

Reconstructing Heritage Post Earthquake The case of Kotagede, Yogyakarta Indonesia

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ABSTRACT

The historical city—Kotagede—has suffered from Yogyakarta Earthquake 2006. Around 175 traditional houses (all of types) were totally collapsed or heavily damage. Those around 30-44% of the damage architectural heritage should be reconstructed. Efforts to Reconstruct the Heritage District, such Kotagede should develop a comprehensive strategy encompassing work to revitalize tangible and intangible heritage resources. Efforts are to include Reconstructing Kotagede's Identity, Reconstructing Kotagede's Characters: The Folk heritage-Javanese houses, Revitalizing the Community based Silver Craft, and Re-organizing the effort to safeguard the Kotagede's Heritage District.

KEYWORDS: Architectural Heritage, Historical District, Kotagede-Yogyakarta, Post-Earthquake, Reconstruction.

INTRODUCTION

UNESCO (1972: 2) reminds us that the cultural heritage and the natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction. Furthermore, the natural disaster, especially earthquake, has caused devastating destruction and mostly irreparable damage of historic buildings and works of art. This is worsened by the situation that whenever an earthquake occurs most of people give more importance to the great monuments rather than the vernacular architecture which constitutes the urban fabric. (Çelebioğlu and Limoncu, 2007; 1) After the earthquake event, most of disaster managers also consider the protection of cultural heritage places as very low on their list of priorities. (Spennemann and Graham, 2007) It is understandable because of the cost for retrofitting, reconstructing and conservation of the heritage post earthquake considered expensive comparing the cost for humanitarian aids. The conservation of a historic building can cost substantially more than building a new structure of equivalent size. The conservation project also takes longer than regular project. The complexity of works and the high quality which should be achieved in heritage conservation create the risk and difficulties to set an accurate prediction on cost budgeting plan and its control at implementation of the conservation work. (Stenning and Evans, 2007: 175-177)

In Indonesia, it is not surprising us if the reconstruction of architectural heritage and historical district are taken into account by government (in a form of policy/financial/technical support) 2-3 years after the disaster. It has some times no policy and program related to heritage reconstruction. In Banda Aceh, the Kohler Dutch Cemetery, Colonial Buildings such as Bank Indonesia, SMA Negeri I, and also Traditional House—Rumoh Aceh Cut Nyak Dhien—were reconstructed by donors' initiatives post tsunami. The Colonial Ward so called *Batang Arau* in Padang started to reconstruct its buildings' heritage two-years after the Earthquake. In Yogyakarta's case, especially the World Heritage Monument such as Prambanan temples complex, have attracted various international supports. However, the folk heritage, the colonial buildings, and other types of heritage did not have enough attention from donors/government soon after Java earthquake 2006.

In most cases, for the collapsed historic building, the conservation post earthquake—in term of technical and physical approach—should be “reconstructed” due to an improvement of the weak parts. However, McCallum (2007: 35), in his articles “Regeneration and the Historic environment,” complaints that the historic environment lies at the heart of so much “physical regeneration”. He suggests to us to think also “non-physical regeneration” by bringing benefits to the historic environment that touches more people's lives and affects the local economy and the places. Urban regeneration is a vital ingredient in conservation, involving a partnership of business initiative with the skills of town planning and heritage management. (Forsyth, 2007: 4) In England, Regeneration through Heritage links Business to the Community to promote private sector involvement in social and economic regeneration. (Falconer, 2007: 77)

In Kotagede—a historical district of Yogyakarta—at first, the initiative was done by universities and NGOs related to preservation, and later on, the government policy through Java Reconstruction Fund (JRF) has started since 2008—three years after the earthquake. The initiative program has promoted not only physical reconstruction but also the non-physical rehabilitation which can sustain the historical district post earthquake. Pilot models and strategies has been developed to cope with community problems in reconstructing their heritage assets in

Kotagede. These experiences challenge to be source of learning for other disaster prone areas which contain many of cultural heritage in Indonesia.

METHODOLOGY

The study has been done as a reflective process of various progressive problem solving by lecturers and students of Universitas Gadjah Mada—as a voluntary team—who worked with or as being part of a “community of practice” coping with issues to improve the Kotagede Heritage District Post Java Earthquake 2006.

