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Financializing The Public Utilities of New Urban Areas in Hanoi: When State Schools No Longer Are The Key Factor in The Residential Unit Design Concept

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Abstract

Since 1986, the Doi Moi policy in Vietnam has changed the State's role from monopolizing the creation of new residential areas, including housing with state service facilities, to decentralizing the private economic sectors to participate in the housing production market. School has always been people's top concern when buying a house and establishing their new life in new urban area projects introduced into Hanoi since the late twentieth century. The theories of residential units in urban form management also emphasize this institution's central role in bringing social community improvements through the physical space. However, the financialization of housing and the 'socialization' of education, which are essentially privatization, have obscured the neighborhood-level school's role by the profits from spatial production, making the urban form unstable and dysfunctional. A review of a residential unit concept that is more adapted to the local context to ensure a win-win between actors having the right to the city is necessary for spatial and social sustainability in new urban areas.

1. Introduction

1.1 Situation and Background

Since the beginning of the twentieth century, due to the industrial revolution, large-scale urbanization in Western countries has brought cities a major change. The severe housing shortage is accompanied by joint problems such as pollution, disease, crime, and social injustices. As the process of architectural and urban 'rehumanization' became an urgent issue, architects and planners began to focus on improving urban landscapes and living conditions through new urban forms and residential concept models.

In Vietnam, for historical reasons, this process took place much later. After the French departure in 1954, modern city ideas were introduced under the influences of Russians in the North and Americans in the South of Vietnam. With external financial and design support, mass new residential areas were built to attract the population to the cities of each region.

By 1986, the Doi Moi policy changed the nature of economic operation towards marketization, leading to new internal issues [1, 2, 3], and at the same time ushering in a post-Soviet era in Vietnam [4]. The Doi Moi Policy originated from the innovation of the economic management mechanism, which included (i) changing the structure of the economy to accept a multi-sector economy and shift to commodity production, (ii) eliminating the centralized bureaucratic and subsidized mechanism, and (iii) recognizing the free market. The state gave up the right to set and maintain prices, instead regulating them with economic measures and tools. This policy ended the State's subsidy in the construction of new residential areas in Vietnamese cities and transferred it to other

economic sectors. The State determined that the private sector plays an important role in providing housing in the form of new residential area projects. However, the state maintains control over the spatial organization of these residential projects to ensure an appropriate number of houses and public facilities for the residents. Furthermore, the state encourages the economic sectors to contribute to the construction of essential public utilities such as education and healthcare, while simultaneously approving the use of state funds to establish these facilities as essential public services in people's lives.

Also, since 1986, Vietnamese cities have become more ideologically 'independent', as shown in planning maps drawn by the Vietnamese themselves [5]. The legalization of the 'Vietnamese version' of the residential unit concept, stems from imported theories and urban reality, aiming to control urban sprawl development before a surge of private investment boosts the real estate market [3].

Hanoi, as a capital, becomes a 'test bed' of new ideas and perspectives on the urban space organization during Post-Doi Moi [6] through the mass creation of new residential areas projects based on the concept of 'residential unit', called KDTM ('khu do thi moi' - new urban areas), which began in the late twentieth century [7]. From the initial seven pilots 'strategic' KDTMs of state-owned enterprises, KDTM projects have been gradually transferred to private and foreign enterprises (in the form of joint ventures) by market(ization) policy. The modernization and financialization of housing production have reacted to the regulation on KDTM that the State initially set, creating an 'institutional gap' [8] between theoretical and practiced [9]. One of the most evident is the nature of schools - a space that is seen as a fundamental factor for establishing new residential areas.

Therefore, this article aims to answer the following research questions:

- How was the 'residential unit' - considered the Vietnamese 'neighbourhood unit' version - formed and developed?
- How has the 'institutional gap' or difference in school-making between institutionalized theories and financialized practices affected the nature of new residential areas production in the form of KDTM projects?
- How is the spatial and social nuclear role of schools in KDTMs' concept being applied from the point of view of the actors having rights to (Hanoi) city?

The article analyzes the current state of schools in KDTMs, specifically KDTM Linh Dam, to shed light on the 'institutional gap' in Vietnam and Hanoi. It emphasizes the need for changes in institutionalized regulations on public utilities in new residential areas to modernize the urban spatial developments of Vietnamese cities, which have become financially influenced by the market economy, with Hanoi playing a significant role. The article's findings assist in making the design of KDTM projects in Hanoi more humane by addressing the most basic needs of the people, specifically educational utilities.

1.2 Materials and Methods

Firstly, the exact origin of the 'neighborhood unit' remains a subject of controversy among scholars and may remain unclear in the future due to its coincidental occurrence in different regions around the world [10]. However, numerous studies acknowledge that the American architect Clarence Perry proposed this concept in 1929. According to Perry, a residential community consists of four common institutions: (1) a primary school, (2) small parks and playgrounds, (3) local shops, and (4) residential environments that provide 'neighborhood services' for urban families [11]. Families worry about the physical and social environment where their child grows up and want to ensure their way to school is safe and free of danger. Therefore, when planning a community, it is crucial to take into account the role of these institutions to avoid conflicts that may arise from the lack of coordination and integration of necessary services into a harmonious system. Thus, Perry explains that the neighborhood unit must be visualized as a 'living organism' or an 'organic entity' [11]. For this reason, Perry introduced six basic principles of a neighborhood organization, the first of which addresses the central role of primary schools in determining neighborhood size. A neighborhood school is seen as improving the local environment, reducing traffic, and making walking more pleasant, promoting health, aesthetics, and enjoyment [12, 13], providing comfort, safety, and enhancing the social and political capital of participants and local communities. An intriguing premise about the link between neighborhood schools and social sustainability is that the characteristics of the school and the activities of its users influence the attachment and satisfaction of neighborhood residents [14].

