Conservation & Promotion “Dinh” in Hanoi Old Quarter

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Abstract. Hanoi Old Quarter is an area of urban heritage with very important role and value. Currently, this heritage is facing many challenges, at risk of being invaded and destroyed by time, environment, natural disasters, and human impact as well as the pressure from urbanization. Central and local government tries to conserve this valuable heritage; however, the result hasn’t met the expectation. This article presents an overview of the number, characteristics and role of Dinh (Vietnamese communal house) in Hanoi Old Quarter, discusses the need for conservation and proposes solution to conserve and promote the role of Dinh using smart city application.

1. Introduction
The Old Quarter is one of the most valuable heritage areas of Hanoi. Under pressure of population growth and urban development, the existence of architectural monuments in general and Dinh in the Old Quarter are facing many difficulties and challenges. On the other hand, Hanoi is currently in the process of building and developing the city in a smart and modern direction with the goal of becoming a livable city and creating the best living environment for people. Therefore, conserving and promoting the role and value of cultural heritages in the Old Quarter including the Vietnamese communal houses are critical, requiring helpful valuation, orientation and systematic solutions compatible with the overall smart city theme.

2. Methods & Results
Hanoi Old Quarter is a 500-acres area within the administrative boundary of Hoan Kiem District, limited by the north of Hang Dau Street, the east of Tran Nhat Duat Street, the west of Phung Hung Street, the side of Hanoi. South Street Hang Bong, Hang Gai, Wooden Bridge, Hang Thung. This is an area with a high density of monuments, mostly religious monuments.

2.1. Number of religious and belief constructions.
In the system of religious and religious relics of the Old Quarter, Dinh has a large number, many times higher than other types of religious works. This fact shows that Dinh is the type of vestige most closely associated with the cultural and spiritual life of Vietnamese people in general and Hanoian people in particular (Figure 1).

Figure 1. Number of religious and belief constructions in Hanoi Old Quarter indicating Dinh as the primary group (~58%) [8,10]
2.2. Features planning, architecture.

The Vietnamese communal houses are distributed in the whole area of the Old Quarter (33 streets and 4 alleys), but are most concentrated in the East and Southeast, especially in the East of Hang Ngang and Hang Duong, Hang Dao and the south of the Old Quarter. There are some streets located 4 to 5 Dinh houses.

Table 1. Number of Dinh houses on some streets. Each street usually has only 1 Dinh with the exception of Nguyễn Hữu Huân with 5 Dinh. [10]

| Order | Amount of communal / street | Number and street name |
|-------|----------------------------|------------------------|
| 1     | 5                          | (Nguyễn Hữu Huân)      |
| 2     | 4                          | (Hàng Bông)            |
| 3     | 3                          | (Hàng Đạo, Hàng Dương, Hàng Bạc) |
| 4     | 2                          | (Hàng Cá, Hàng Buóm, Trần Nhất Duật, Hàng Vai, Hàng Quất, Hàng Gai, Hàng Nón, Hàng Lưốc) |
| 5     | 1                          | 24 (Hàng Cạnh, Hàng Ngang, Cầu Gồ, Hàng Thông, Nguyễn Siêu, Đồng Thái, Ngô Hải Tướng, Lò Rèn, Bát Đàn, Hàng Hôm, Hàng Cổt, Hàng Rưới, Ngô Gạch, Hàng Đầu, Giám Cầu, Hàng Giây, Đồng Xuân, Hàng Da, Hà Trung, Trần Quang Khải, Ngô Phát lộc, Ngô Trung Yến, Ngô Tâm Thượng, Ngô Gia Ngur) |
| Total | 15                         | 37                     |

Due to the characteristics of the urban architectural form, the structure of the street, the Vietnamese communal houses in the Old Quarter are much different from other Vietnamese communal houses in the rural. Dinh is usually built on the street or inside residential area. The floor surface of these urban Vietnamese communal houses is relatively small (E.g. Dinh Kim Ngan is 575 sq meter). The building structure is more simplified, arranged more neatly and contains more incomplete functional components than one of Dinh in rural areas. Factors of location, direction and layout of the overall ground Dinh are not too dependent on the principles of ‘feng shui’ but depending more on the actual conditions of the land. In the Old Quarter of Hanoi, the Vietnamese communal houses are arranged in the following main forms: The plan with the peacock shape (工), the shape in the second shape (二) and the plan in the shape of a "pipe", with house classes Develop in depth (Table 2). [1,3,5]