It involves systematic observations, data collection and organization which can be then used by the practitioner-researcher in action to make proper decision, to develop strategy, to solve problem for better improvement as well as to have reflection in the form of more scientific report or other source of learning (Parsons and Brown, 2002; Ferrance, 2000: 9)

The approach of the study using the action research method is first, collecting the data and facts of the impact of the earthquake to heritage damages in Yogyakarta through history since 1867. Second, it was an observation which can describe how vulnerable the latest earthquake in 2006 gave impact to the heritage assets of Yogyakarta. Third, we focussed on collecting data and facts in the Kotagede historic district. These first-three steps became a knowledge of how the impacts of earthquake to the cultural heritage assets. Before we decided to develop initiatives and strategies to reconstruct the Kotagede Heritage District, we learnt first various efforts to reconstrcut various types of heritage in various places post earthquake 2006. The previous observation and lesson learnt became important considerations for action based proposal and strategy to reconstruct Kotagede Heritage district.

RESULTS AND DISCUSSION

1. Brief about Earthquake's History and Heritage Damage in Yogyakarta

Historically Yogyakarta’s region has experienced a significant seismic event for a period of every 60-75 years. In the past 200 years, there were 3 vulnerable earthquakes. Those are in 1867, 1943, and 2006. The last vulnerable earthquake, in May 27, 2006, was occurred after 5 non-vulnerable earthquakes in 1981, 1992, 2001, 2004, and 2006. One can learn that the nearest the earthquake to the 2006’s vulnerable earthquake, the shorter the span in between two earthquake. This indicates the more frequent the earth plate was moving and shaking towards the significant seismic event. (see figure 1.) It was reported that in the earthquake 1867, 372 houses were collapsed and 5 persons were dead. However, the city landmarks so called “*Pal Poetih*” (“*wittepaal*=white pile) was ruined, the water castle “*Taman Sari*” was totally damage. Some of Sultan’s residents were also damaged. The *resident huis* of the Dutch colonial was also suffered from the earthquake. If the city land mark was reconstructed with new design that is nowadays known as “*Tugu*” (tower), the water castle remains ruins till now. The water was filled by the densely houses of families who used to be Sultan’s *abdi dalems* (a kind of civil servant in Javanese aristocratic system). The vulnerable earthquake in 1943 caused 2,800 houses damaged and 213 people were dead. No heritage building was reported damage. In the Yogyakarta’s earthquake 2006, it was more than 300.000 houses collapsed, and 6,234 people were dead. It was reported more than 200 listed heritage in Yogyakarta special province have been damaged. Those figures were not to include the heritage damage of the Central Java province. The 2006 earthquake was believed to be the most vulnerable disaster in the Yogyakarta’s history.

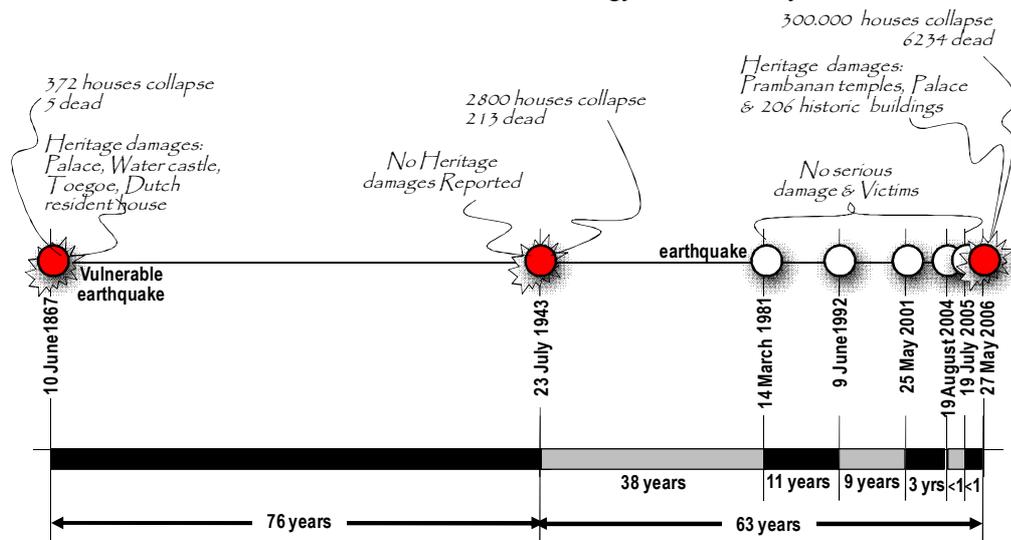


Figure 1. History Earthquake and Heritage Damage in Yogyakarta (Analyzed and Modified from data source: <http://www.pu.go.id/infopeta/RwnBanjir/bencana2006/3334gempasejarah.htm>)