Secondly, housing is one of the least productive factors in a socialist economy [15]. The primary advice for post-socialist governments is to privatize public housing in favor of homeownership [16]. On the other hand, the privatization process will promote regulations for developing the housing financial system [17]. Financialization, understood as the growing dominance of economical engines, markets, actors, and institutions of various scales [18, 19], has become a concept to understanding the major changes in the contemporary urban housing market. Consequently, the market views housing as a commodity, a tool for accumulating wealth, and frequently as a safeguard for trading financial instruments. This tendency increasingly disconnects housing from its social

function of providing a place to live in security and dignity and hence undermines the realization of housing as a human right [20]. Financial markets have left people and communities behind in favor of housing profits. The state plays a central role in the financialization process, primarily through the politicization of housing. In other words, the goals of the construction and finance industries combined with those of the coalitions in power have created a new generation of housing [21]. The financialization of housing also triggers massive speculative waves, which in turn lead to rising house prices and affordability issues [21]. Therefore, on the contrary, there have also been some studies on housing de-financialization to reform the financial-led housing market, change urban management methods, strengthen the public housing and affordable housing sector [22].

From there, to answer the research questions, the content of this article will proceed in three important parts:

- Firstly, we employ the desk study method to examine the impact of external factors and internal changes on the Vietnamese residential unit concept over time. This is based on the theoretical framework we created by studying neighborhood units and financialization.
- Next, we analyze the nature of the current KDTM model, which is based on the residential unit theories in promoting the 'socialization' of education in Vietnam, leading to direct impacts on on the practice of planning and making schools in KDTMs.
- Finally, the qualitative observations of the KDTMs around Linh Dam Lake, typical for the peri-urbanization process at the southern gateway of the Hanoi city, review the real-world findings on how KDTMs' neighborhood school systems operate.

2. The 'Residential Unit' - A Vietnamized Concept of Neighborhood Unit

2.1 Preliminary Influences from Outside Ideologies

During the period 1954-1986, when (Northern) Vietnam started socialism regime, new residential areas in the form of the collective living quarter were heavily influenced by the Soviet concept of *microrayon* (or *microraion*) [23, 24] - it is a new type of urban planning with industrialized housing construction, a Soviet version of the neighboring unit [25], developed after an architectural competition in 1960 for the southwestern region of Moscow based on a new method of grouping and arranging multi-unit apartment buildings in shifting from a layout along the neighborhood perimeter to a more liberal layout. *Microrayon*'s core units are groups of buildings for 2,000 inhabitants. They are combined into a microrayon with 9,000-12,000 inhabitants. Daily utility services include kindergartens, schools, food shops, canteens, clubs, management services, sports fields, and playgrounds. These services are located within the boundaries of a microrayon and less than 400 meters from any house. Periodic utility services, such as cinemas, libraries, department stores, and healthcare facilities, will be built for the larger residential area (composed of several *microrayons*). This is arguably the most significant shift in the modernization of urban planning in the Soviet Union [25], and it has a significant impact on the process of (re)making cities in socialist bloc countries, including Northern Vietnam. In Hanoi, during more than 30 years of the period 1954-1986, more than 30 *microrayon*-style housing blocks were built, later called KTT ('*khu tap the*' - collective living quarter), with a total area of about 450 hectares, of which the smallest was about 3 ha, the largest was about 50 ha.

In addition to the Soviet Union, Vietnam is also influenced by Chinese ideas in housing and population management due to its proximity in geographical location and cultural history [26]. Following the *danwei* model [27, 28, 29], several new smaller-scale housing complexes, called 'collective houses', were built and managed by agencies for their employees to close the life cycle of workers: from work to the residence. In the 1980s, when the bloc of socialist countries began to show a crisis, and the influence of the Soviet Union gradually decreased, Vietnam also began to search for new forms of economic and urban planning. Once again, China is seen as the forerunner due to its economic reform in 1978-1979 [30, 31, 32]. *Xiaoqu*, semantically equivalent to *microrayon* (*xiao* = *micro*, *qu* = *rayon*), was developed based on the *danwei* model applied to government pilot housing since the second half of the 1980s when SOEs were released from the responsibility of providing welfare functions [33]. It is the basic unit of urban residential planning and is also an intermediate scale between *juzhuqu* (residential area) and *zutuan* (group of buildings). A *juzhuqu* can be made up of several *xiaoqus*, and each *xiaoqu* can be is composed of several *zutuans*. According to the National Standard GB 50180-93 "Code for Planning and Design of Urban Residential District" in 1993, the scale of a *xiaoqu* is limited to 3,000-5,000 households corresponding to a population of 10,000-15,000 people, distributed on an area surrounded by city arterial roads or natural boundaries. Furthermore, *xiaoqu* must provide a set of public utilities and services that meet its residents' basic material and cultural needs [34].

Thus, the urban form of Hanoi has been respectively influenced by two concepts: firstly, *microrayon* - the Soviet neighborhood unit version since the early 1960s due to the regime ideology similarity, and secondly, *xiaoqu* - the Chinese neighborhood unit version since the late 1980s due to regime reform similarity. Therefore, before 1986, the new urban residential areas in Hanoi were called '*tieu khu*' in Vietnamese (sub-district), in which '*tieu*' was equivalent to '*micro*' or '*xiao*', '*khu*' was equivalent to '*rayon*' or '*qu*'. After 1987, the 'residential unit' concept

was officially proposed to replace 'sub-district', derived from the neighborhood unit when referring to the original concept instead of the Soviet or/and Chinese concept. However, clearly, the characteristics of the residential unit planning still show the influences from microrayon and xiaoqu, which are deeply ingrained in the thinking of Vietnamese planners and architects for both politically and ideologically reasons through personnel training programs of the Soviet Union and China.

2.2 The Evolution of Legalizing the Residential Unit Concept

Although there is controversy about the effect of standardized neighborhood-unit planning on viable public transport, cross-neighborhood walkability, social diversity, movement economics, and other important parameters, even suggested that it was finally time to remove the neighborhood unit as a best-practice model [10]. However, in Vietnam, this concept is still considered the backbone for most practices in planning, design and policymaking since 1986.

Since 1987, the design standard TCVN 4449:1987 on urban planning has proposed 'sub-district' as a basic planning unit in civil areas in Vietnamese cities [35]. In the sub-district, there are houses and level I service facilities with a service radius of 400-500m (among them are preschools, primary and secondary schools) serving the residents' daily needs. At a larger scale, the residential district includes several sub-districts and level II public service facilities with a service radius of 800-1,200m (among them are high schools) serving the residents' periodical needs. The dividing line between residential districts is usually urban roads and natural boundaries. Among the public utilities, the school is always the prerequisite for forming both residential sub-district and district.