The current situation of Dinh houses in the Old Quarter is not very satisfactory. The landscape and environment are overwhelmed and occupied for housing, business and other purposes (Figure S4). The technical status of the buildings is downgraded, the number of works with enough main items is not much, many works only have a small amount of worship space. [10]
Table 2. Three types of overall ground layout Dinh in Hanoi. Among these three, “Ống” is the most common type due to its rigid structure being suitable for city layout while “Nhị” and “Công” are more common in rural area. [1]

| Order | Layout format               | Typical projects                                                                 | Illustration |
|-------|-----------------------------|----------------------------------------------------------------------------------|--------------|
| 1     | Overall ground Shaped “Nhị” | Đình Quan Đề, Đình Nhân Nội, Đình Hà Vĩ, Đình Tú Thị                              |              |
| 2     | Overall ground Shaped “Công”| Đình Kim Ngân, Đình Trường Thị, Đình Phát Lộc, Đình Đông Thành, Đình Tân Khai, Đình Yên Thái, Đình thành Hà, |              |
| 3     | Overall ground Shaped “Ống” | Đình Đồng Lạc, Đình Đức Môn, Đình Trung Yên, Đình Lò Rèn, Đình Vũ Du,            |              |

Table 3. Comparison of traditional Dinh architectural features in rural areas in Northern Vietnam and in Hanoi Old Quarter.

| Characteristics                      | Vietnamese communal house. | Vietnamese communal house in Hanoi Old Quarter |
|--------------------------------------|---------------------------|---------------------------------------------|
| Directions                           | The orientation of the building complies with feng shui and conception of religion - belief such as South, Southeast, West ... | The direction of the building is dominated by the direction of the streets, so it is often not fully complying with the principles of feng shui concept. |
| Land                                 | There are separate areas, spacious land.                          | There are rare isolated areas, land is limited in area. |
| Building location                    | Construction in an important position (Between villages, village heads) | Street corner, street surface, middle of the street Places where people gather to work in the same profession and work in the same hometown |
| Scale and overall layout of the work | Big, most important village. With the investment, contribution, wealth and wisdom of the whole village. Buildings usually have a complete overall: garden, lake, main and auxiliary works. | The work is produced by a group of people, the same clan, the same village, the same guild. The work has a smaller scale. The overall must simplify the items, layout neat. |
| Architectural and artistic characteristics | Many works have typical values, unique in architecture, art, sculpture and decoration | Folk architecture style is traditional but not as unique and masterful as in rural areas. Proportion of works suitable to the land plot and surrounding works. |
| Environment landscape               | Quiet airy. Spacious land suitable for functions and activities.  | The environment is crowded, polluted, noisy and chaotic.  |
2.3. Role and function of Vietnamese communal houses in Hanoi Old Quarter.

Vietnamese communal house is the public architecture of Vietnamese villages. The architecture called Dinh originated from the name of Dich Dinh, Dinh Tram, which were located at each street level so that the King could patrol and walk with the resting place. Gradually, the Vietnamese communal houses turned into Vietnamese communal houses with three main functions: The religious function (The place of worshiping Gods and worshiping the village tutelary god); administrative functions (centers of social and administrative activities of the village such as meetings, handling, fines ...); Cultural functions (As a cultural center of the village community, where games and festivals take place ... ) [5]. When people went to Thang Long for settle down, they formed a community of the same origin, profession, and guild worked together to build communal temples in the city to be a place of worship. [9] Due to the impact of urbanization and urban development, the way of life, career structure, ideology and lifestyle of the people also changed in accordance with actual social developments. These changes have affected religious and belief constructions, especially Vietnamese communal houses in the Old Quarter.

Some functions have changed or disappeared, some functions such as performing folk arts, exhibiting, introducing local history, introducing craft and traditional handicraft products have been introduced. However, these functions have just appeared in some temples. Currently, in the Old Quarter of Hanoi, the Vietnamese communal houses still retain the function of worshiping gods and saints, accounting for the highest percentage, then worshiping the ancestors.

Literature and surveys show that although there are changes in the number and function, the Vietnamese communal houses are still valuable and play a very important role in Hanoi Old Quarter. Internal. Based on evaluation results, the role of Dinh architectural monuments varies among the target groups. However, we can easily see the prominent roles are: The role for the cultural life of the community (1), the important role in the architectural environment, urban landscape (2)

### Table 4. Status of Vietnamese communal houses.

| Order | Current Status       | Number of works |
|-------|----------------------|-----------------|
| 1     | Most main items      | 18              |
| 2     | Some main items:     |                 |
|       | - Gate + Worship space | 7               |
|       | - Worship space      | 14              |
| 3     | No main item         | 16              |

These statistics show that only ~31% of communal houses are well-preserved while at least 28% are considered disintegrated