2. Yogyakarta’s Heritage Vulnerability in the Earthquake 2006

Yogyakarta has been developed a government program called “KCB” or *Kawasan Cagar Budaya* (Cultural Heritage District) since 1995. The districts of cultural heritage contain number of architectural heritage and artifacts, *intangible* cultures such as a place for *batik makers* (traditional painting clothes), silver craft, and other artworks. All 4 regencies (*Kabupatens*) and city of Yogyakarta Special province have listed 1,233 heritages. According to a report of *Kondisi Umum Kekayaan Budaya DIY: 2007 (A General Condition of Cultural Property of DIY: 2007)*, around 91 % (1,132) of the cultural properties were in good condition before earthquake. It was decreased after the earthquake. It becomes 74.29 % of listed properties are in good conditions after earthquake. It means the damage cultural properties increased from 9 % to 25.71 %, from 111 damage cultural properties (existing) to 317 damage one post earthquake. The damage heritage increased more than 3 times. The detail data of the five district and city in the province can be understood from the following graphic (see figure 2):

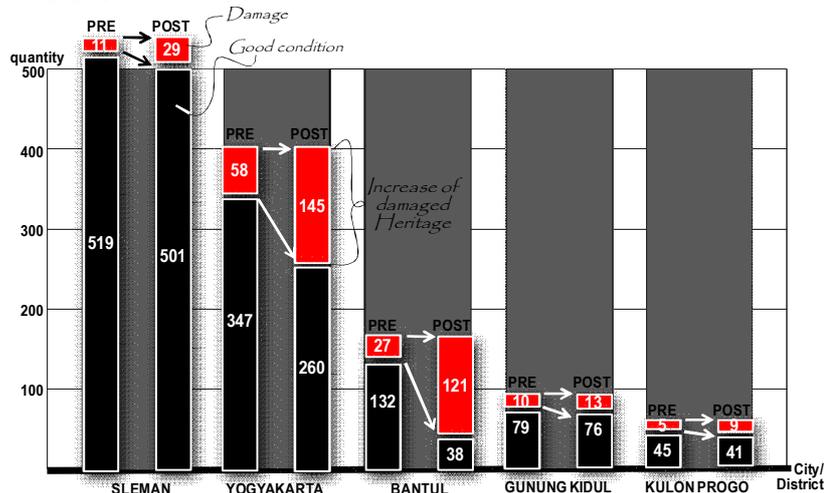


Figure 2. the Heritage Condition Pre-post Earthquake in DIY
(Analyzed and Modified from data source: *Kondisi Umum Kekayaan Budaya DIY: 2007*)

There are at least four types of architectural heritage that had damage in the earthquake 2006 even. Those are Temples, *Kraton* or Sultanate palace and its surrounding, colonial buildings, and the Javanese traditional architecture. They have specific problem concerning “non-surviving” part of their architecture in anticipating the last earthquake.

Temple (*candi*) is among others heritage which has a high degree of irreplaceable and antique. The *candi* Prambanan’s compound, *candi* Plaosan compound, *candi* Sewu, *candi* Sojiwan were on the list of damage temples by the earthquake. The 1991’s World Heritage Temple, the Prambanan temple’s compound, suffered the worst damage comparing others. In the Yogyakarta Palace (built in 1775), although some of building within the palace were constructed using iron casted structure, most of buildings and houses were built from wooden structure and brick constructions. Most wooden structures of many traditional house and buildings were survived during the earthquake, but the palace’s *Bangsai Trajumas*—the grandeur wooden open pavilion was collapsed on a sacred set of gamelan instruments.

Meanwhile the Colonial architecture which could represent a *value of artistic monumentality* from the Dutch, structured by the bricks bearing walls type. This type of structure is very critical to resist from lateral forces resulted by earthquake. The thickness of walls and the location towards the active fault gave influence to the type of damage from wall cracks to totally collapsed walls.