The Vietnam Building Code in 1996, upgraded from Standard TCVN 4449:1987, has replaced the sub-district with a 'residential unit' - the basic unit to form residential areas [36]. 12 years later, in 2008, the (new) Vietnam Building Code more clearly defined the size of a residential unit based on a service radius of 500m (equivalent to about 80 ha) and a population of 4,000-20,000 people [37]. In these codes, the 'lower' and 'upper' levels of residential units are also referred to as mapping of the neighborhood's hierarchy [38].

Most recently, in the National Technical Regulation QCVN 01:2019/BXD in 2019 and QCVN 01:2021/BXD in 2021 on construction planning, 'residential unit' are defined as "basic functional pattern of city, mainly serving residential needs, including: groups of houses; public and service facilities, public greens to serve the regular and daily needs of the population community; residential-unit-level roads and parking lots". A residential unit can accommodate a population ranging from 4,000 to 20,000 people. Each residential unit must arrange adequate public and service facilities, firstly for its' residents, and secondly for neighboring residents. Also, the residential-unit-level public and service facilities must ensure the accessibility of its' inhabitants with a service radius of less than 500 m, including 8 types of facilities which are divided into 4 groups as follows: (1) The group of educational facilities including preschools, primary and secondary schools; (2) The group of health care facilities including medical stations; (3) The group of cultural and sports facilities including a playground for a group of houses, a training ground and a culture - sports center; (4) Group of commercial facilities including market [39, 40].

According to the National Technical Regulation, for every 1,000 residents, there will be forty children in preschool, 65 primary school graders, and 55 secondary school graders. The Vietnamese standards for school design also stipulate that school planning in residential areas must align with the school network planning, meet the needs of local socio-economic development, and facilitate the attendance of graders, more specifically:

- Primary schools typically accommodate between 65 and 80 graders per 1,000 people. The design of primary schools allows for a maximum of thirty classes, with a maximum of 35 graders per class, resulting in a maximum of 1,050 graders per primary school.
- Secondary schools typically accommodate between 55 and 70 graders per 1,000 people. The design of secondary schools limits the number of classes to forty-five, ensuring a maximum of 1,800 graders per secondary school.

Table 1 *Evolution of the residential unit' concept after Doi Moi*

		1987	1996	2008	2019, 2021
Levels of urban residential space organization	'Lower' level	Group of houses	Group of houses	Group of houses	Group of houses
	Elementary level	Sub-district	Residential unit	Residential unit	Residential unit
	'Upper' levels	Residential district	Residential district	Urban area	Urban area
		Sub-city	Sub-city		Urban development area

	1987	1996	2008	2019, 2021
	City	City	City	City
	-	-	-	Region
Categories of public and service facilities in residential areas	Education	Education	Education	Education
	Health care	Health care	Health care	Health care
	Culture	Culture	Culture	Culture and sports
	Sports	Sports	Sports	
	Commercial facility and public canteen	Market	Market	Commercial facility
	Living service facility	-	-	-
Classification of the system of public and service facilities in city	Sub-district-level *(level I)*	Level I *(daily service)* - Residential-unit-level	Residential-unit-level	Residential-unit-level
	Residential-district-level *(level II)*	Level II *(periodical service)* - Residential-district-level	City-level	City-level
	-	Level III *(non-regular service)* - City-level, sub-city-level		

Source: [35, 36, 37, 39, 40]

Thus, there has been a strong transformation of urban(ization) morphological organization theories over more than 30 years towards being more open to the market factors and more receptive to outside ideas in the globalization process. These institutions are crucial for promoting new residential areas as Vietnam transitions into the new millennium.

3. Financialization of Making Urban Form

3.1 Transfer of the Role of Actor Producing New Residential Projects After Doi Moi

The concept of modern, complete, self-contained and synchronous housing projects is formed as new development projects in suburban areas to accelerate urbanization and improve the quality of life. The quality of housing amenities was first mentioned officially in the Hanoi Master Plan in 1992 - the first post-Doi Moi master plan made by Vietnamese experts after a period of decisive influence by the Soviets. It can be seen as a new 'initiative' in an effort to find a new development method that is favorable for the management of city-(re)making activities that exploded after the State abolished its monopoly and gradually accepted the participation of non-state economic sectors. From this master plan, a new architectural and planning management model was proposed and applied to Hanoi through the appearance of the Municipal Office of Chief Architect in 1992 and was replaced by the Department of Planning and Architecture 10 years later [41]. The Hanoi Master Plan in 1998 reaffirmed once again the determination to develop urban housing in Hanoi, mainly in the suburban areas, in the form of an investment project to produce the mass of housing with concurrent technical and social infrastructure which, since 1999, has been officially named KDTM by the Government, and seven pilot KDTMs were designed from 1993-1994 and started construction in the years 1997-1998 [42].

Unlike traditional residential areas, KDTMs are built on the principle of synchronization of three factors: (1) housing, (2) technical infrastructure, and (3) social infrastructure. It is considered a 'groundbreaking' idea in the context of shifting from an 'instinctive, spontaneous' construction to 'following norms and laws' construction after Doi Moi. In other words, to effectively manage the increasing growth of urban housing due to urbanization and the participation of the private sector, the State wishes to manage a 'project package' responsible for one enterprise instead of individual activities. Through incentives in land allocation and financial support mechanisms, the State encourages large-scale housing development projects, but simultaneously requires project owners to ensure technical and social infrastructure not only within that project but also at the city level. Before Doi Moi, because of the subsidy policy, the State monopolized this responsibility. Now, according to the operation

of the market economy, the State redefines the development nature by facilitation mechanisms to decentralize powers for the economic sectors. Thus, the KDTM model puts the project owner in a bond of benefits and obligations: while economic profit from housing is considered a benefit, the development of technical and social infrastructure to ensure the operation of the residential area is considered an obligation.

