Management of Environment-friendly and Corporate Real Estate in New Japanese Market, the 13th Pacific Association of Quantity Surveyors Congress, Malaysia