The most representative Javanese traditional architecture which can be found in rural and urban area is called “*dalem*”. Most of *dalems* has *Joglo* type of architecture. The *Joglo* type was built with wooden structure supported by the main four pillars in the middle called “*soko guru*” and 12 smaller pillars at the periphery. The *soko guru* and other pillars stood up at upper ground type foundation so called *umpak*. The four *soko guru* were connected rigidly at the upper parts by *tumpang sari*—multi-frame beams constructed one on the top of the other by interlocking and overlapping system. This very rigid *tumpang sari* supports the upper part of *Joglo* roof. The integration of *umpaks-soko guru-tumpang sari* formed a core structure known as “*rong-rongan*.” (Prihatmaji, 2007: 5) It is believed to be the strongest part of *Joglo* in stabilizing the effect of ground shaking because of its *rong-rongan* construction rigidity and weight. (see figure 3. *Joglo* Structural Parts)

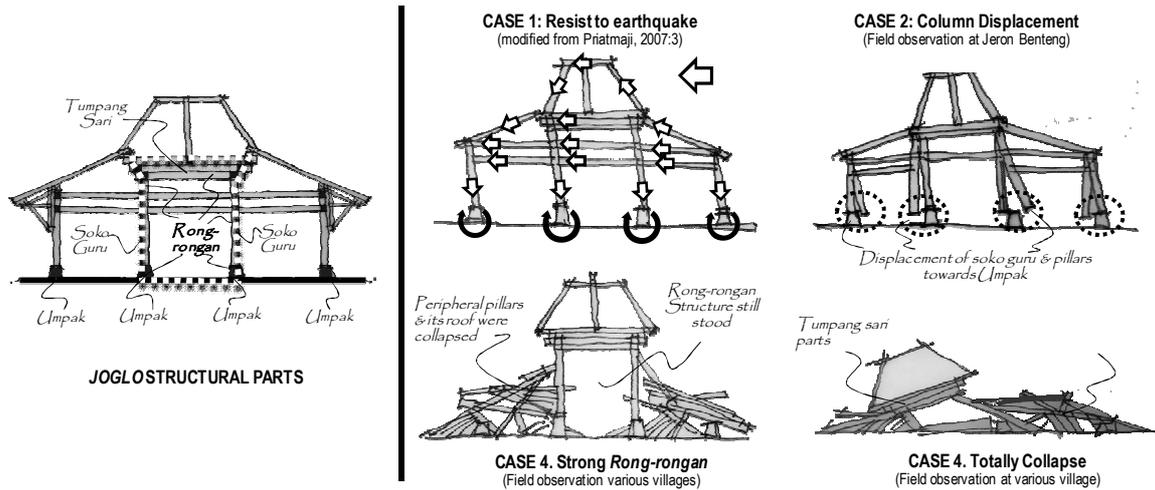


Figure 3. The Joglo Structural Parts & Joglo damage Typology

Although theoretically, the *Joglo* has strong system structure to anticipate the earthquake, the critical parts lie on the connection between the *umpak* and the *soko guru* or peripheral pillars, between the *soko guru* and the *tumpang sari*, and between the peripheral pillars to beams above them. The Javanese connection details are weak to anticipate the lateral forces. (Frick, 1997: 163-164) Through observation of collapsed and damaged *Joglos* suffered from the Yogyakarta’s earthquake 2006, we found several cases which can be understood from the following diagrams: (see fig. 3. *Joglo* damage Typology)

3. Vulnerable Kotagede Heritage District Post Earthquake 2006

Kotagede was the fifteenth century built capital of Islamic Mataram kingdom in Indonesia. Kotagede literally means “big city” (*kota*=city; *gede*: big). It represents the Javanese ideal site and its unique characteristics. (Adishakti, 2008: 244) As a typical city of Java, the urban structure of Kotagede was formerly based on the concept called *Catur Gatra Tunggal* (four components in one). Those four components—a palace (*kraton*), mosque (*mesjid*), market (*pasar*), and square (*alun-alun*)—were structured the Javanese city center. These four components were influenced the pattern of the later Islamic Palace cities in evolutionary way both of coastal palace cities such as Lasem, Tuban, Gresik, Jepara, etc. and of inland palaces cities such as Kartasura, Surakarta, and Yogyakarta. (Ikaputra, 1995: 25) Beyond those four components, Kotagede is also enriched by traditional houses (*kalang* house), small alleys (*jalan rukunan*), open spaces with banyan trees, and by home industries especially famous for their silverworks.