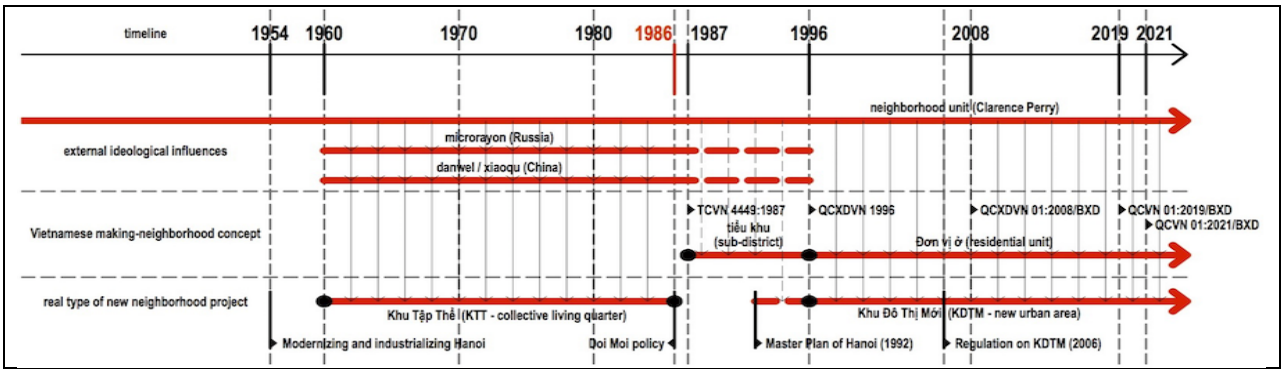

Fig. 1 *The conceptual and actual development of new residential areas in Hanoi*

Since the 1993 Land Law, the recognized economic value of land has become a prerequisite for land capitalization to form the real estate market. Land and houses, once prohibited for purchase and sale, have now become highly profitable commodities, drawing significant investment capital to the real estate market. A large number of private construction businesses and lenders have emerged to meet consumer demand. However, this market-driven approach has pushed house prices beyond the reach of many people due to the shortage of housing supply in both quantity and quality. The KDTM model is regarded as a solution that can address these shortcomings by providing large quantities of sustainable quality housing and necessary service facilities. Therefore, KDTM project owners become 'more powerful' in the real estate market, especially those with competitive advantages such as accessing local land reserves, having good products, having a solid brand name, and mobilizing many capital sources. The morphology of Vietnam's new towns is highly dependent on financial conditions [43].

In theory, since 1993, the State has handed over the housing finance market to the private sector. However, this withdrawal is actually not complete, reflected in the appointment of state-owned enterprises in charge of important KDTM projects or the contribution of State capital through land value. The 'decentralization' or 'empowerment' to economic enterprises in housing and urban space production has made them one of the four important actors having 'rights to the city': (1) political actors need to find a balance between public and private interests, (2) economic actors - usually private enterprises, look for suitable urban resources for their investment, (3) urban planners create regulations to meet the interests of all other actors and citizens, and (4) citizens need to be aware of their rights for the city [44]. Even in a society that increasingly prioritizes economic and market values, these enterprises skillfully negotiate and collaborate with political actors to craft beneficial policies that foster highly commercialized spaces for their projects.

3.2 Reviewing the Role of Schools in the New Urban Area in the Context of Educational Socialization

In 1991, following the Law on Universalization of Primary Education, primary education was compulsory for all children aged 6-14. Therefore, the construction of (primary) schools is promoted, especially in KDTMs. To meet such a significant demand, in addition to the State budget, the central and local governments call for the mobilization of external resources through the education 'socialization' policy, which means mobilizing the whole society to contribute to education, including helping the State build and perfect the school system [45]. In other words, through socialization, which is essentially privatized [46], the State wishes to diversify types of schools based on the participation of the State and society: (1) Public/State schools established by the State and fully subsidized with the State budget; (2) The semipublic/charter schools jointly invested by the State with non-state organizations (all economic sectors or individuals), by sharing between the State budget and social capital; (3) People-founded schools established by residential communities sources; (4) Private schools established by social, socio-professional, economic organizations or individuals with fully non-State capital (according to the Law on Education 2005).

Thus, the school's nature primarily depends on the allocation of resources and the operation management, which fall under two significant capital categories: state and non-state budgets. Therefore, since 1990, the non-public schools began to be promoted along with the economic development of the society. On the one hand, it

shows the State's efforts in affirming the crucial role of the school system in population improvement and residential area development. On the other hand, privatization and financialization (defined by the term 'socialization') in education are becoming more apparent [47].

According to the education and planning policies outlined in legal regulations, all new residential area projects are required to establish a public school system. This is to ensure that all children in the area have access to schools that provide high-quality education and have tuition fees that are controlled by the state. In other words, the state expects new residential projects, including KDTM projects, to not only provide housing that ensures residents' material well-being but also to ensure their access to public services, particularly education, which is considered essential for their spiritual development.

Residential facilities provide a context for social sustainability and influence the satisfaction of the surrounding through its material quality, in which school is considered one of the important factors [14]. Therefore, to ensure the development goals of urban space and humanity, legal documents stipulate that there should be all three types of schools in KDTM: preschool, primary school, secondary schools with a service radius less than 500 meters (that is, the distance between two the same type schools is less than 1,000 meters). However, there is no regulation on the public-private nature of these schools leading to a situation of 'ambivalence' in investment and operation scenarios:

- The KDTM owner prepares the land and mobilizes capital to build and operate the school. Due to the capital source, this school will be the property of the project owners, not part of the public-school system. Project owners can decide the rate of tuition fees according to market rules based on the quality of facilities and educational services. The school is considered an educational business and has the full right to choose the target customers.
- The KDTM owner prepares the land, transfers it to the government to build and operate the school as part of the public system, and complies with the State's regulations, especially the tuition fees, to ensure accessibility for the entire population. As such, the school is considered a social welfare facility under the administrative boundary management (ward/commune), for both residents and non-residents of that KDTM. Thus, although the school is in the KDTM, the management rights do not belong to the KDTM owner.
- The KDTM owner prepares the land and mobilizes capital to build the schools, then transfers it to the State immediately after completion or after a period of operation and exploitation (as a private school). The State will compensate project owners with reimbursements or reciprocity projects. The school will then become part of the public system.