### Table 5. Functions of Vietnamese communal houses in Hanoi Old Quarter. Majority of Dinhhs remain functional nowadays. [3,5,10]

| Order | Old function.                              | Number of original Dinh houses | Number of Dinh houses retaining old functions |
|-------|-------------------------------------------|--------------------------------|---------------------------------------------|
| 1     | Worship of Gods, Saints, Citizens, National Heroes | 45                            | 32                                          |
| 2     | Worship of Gods, Saints, Imperial Citizens and Vocational Masters | 5                             | 4                                           |
| 3     | Worship of the Founder                     | 8                             | 7                                           |
Table 6. Results of the survey on the role of Dinh architecture in Hanoi Old Quarter among three different groups conducted by the author. Despite some difference in opinions, all three groups agree on the importance of Dinh with high percentage.

| Role                                                                 | Opinions of local community | Opinions of local managers | Traveler comments |
|----------------------------------------------------------------------|------------------------------|----------------------------|-------------------|
|                                                                      | VI (%) | I (%) | VI (%) | I (%) | VI (%) | I (%) | NI (%) | VI (%) | I (%) | NI (%) |
| Maintain the cultural identity, spiritual life of the community.     | 43     | 45    | 12     | 35    | 46     | 19    | 18     | 47     | 35    |
| Message of history, culture, architecture and art.                   | 26     | 48    | 26     | 38    | 49     | 13    | 22     | 53     | 25    |
| Community cohesion.                                                  | 25     | 47    | 28     | 31    | 55     | 14    | 11     | 28     | 61    |
| Tourism development.                                                 | 17     | 38    | 45     | 35    | 47     | 18    | 25     | 48     | 27    |
| Important architectural components in the old town.                  | 22     | 46    | 32     | 27    | 58     | 15    | 18     | 31     | 51    |

VI: Very important, I: Important, NI: Not important

2.4. Number of religious and belief constructions.

In the system of religious and religious relics of the Old Quarter, Dinh has a large number, many times higher than other types of religious works. This fact shows that Dinh is the type of vestige most closely associated with the cultural and spiritual

3. Discussion

3.1. Motivation.

Religious architecture and beliefs are born and nurtured by traditional beliefs, morals and customs of the nation, so they have a strong, durable and indispensable vitality in the cultural life of Vietnamese people in general and Hanoi people. Therefore, through many fluctuations of time, of history, under the impact of nature and people, many relics have been destroyed, leaving only vestiges or degradation, but still exist. Immortal construction in the hearts of Vietnamese people. The confirmation of the need to conserve Dinh vestige in Hanoi Old Quarter is confirmed on the following bases: Law on heritage conservation; Cultural heritage is a core element for developing a smart and sustainable city; needs of local communities and tourists.

3.2. Direction.

Implementing the integration of Smart City and relics conservation strategy with the motto "Developing smart cities to conserve monuments and conserving monuments to develop smart cities"; maintain and promote Dinh architectural relics in Hanoi Old Quarter towards intelligent relics, meet the experience, intelligent interaction, exploitation and management with intelligent tools; maintain and promote the tangible and intangible elements of relics appropriately, ensuring that the relics exist in the urban environment. (Figure 3).
3.3. Solution.

3.3.1. Overall solution. For Dinh vestiges to exist and promote their role, the value needs to connect it with other functional spaces in the old town area in order to create complex spaces of historical, historical and literary spaces. Continuous goods in the form of clusters and glands: cluster-type complexes applied to spaces within a radius of 100 - 200m include: Clusters of religious and belief works; Dinh monuments complex, historical monuments, memorial architecture, landscapes, landscapes, commercial space, culinary space, folklore performing space, traditional art (Figure 4 and Figure 5).

A combination of lines applicable to craft and pedestrian streets includes: street space, religious and religious space, historical space, commercial space, cuisine, cultural and art space. Folk arts, festive space.

Table 7. Level of interest of tourists for Dinh architectural relics showing that international visitors are much more interested in Dinh compared with domestic guests.

| Level of concern       | Ratio (%) |
|------------------------|-----------|
|                        | International visitors | Domestic guests |
| Very interested        | 38        | 20          |
| Care                   | 46        | 39          |
| Do not care            | 12        | 24          |
| Other                  | 04        | 17          |

Table 8. Survey results of community interaction with Dinh architectural monument. Unexpectedly, middle aged (35-year-old to 60-year-old) turns out to be the most popular group due to high amount of participation in tourism.