For those above significant values and characteristics, in 2003, Kotagede was declared by Yogyakarta Mayor as “Living Museum” especially or its well-known traditional houses and unique *Kalang* houses and *kampung* of sterling silver crafters. (Adishakti, 2007: 4) However, three years after becoming “Living Museum” this historic city was stricken by earthquake of May 27, 2006. All of the sudden, the tangible and intangible heritage were suffered from devastated damages.

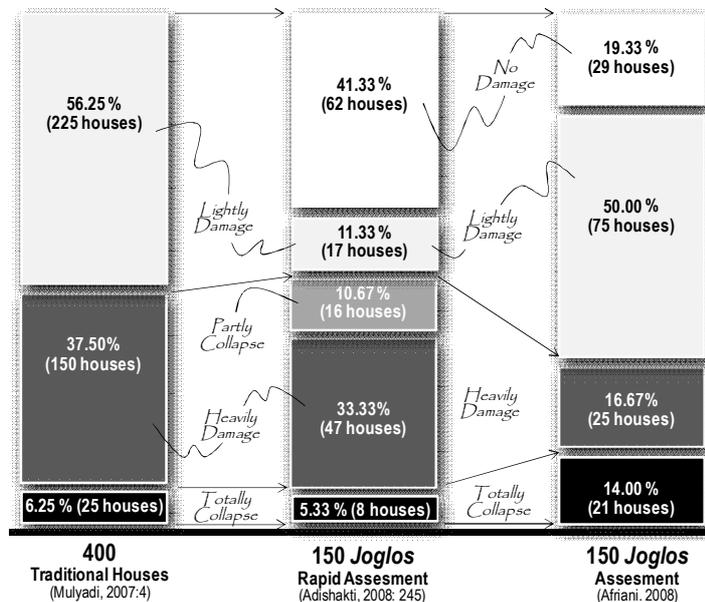


Figure 4. The Number of Traditional Houses and Joglos Damages

From 3 sources of traditional house's assessments (see fig. 4), it is found that, the totally Collapsed Traditional Houses including *Joglos* estimated around 5-14 %. If we added the totally collapsed houses with the heavily damaged houses and partly collapsed ones, the percentage increased in range 30 to 44 %. This percentage shows the critical needs for total reconstruction of traditional houses, to keep the heritage of Kotagede significance for today and future generation. It means we deal with around 175 traditional houses (all types) to be reconstructed. If we put *Joglo* as the priority among them considering this architecture typology represented and contributed the Javanese cultural heritage, we need to provide reconstruction financial supports to around 50 *Joglos*. In fact, so far it was recorded only 5 *Joglos* have been reconstructed by donors since 2006. It was worsened by some families who could not afford the *Joglo*'s reconstruction sold the collapsed *Joglo* to the antique house merchants. There were estimated around 10-15 *Joglos* have been sold and brought out of Kotagede. The earthquake also made Kotagede stop its family home production of crafts especially on silver handicraft items. This stagnancy of handicraft home's industry—which has long been Kotagede's trademark—added a list of economic loss of the place.

Kotagede post earthquake 2006 experienced a threat of suffering lost of tangible and intangible heritage that composed the historic Javanese city. This situation became the concern of New York based World Monuments Fund (WMF). The WMF has put the Kotagede Heritage District in list of 100 Most Endangered sites since June 6, 2007. In 2008, the organization continued to declare the Kotagede in the book "2008 World Monuments Watch List of 100 Most Endangered Sites", stated as follows:

The entire area surrounding Kotagede suffered damage in the May 2006 earthquake, and local residents still await aid to restore their homes. Today repairs are carried out in a haphazard way, resulting in loss of historic fabric. Government assistance provided in the wake of the earthquake has encouraged new construction rather than preservation, but it is hoped that Watch listing will highlight the importance of incorporating the area's still-living cultural heritage into the rebuilding of this Javanese city. (WMF, 2008: 19)

By listed in the 100 World Most Endangered Site, Kotagede expects to have more attentions, supports, concrete involvement of government, various donors, stakeholders, universities and from its owned community.