Therefore, self-investment, self-exploitation or transfer to the State considers financial efficiency for KDTM owners. On the contrary, the transfer of schools to KDTM owners is a matter of social and economic efficiency for the government to ensure universal education in the limited State budget.

4. On-site Findings of School-making Scenarios in New Urban Areas Studied

Thus, the government has demonstrated its social development goals through legal provisions on the institutionalized presence of schools in KDTMs. However, for KDTM owners, schools have hidden economic intend through the investment efficiency or advertising effectiveness, enhancing real estate products' (economic) value. The educational business may be an inevitable trend encouraged by the State to promote and develop education in the context of the post-Doi Moi market economy. However, due to familiarity with the state's educational subsidies in the pre-Doi Moi period and Hanoi being the most expensive city in Vietnam [48], most Hanoians still rely on the public-school system. Schools in KDTMs have become a testament to the social transformation process in Vietnam in general and Hanoi in particular.

The selected case study focuses on a cluster of three cohesive KDTMs situated at the southern gateway of Hanoi, all under the ownership of the Housing and Urban Development Corporation (HUD). This is a state-owned enterprise directly under the Ministry of Construction, established after Doi Moi to undertake strategic state housing and KDTM development projects. Among this cluster, Linh Dam KDTM (combined from three component projects established in 1997, 2000 and 2001) plays the core role, was one of the first pilot strategic KDTMs of Hanoi and was awarded the label of 'model KDTM' in 2009. After the 'success' of Linh Dam KDTM, HUD continued to expand this project with the Southwest Linh Dam KDTM in 2006 and the South Linh Dam Lake KDTM in 2014. This KDTM cluster is considered typical for the (sub)urbanization in the southern city and the premise for establishing Hoang Mai urban district in 2003, which was administratively transformed from a rural area.

The commercial houses at Linh Dam and Southwest Linh Dam KDTM have nearly reached completion and have been sold to individuals. The South Linh Dam Lake KDTM is currently undergoing site clearance and technical infrastructure construction. We have documented some findings from our qualitative observations in these KDTMs and compared them with other KDTMs in Hanoi.

4.1 First Finding: Location of Land for Schools in KDTMs

When designing, project owners often arrange land for schools in unfavorable locations to reserve central land with advantages of accessibility for commercial housings or commercial facilities to maximize their profits.

Schools can be located at the edge or corner of the KDTM, 'arbitrarily', according to the project owner's intention. Besides, due to the lack of comprehensiveness in planning considerations between adjacent KDTMs, or between KDTMs and neighboring residential areas, the distance between schools in different residential areas is irregular, which means that some people have to send their children to school further away. The case of Linh Dam KDTM reveals that its most significant residential area, the Linh Dam Lake and the North Linh Dam housing areas, which are home to numerous high-rise apartment buildings, lies completely out of the service radius of current schools, including those that are planned for future construction. The farthest bird fly distance from a house to school can be up to 800-900m, but in reality, children have to go much farther due to the spatial structure and traffic network of Linh Dam KDTM.

Table 2 *Summary of information about Linh Dam KDTM, Southwest Linh Dam KDTM and South Linh Dam Lake KDTM*

	KDTM	Initiation	Project area *(hectare)*	Population *(thousands of people)*	Population density *(person/ha)*	Land for educational institutions *(hectare)*			
						Preschool *(lot)*	Primary school *(lot)*	Secondary school *(lot)*	Totality *(percent of project area)*
1	Linh Dam KDTM	1997	200,5	24,9	124	1,8	1,8		3,6 (1,8%)
1.1	North Linh Dam housing area	1997	24,0	5,8	242	0,5 (NT[1])	0	0	0,5 (2,1%)
1.2	Linh Dam Lake general service and housing area	2000	160,1 (including 73.9 hectares of water surface of Linh Dam lake, and 16.4 hectares of residential land of Linh Dam village)	14,6 (including 1.2 thousand inhabitants of Linh Dam village)	91 (192 people/ha for the new housing area)	0,5 (NT1[2] 0,2; NT2[3] 0,3)	0,5 (TH1[4])	0,5 (TH2[5])	1,5 (0,9%)
1.3	Extension of North Linh Dam housing area	2001	16,4	4,5	274	0,8 (NT[6])	0,8 (TH[7])		1,6 (9,8%)
2	Southwest Linh Dam KDTM	2006	75,9 (including 16.5 ha of existing village residential land, and 16.8 ha transferred to other local projects)	7,9 (including the existing 2.4 thousand inhabitants of the villages)	104 (129 people/ha for the new housing area)	1,3 (0.4 of NT1[8]; 0.8 of NT2[9]; 0.1 of NT3[10])	2,3 (1.1. of TH2[11]; 1.2 of TH3[12])	2,2 (1.2. of TH1[13]; 1.0 of TH4[14])	5,8 (7,6%)
3	South Linh Dam Lake KDTM	2014	147,9 (including 38.0 ha of existing village residential land, and 11.0 ha transferred to other local projects)	26,1 (including the existing 2.4 thousand inhabitants of the villages)	176 (199 people/ha for the new housing area)	2,6 (0.4 of NT-01; 0.7 of NT-02; 0.4 of NT-03; 0.1 of NT-04[15]; 0.2 of NT-05; 0.4 of NT-06; 0.4 of NT-07)	2,6 (1.4 of TH-02, 1.2 of TH-04)	3,3 (1.7 of TH-01; 1.6 of TH-03)	8,5 (5,7%)

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KDTM	Initiation	Project area *(hectare)*	Population *(thousands of people)*	Population density *(person/ha)*	Land for educational institutions *(hectare)*			
					Preschool *(lot)*	Primary school *(lot)*	Secondary school *(lot)*	Totality *(percent of project area)*
Total		**424,3**	**58,9**	**139**				**17,9**

Notes

[1] Linh Dam Practical Kindergarten (Hanoi Kindergarten Intermediate School)