| Activity                  | Rate of participants (%) |
|---------------------------|--------------------------|
|                           | Elderly | Middle aged | Youth |
| Festival                  | 30      | 35          | 17    |
| Spirituality and beliefs  | 42      | 34          | 12    |
| Performers, folk songs    | 25      | 32          | 15    |
| Tourism                   | 16      | 52          | 36    |
| Community activities      | 27      | 18          | 0     |
| Activity                      | Elderly | Middle aged | Youth |
|-------------------------------|---------|-------------|-------|
| Festival                      | 30      | 35          | 1     |
| Spirituality and beliefs      | 42      | 34          | 12    |
| Performers, folk songs        | 25      | 32          | 15    |
| Tourism                       | 16      | 52          | 36    |
| Community activities          | 27      | 18          | 0     |

**Figure 4.** Cluster of religious and belief relics within a radius of 100-200 m

**Figure 5.** Dinh vestiges clusters and other spaces within a radius of 100-200 m

**Figure 6.** Complex model for different streets with their corresponding factors
3.3.2. Solutions for constructions.

a. The solution is based on the consideration of the role and value of the monument:

- For typical value relics, relics have been ranked: Conserve and fully restore the traditional functional space of the building in the form of physical space. Renovating and embellishing the garden and landscape, integrating a number of new and suitable functions to promote the use value of the monument.

- For relics of average value and unclassified relics: conduct surveys, classify spaces in the overall according to the following diagram:

  With factor 1: conservation, embellishment, reconstruction in the form of physical space; element 2: restoration and conservation in the form of cyberspace; element 3: newly built in the form of physical space or in combination with neighbouring constructions.

- For damaged, destroyed, encroached relics that are difficult to recover: Conduct research, surveys and restoration of relics in the form of digital documents for archiving.

b. The solution is based on the review of the main function of the monument:

- For the Family Worship Hall in the streets, retaining the characteristics of the old trade village: Maintaining the Gate space (tam quan), Class yard 1, Worship space in the form of physical space. Considering and integrating the functions of displaying and selling traditional handicraft products, souvenirs for visitors, tourism, living spaces of associations and occupational groups into these spaces. Building a few spaces to introduce the origin, historical origins and development of the relics, displaying materials, exhibits and models of production lines of traditional crafts in the form of space. virtual (Figure 8).

- For Vietnamese communal house to worship Thanh, Than, Thanh tutelary gods: Maintain the spaces of Gate (tam quan), yard layer 1 (If any), worship space in the form of physical space. Integrating more living spaces for local communities into this space ... Building several display spaces, introducing the origin, historical origins and development of the monument, Traditional culture of the locality (district, ward ...) in the form of virtual space.

3.3.3. Relics management solution. Optimize the use of information technology in the management and exploitation of monuments with the following contents: Digitizing all the Dinh monuments in the Old Quarter for research, conservation, tourism and exploitation. and relics management; Building and developing an intelligent environment for assessing and managing heritage and relics; Develop interactive travel maps, websites with program content, events, plans, itineraries, propaganda information, promoting heritage and monuments.
3.3.4. **Recommended technologies.**

**Table 9.** Technologies applied in conserving and promoting Dinh vestige in Hanoi Old Quarter with their corresponding applicable domains.

| Technology                          | Content work                                                                                                                                 |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 360 photography technology, 3D scanning | Digitize relics                                                                                                                                  |
| Artificial intelligence (AI)        | Building a process of handling, conserving and restoring relics - Detecting damaged structures, calculating quantity of repaired materials. |
| Virtual reality technology (VR)     | Construction of works or work items in the form of interactive virtual relics 3D                                                              |
| Virtual reality, Augmented reality and 360 Virtual tour | Reconstructing some intangible elements that currently do not have the conditions to rebuild in the form of virtual space |
| Internet of things (IOT)            | Automatic and multi-lingual voiceover system - Information and heritage promotion - Increase accessibility to monuments (online, offline and combined) |
| QR code technology in VN Guide application - 3D website technology | Create 3D relics on the Website to enhance the experience of the visitors |
| Virtual reality (VR)                | Technology connects monuments at past and present times                                                                                         |
| 3D scanning and printing            | Restoration, duplication, production of artifacts, heritage and souvenirs                                                                        |
4. Conclusions
Conserving monuments in general and conserving Dinh monuments in Hanoi Old Quarter is a difficult and complex task. In the context of the 4.0 technology revolution and the "Internet of Things" trend, this work needs to be changed to meet the requirements of reality. Exploiting the applications of smart city and advanced technology to conserve and promote the value of Dinh houses in Hanoi Old Quarter is a study with the hope of contributing to building Hanoi capital a smart city, modern, rich identity.

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