4. Efforts to Reconstruct the Heritage District

A comprehensive strategy that would directly respond to the urgency to revitalization action toward the damaged post earthquake and to support local communities' ability to get back on their feet, is needed, that would encompasses work to revitalize tangible and intangible heritage resources. Every conservation effort would require a case-by case approach since each historic building is owned by individual owners, while retaining the traditional characteristic of the historic district. (GMU-JICA, 2007:2) Some efforts to reconstruct the most endangered site post earthquake 2006 can be mentioned as follows:

a. Reconstructing Kotagede's Identity.

Some efforts to reconstruct the identity of Kotagede's Heritage District have been done especially related to elements visible and functional for public. Among of the efforts are a reconstruction of ancient gate of the mosque, a renovation of *rukunan*'s street characterized by narrow alleys in between walls, a reconstruction of Kotagede's land mark—an old Dutch electric power distribution—called *Babon Anim*, a revitalization of shop house façade, and a refinement of the unfriendly new Community Hall Post Earthquake with Kotagede's style. Most of the funding was from the local government.

b. Reconstructing Kotagede's Characters: The Folk heritage-Javanese houses

The most difficult tasks to cope with one of World Endangered site—Kotagede is to reconstruct the representative tangible heritage—the Javanese Traditional House especially the damage houses and totally collapsed *Pendopo* with its *Joglo*'s architecture. Stenning and Evans (2007: 177-178) raised the issue of the difficulties of historic buildings conservation: *A historic building project is likely to contain expensive items with a high level of uncertainty and complexity and to be dependent upon outside funding.*

The external source and funding, unfortunately, can be afforded in short right away after the disaster. Most donors or even government supports go to the "humanitarian aid" rather than the heritage program. It is understandable because in Kotagede the cost of one traditional house reconstruction which is around Rp. 60,000,000,- to Rp. 120,000,000,- (=6,650 - 13,300 US\$) equals to 40 to 80 units of Bamboo's T-shelters or to 4 to 8 units of permanent house. However, the philosophy to support wider beneficiaries in time of emergency and transitional period should not make this heritage being neglected. The government policy should automatically create a special planning division concerning post disaster safeguard for heritage in line with the humanitarian aid. The above issues made the process of reconstructing Kotagede's Characters and identity through Javanese houses will take and should be planned within long term scheme.

One of strategy and approach to restore this valuable identity of Kotagede's Heritage District is through the promotion of "Heritage Foster Parents Program"—*Program Orangtua Asuh Pusaka*". The program was started by campaigning and promoting the program to as many as possible donors. One of Gadjah Mada University partners to initialize and promote the program was Japan International Cooperation Agency (JICA). Within 2 years, after the earthquake of the period 2006-2008, the Foster Parents Program has been gained significant supports from at least 4 donors to reconstruct 5 traditional houses and to retrofit some houses. Those supports were coming from: Royal Dutch Government, Japan International Cooperation Agency (JICA), Total Indonesia (French Based Oil Company),

and Exxon Mobile (US based Oil Company). From the success of reconstructed and retrofitted houses, we expect to have more attention from government or other donors to supports and save entire assets especially traditional houses of this 100 World Most Endangered Heritage Site.

c. Revitalizing the Community based Silver Craft

The Vision to Conserve the Kotagede's Heritage District Post Earthquake is:

The rebirth of Kotagede's Historic District with social, cultural and environmental quality better than it was prior to the earthquake, where the community has the capacity to manage the restored cultural heritage independently and where the restored heritage could give economic and cultural impact back to the community. (Adishakti, 2008: 249)

It is clearly stated above that the better quality of Kotagede's Heritage District post earthquake is not only relying on "physical reconstruction" or tangible cultural heritage but also intangible one. Intangible cultural heritage of Kotagede Heritage district can be ranged from producing traditional food (*kipo*, *legomono*, etc.), clothes (*sulam*), to making crafts (gold, silver, cooper, etc.), from having asset of community group maintaining traditional *gamelan* music to one practicing more popular folk *keroncong*, from keeping Javanese poetry reading (*mocopat*) to spreading the Qur'an reading (*pengajian*, *iqra*).