[2] Currently unused land

[3] Branch 1 of Hoang Liet Kindergarten (Hoang Mai District Education & Training Department)

[4] Hoang Liet Primary School (Hoang Mai District Education & Training Department)

[5] Hoang Liet Secondary School (Hoang Mai District Education & Training Department)

[6] Hoa Huong Duong Kindergarten (HUDECO Education Development and Investment Joint Stock Company)

[7] Bill Gates Schools: Thang Long Kindergarten, Thang Long International Primary School, Thang Long International Middle & High School

[8] Currently unused land

[9] Cemetery of Bang A village

[10] Branch 2 of Hoang Liet Kindergarten (Hoang Mai District Education & Training Department)

[11] Currently unused land

[12] Chu Van An Primary School (Hoang Mai District Education & Training Department)

[13] Currently unused land

[13] Pond of Bang A village communal house

[14] Currently unused land

[15] Branch 3 of Hoang Liet Kindergarten (Hoang Mai District Education & Training Department)

Fig. 2 *Example of the way to (existing) school of HH2A children in HH apartment complex of Linh Dam KDTM: they have to walk from 13 to 21 minutes with a distance of 1.1 to 1.7 km to go to the primary schools around their residence. Notes: Walking time and distance are proposed according to https://www.google.com/maps/dir/HH2A+Linh+Dam,+Hoang+Lie,+Hoang+Mai,+Ha+Hanoi/*

Another 'trick' of KDTMs to avoid reserve land for schools is to take advantage of available schools in neighboring villages by merging them within the project boundary in the form of renovation and embellishment project, thereby reducing the central role of schools in creating new residential communities. This 'trick' is also recognized in Linh Dam KDTM when its owner proposed Linh Dam village (on Linh Dam peninsula) to become part of the project's area, and Hoang Liet Kindergarten (Branch 1), Hoang Liet Primary School, Hoang Liet Secondary School in village 'naturally' become public schools of KDTM. In 2001, when Linh Dam KDTM was

expanded, a preschool and a primary school were proposed, but both are private schools. Therefore, when designing the Southwest Linh Dam KDTM, although it was only expected to be close to 8,000 people, the project owner had to add more new schools than required: two kindergartens, two primary schools and two secondary schools. However, the service radius of these schools still cannot cover all of Linh Dam KDTM. Notably, in these KDTMs, there is no restricted traffic zone, so it is unsafe for children to go to school far away without an adult.

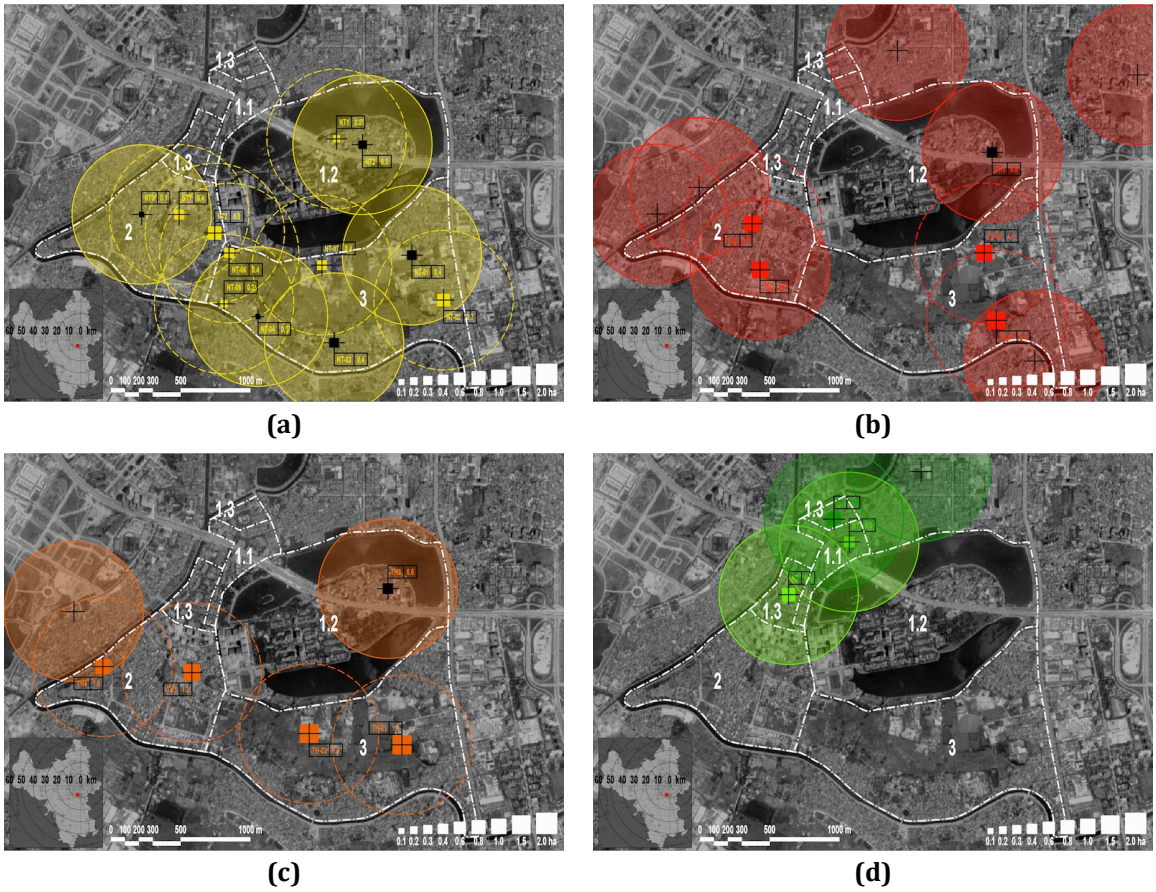

Fig. 3 *(a) Service coverage of public preschools - yellow areas; (b) Service coverage of public primary schools - red areas; (c) Service coverage of public secondary schools - orange areas; (d) The sparseness of non-public schools - green areas*

4.2 Second Finding: Dephasing Between Developing Housing and Building School in KDTMs

Despite reserving lands for schools, the KDTM owner delayed construction for various reasons, leaving residents with houses but no schools for their children. Those lands are currently left fallow or temporarily exploited for other commercial functions such as parking lots, sports fields... to get some profit. Therefore, rather than being constructed concurrently with housing as required, social infrastructures are often built later, sometimes even at an unspecified time. There are not enough schools, KDTMs' residents are forced to send their children to school in neighboring residential areas.

In addition to an existing kindergarten (lot NT3) in the village (Branch 3 of Hoang Liet Kindergarten), 8 years after the commencement date of Southwest Linh Dam KDTM, only one primary school (lot TH3) was built in 2017 (public Chu Van An Primary School). The remaining 5 schools have not yet been built for various reasons, including 1 kindergarten (lot NT1) and 1 secondary school (lot TH1) transferred to other enterprise to build private schools (these 2 lots are currently being exploited as a parking lot), 1 secondary school (lot TH4) land acquisition has not been made, 1 kindergarten (lot NT2) and 1 primary school (lot TH2) are proposed to be removed from the planning because the lot NT2 is currently the cemetery, and the lot TH2 is located within the communal house of Bang A village. The severe shortage of schools has resulted in overcrowding among students. For example, in the 2018-2019 school year, Chu Van An Primary School had to receive 1,145 first graders (to be divided into 23 classes with an average of 50 graders/class) while the standard allows a maximum of 30 classes (for all grades), a maximum of 35 graders per class, which means a maximum of 1,050 graders per primary school. Due to the limited

number of classrooms (there is a total of 57 classes, of which first grade has 23 classes, second grade has 13 classes, third grade has 9 classes, fourth grade has 7 classes, and fifth grade has 5 classes), this school must develop a solution to study 1/2 day instead of the whole day as usual, affecting the quality of education and children pick up.

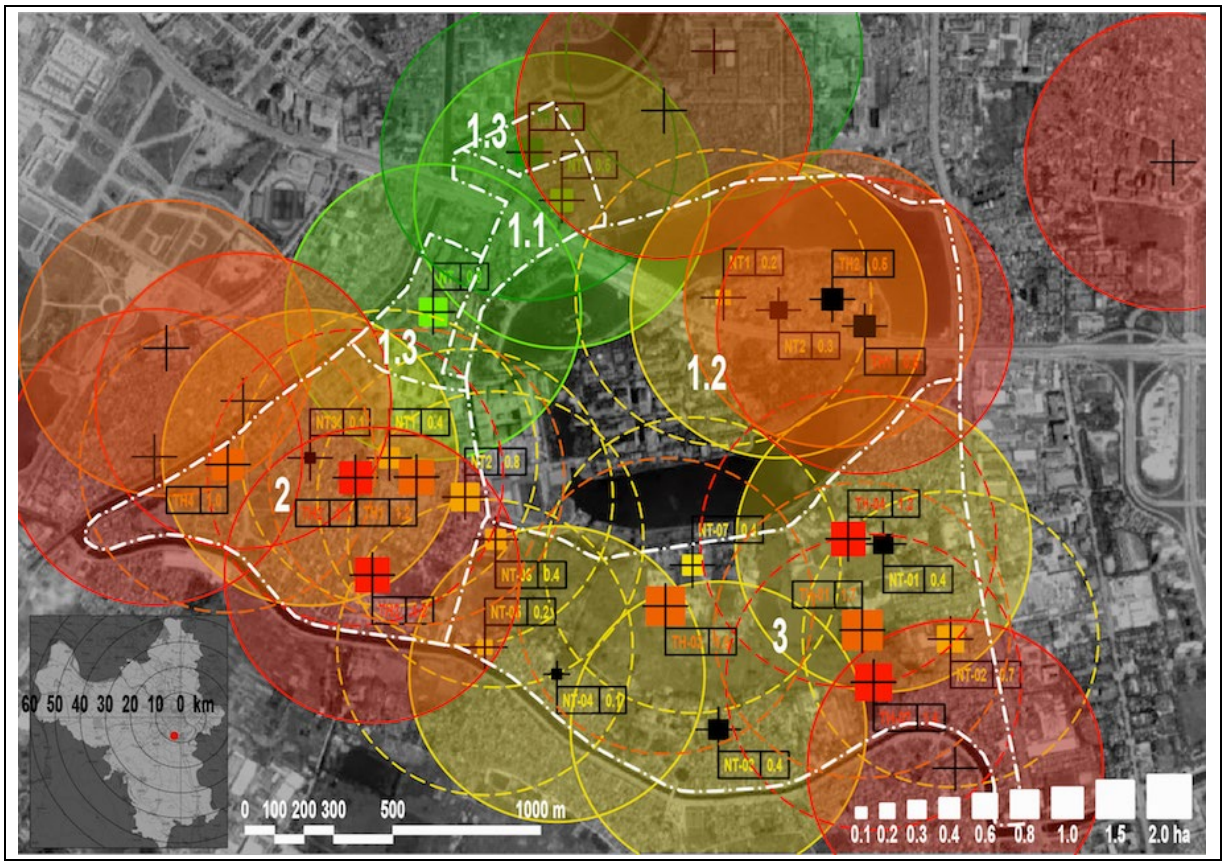

Fig. 4 *Overlapping map of the service coverage of the (public and non-public) school systems in Linh Dam KDTM clusters. Notes: 1.1: North Linh Dam housing area (1997); 1.2: Linh Dam Lake general service and housing area (2000); 1.3: Extension of North Linh Dam housing area (2001); 2: Southwest Linh Dam KDTM (2006); 3: South Linh Dam Lake KDTM (2014); Solid circle: a 500-meter service area around the built-up schools; Dotted circle: 500-meter service area around the not yet built-up schools; Black cross: existing schools outside the boundaries of KDTMs; Black cross with black square: existing schools (of the villages) before the appearance of KDTMs (size of the square representing school land area); Black cross with coloured square: additional schools suggested by the KDTMs (size of the square representing school land area); Yellow: public preschools; Red: public primary schools; Orange: public secondary schools; Light green: non-public preschools; Dark green: non-public inter-schools (primary, secondary, and high school)*

In addition to the delayed school-making, the lack of population control aggravates this overcrowding situation. The conversion of lot CC6 in Linh Dam KDTM, originally planned for public works, into twelve high-rise apartment buildings between 2014 and 2016, offering approximately 9,000 apartments for approximately 35,000 new residents, has resulted in a sudden surge in the population. This 'additional' population is even more significant than the initially designed population. The planning adjustments were completed without consulting the residential community. As a result, the 'original' residents of the KDTM must share the limited number of schools and other facilities with the large number of 'new' residents. This is a consequence of the method that project owners often use: designing KDTM with ideal population density to get approval, then gradually adjusting local planning to increase density and profitability during construction. The issue arises from the fact that the government, upon accepting the population growth plan, did not compel the project owner to establish schools in a synchronous manner.