Among all of the intangible cultural heritages, the craft home industry was suffered severe economic impact after the earthquake. No order-no buyer means no-income for family to survive after earthquake. How could we support to sustain the economic life of the craft maker's family? If the traditional house reconstruction efforts have emphasized on regenerating physical culture and still given benefit to limited beneficiaries, the economic revitalization especially the silversmith family has been developed to sustain the intangible assets of Kotagede. The aim of conserving both intangible and tangible culture of Kotagede's valuable heritage is to take into account the importance of sustainability of those assets for the community. Sustainability comprehends that cultural diversity is an essential component of cultural identity, sense of community belonging, social inclusion, and participation. (Rodwell, 2007: 185) Therefore, to improve sense of community belonging, social inclusion as well as cultural identity, Gadjah Mada University and its partner Exxon Mobil developed a program called "The Kotagede Craft Post Earthquake". The program reactivated small-scale craft industry production by supporting 50 silversmithes especially low income and labor's scale ones to solve their production problems.

The program has significant contribution for small industry economic revival especially for labor scale of silversmith families. The Craft Revitalization Program is believed to be one of several efforts for Kotagede economic and cultural activity relief.

d. Re-organizing the effort to safeguard the Kotagede's Heritage District

Since various efforts to safeguard both tangible and intangible assets have been done by various "actors" and supported by various donors, there has been a need to synergize all of efforts into effective coordination and greater beneficial effects. Although the idea to coordinate activities to safeguard Kotagede was raised in 2006, in time when we were busy to safe the Kotagede's assets after earthquake, but an effective action towards realizing the idea was started from April 2009. Several focus group discussions have been conducted involving various institutions, individuals, communities to set up coordinative body to integrate and reinforce of further action and movement to conserve the Kotagede's assets Post Earthquake since that time. Java Reconstruction Fund (JRF) program for Kotagede plays a role to accommodate discussions towards forming a coordinative or Joint Secretariat so called *Sekratriat Bersama* (SETBER).

5. The Challenge for Sustainable Tourism.

The tourism in the historic city experiences a dichotomy of developing the city as object (a consumable product) and the city as subject (place of living). (Orbasli, 2002: 128) History tells us that a 'good' city evolves on the basis of local characteristics and design principles, not by mere chance. (Frey, 2005: 20) Kotagede as a "consumable product" can be easily explored from its physical characters as a Javanese city which has a spatial pattern, folk architectural heritage, and its intangible assets such as silver craft home industry. However, Creating a Kotedege as a "better place of living" cannot be achieved without involving the community at any development program in response to accommodate their needs and aspirations.

Reconstructing Kotagede Post Earthquake should be fundamentally based on how to improve the quality of its local city characteristics—i.e. city spatial, streets, and architectural heritage through heritage conservation after the disaster. In the same time, we also have to revitalize the local economic assets—silver craft home industries—which have been exist with long history as intangible heritage in the city. The involvement of people who live in Kotagede should work and support the process of reconstructing and revitalizing Kotagede's assets both as "consumable products" for tourism (external driven) as well as "capital" for community living needs (internal driven).

6. Lesson Learnt

The various type of heritage can be managed differently as case by case, but most of privately owned heritage properties ("folk heritage") are usually in critical situation. The awareness of those cultural significances learning from good experience and practice are encouraged to be introduced directly to the community.

The three fundamental activities needed for Kotagede Post Earthquake should be directed to Heritage Conservation, Craft Revitalization, and Community Efforts. The conservation should not merely deal with maintaining the physical quality of the heritage by the physical reconstruction but also to regenerate economy and “recontextualize” social function post earthquake aimed to sustain to benefit people today and future generation. This idea of sustainable development of Kotagede post earthquake including the possible sustainable tourism development can be as model for other heritage city post earthquake.

CONCLUSION

We should be aware of the Heritage Supports Post Disaster that usually becomes in low priority comparing to humanitarian aids. It is recommended that all possible anticipations to safeguard the heritage towards future disaster especially earthquake are to include at long term planning and implementation. If possible, it should be embedded into the government program of conserving cultural heritage.

REFERENCES

- Adhisakti, Laretna T. (2007) *Quick Emergency Response And Long Term Recovery Agenda: Pusaka Jogja Bangkit! – Jogja Heritage Revival! - Save Heritage and Build a Better Local Economy*. International Seminar on Recovery Management of Arts and Cultural Heritage, Multimedia Room, Gadjah Mada University, January 19, 2007.
- Adishakti, Laretna T (2008) *Community Empowerment Program on the Revitalization of Kotagede Heritage District*. In *Vulnerable Cities: Realities, Innovations and Strategies*, Edited by Tetsuo Kidokoro, Junichiro Okata, Shuichi Matsumura, Norihisa Shima. Tokyo: Springer.
- Afriany, Nurmiana (2008) *Upaya Melestarikan Rumah Joglo di Kotagede*. (Efforts to Conserve Joglo house in Kotagede). Kedaulatan Rakyat Daily news Paper. May 07, 2008. (In Indonesian)
- Çelebioğlu, Banu & Limoncu, Sevgül (2007) Strengthening Of Historic Buildings In Post-Disaster Cases. Proceedings of 2006 International Conference and Student Competition on post-disaster reconstruction "Meeting stakeholder interests" Florence, Italy, May 17-19, 2006, Montreal: The IF Research Group Université de Montreal in 2007.
- Falconer, Keith (2007) Sustainable Reuse of Historic Industrial sites. In Forsyth, Michael (2007) *Understanding Historic Building Conservation*. Oxford: Blackwell Publishing Ltd.
- Ferrance, Eileen (2000) *Action Research*. Providence: Northeast and Islands Regional Educational, Laboratory At Brown University
- Frey, Hildebrand (2005) *Designing The City. Towards A More Sustainable Urban Form*. London & New York: the Taylor & Francis e-Library.
- Frick, Heinz (1997) *Pola Struktural dan Teknik Bangunan di Indonesia*. (Building Structural Pattern and Technique in Indonesia). Yogyakarta: Penerbit Kanisius. (In Indonesian)
- GMU-JICA (2006) *Community Empowerment Program: Revitalization of Kotagede's Heritage District*. A Heritage campaign Leaflet to Revitalize the Kotagede Heritage District Post Earthquake. Developed by Gadjah Mada University and Japan International Cooperation Agency.
- Ikaputra (1995) *A Study on the Contemporary Utilization of the Javanese Urban Heritage and its Effect on Historicity*. Doctoral Dissertation, Osaka University Japan.
- Orbasli, Aylin (2002) *Tourists in Historic Towns. Urban Conservation and Heritage Management*. London & New York: the Taylor & Francis e-Library.
- Parsons, Rick D., and Kimberlee S. Brown. (2002) *Teacher as Reflective Practitioner and Action Researcher*. Belmont, Calif.: Wadsworth/Thomson Learning.
- Prihatmaji, Yulianto P. (2007) *Perilaku Rumah Tradisional Jawa “Joglo” Terhadap Gempa*. (Character of Javanese Traditional House “Joglo” against Earthquake). Jurnal Dimensi Teknik Arsitektur Vol. 35, No. 1, Juli 2007: 1 – 12. (In Indonesian)
- Rodwell, Dennis (2007) *Conservation and Sustainability in Historic Cities*. Oxford: Blackwell
- Spennemann, Dirk H.R. and Graham, Kristy (2007) The importance of heritage preservation in natural disaster situations. *International Journal of Risk Assessment & Management* 2007, Vol.7, no 6/7. pp. 993-1001.
- Stenning, Adrian and Evans, Geoff (2007) *Costing and Contracts for Historic Buildings*. In Forsyth, Michael (2007) *Understanding Historic Building Conservation*. Oxford: Blackwell Publishing Ltd.

- UNESCO (1972) Convention Concerning the Protection of the World Cultural and Natural Heritage. United Nations Educational, Scientific and Cultural Organization Convention adopted by the General Conference at its seventeenth session, Paris, 16 November 1972
- Wahyudi, Heri EJ (2008) *Settlement and Housing Post Earthquake in Yogyakarta, 2006. A Heritage Housing Program of Kotagede, Yogyakarta Indonesia*. Alumni Paper of Shelter Design and Development, Housing Development & Management, Lund University, Sweden.
- WMF (2008) *2008 World Monuments Watch List of 100 Most Endangered Sites*. New York: World Monuments Fund. Source: <http://wmf.org/watch2008/watch.php?id=S8579>
- (2007) *Kondisi Umum Kekayaan Budaya DIY: 2007 (A General Condition of Cultural Property of DIY: 2007)*