4.3 Third Finding: The Ambiguity Between Public and Private Schools in KDTMs

There has been ambiguity between the construction of public and private schools in the KDTMs, as they have not been mentioned in project approval decisions, leading to controversy over who will build them.

(a) **(b)**

Fig. 5 *(a) High-rise buildings of Southwest Linh Dam KDTM densely built around the not-yet-built school land (lot TH1 and NT1); (b) The plot of Bang A village cemetery is planned for the one of preschools of the Southwest Linh Dam KDTM (lot NT2)*

Because of the relatively easy legal regulation, private kindergartens (≤ 50 children) are ubiquitous in the KDTM by converting residential use purposes, which the residents accept due to their convenience and flexibility to make up for the lack of (public) preschools. However, the situation in primary and secondary schools is entirely different. In order to integrate KDTM-school into the public-school system, the project owner must convince the government to allocate the budget, while the private school system is difficult to access for the people because of the difference in tuition fees and educational perspectives. Therefore, KDTM-schools are not only limited in number but also fail to meet the needs of the residents. The reality of Linh Dam KDTM and other KDTMs in Hanoi shows that the service radius of private schools will not be determined physically like that of public schools. To put it differently, we need to reevaluate the impact of private schools on KDTM residents, as their influence extends beyond the boundaries of residential areas, unlike public schools. These schools must find customers throughout the city who can afford tuition fees that are 2.5-3.5 times higher than those of public schools [49]. They must also adopt different educational perspectives, prioritizing the development of children's skills and activities over knowledge acquisition.

On-site observations reveal that not all residents of KDTMs have the option to send their children to private schools, despite their proximity to home. They are forced to consider public schools located outside the KDTM area. However, this is not easy when public schools still use the criteria of people's place of domicile to consider application documents. In some cases, to ensure social security conditions for people, the government is reluctant to invest in building schools for some KDTMs, leading to 'jealousy' and making the inertia in school-making more and more serious. Therefore, the plan to 'rely on' KDTM owners to support school development has partially failed.

5. Conclusion

Therefore, contrary to the government's expectations, project owners who disregard the game's rules due to their economic intentions do not guarantee both quantity and quality for KDTM-schools.

In terms of quantity, the lack of schools is gradually becoming common in KDTMs. During the design phase, the KDTM owner consistently employs strategies to circumvent or reduce the number of schools, citing their non-commercial nature. This involves relinquishing favorable land for commercial facilities in an effort to maximize investment efficiency. Therefore, the KDTMs population is initially calculated with an ideal density to minimize the number of schools. In the construction phase, the owners of KDTMs often find ways to delay the construction of schools, which results in a lack of synchronization between the development of the number of schools and the population. During the operation of the KDTM, the project owners neither respect the planned population nor control the additional population; they even promote population growth (for the development of commercial services), leading to overcrowding in schools.

In terms of quality, the spatial and social nuclear role of schools gradually becomes blurred. In terms of location, KDTMs-schools are not conveniently situated at the center of groups of houses or residential areas, which would facilitate easy accessibility for people and children. As a result, schools have lost the physical position that was previously assigned to them in the institutions of new communities. In terms of time, the delay in developing schools and housing has negatively impacted the quality of life for residents and the reputation of KDTMs. Requiring children and residents to travel out of residential areas (the average distance to the nearest daily use) to access primary schools and other facilities is not a good idea [14]. The integration of KDTM schools into the

public or non-public system depends on the intentions of the project owners. Paradoxically, private schools, despite having high-quality facilities, fail to meet the needs of the majority of the population, resulting in a situation where they are perceived as useless or insignificant. In other words, residents often do not count private schools as neighborhood-level public facilities in KDTM.

The residential unit concept, based purely on the calculation of the physical space scale, shows irrationality in the new context of Vietnam, when the speed of urbanization, population concentration, and the need to improve living conditions are increasingly recognized and promoted. This concept represents the ideal in creating planned residential areas in the past when the financialization was not strong and did not dominate the urban form. The current state of KDTMs has shown that many financialization accounts only assign a passive role to space and place [50]. The process of creating KDTMs also demonstrates the bureaucratization involved in managing urban spatial development, as it solely relies on population calculation criteria without strictly controlling the actual population. In practice, there is a large gap between the institutionalized regulations and the financialized KDTM market. The idea of creating new neighborhoods based on neighborhood units designed as a physical tool to provide opportunities for residents to interact and expand their sense of place was undermined [51].

In Vietnam, a society that places a high value on education, public schools continue to play a significant role in the development of new residential communities, albeit through profit-based KDTM projects that aim to find a sustainable urban form for municipality planners and an effective method for government urban management. Urban forms cannot be deemed sustainable if their communities exhibit instability and dysfunction [52]. Whether Hanoi and other Vietnamese cities need to have a new viewpoint on a more adapted residential unit model to ensure a win-win among the four important current actors involved in KDTM-making: policy actors - economic actors - planners - citizens?

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Minh-Tung Tran, Tien-Hau Phan;* ***data collection:*** *Minh-Tung Tran, Ngoc-Huyen Chu;* ***analysis and interpretation of results:*** *Minh-Tung Tran, Ngoc-Huyen Chu, Tien-Hau Phan;* ***draft manuscript preparation:*** *Minh-Tung Tran, Ngoc-Huyen Chu. All authors reviewed the results and approved the final version of the manuscript.*

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