Impact of greening projects on the development of human capital in Vietnam's cities

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Abstract. The article considers the influence of factors of the urban environment on the human and professional capital of workers living in large cities of the Socialist Republic of Vietnam. The present state of urban agglomerations of Vietnam and the trends of greening urban areas are assessed, considered as a factor in the perceived quality of life of the population, which has a direct impact on the state and development of the human capital of workers living in the city. It is concluded that a significant part of the urban areas of the major cities of Vietnam from the point of view of landscaping are insufficiently equipped. The quality of life of workers in these territories has significant drawbacks, which determines the limitations inherent in human capital. The issue identifies the types of landscaping of urban areas in major cities of Vietnam, and evaluates the effectiveness of a number of projects implemented under various types of landscaping.

1 Introduction

Currently, environmental priorities are widely incorporated into the strategic development programs of the territories of most countries of the world. The theory and methodology of the “green” strategy for economic development continues to be formed, it is widely discussed in the expert community. Examples of the implementation of environmentally friendly projects are associated with technological, innovative excellence, and are considered the basis for long-term economic development.

The creation of a “green”, ecologically friendly living environment and people’s labor activities require significant financial resources, and the maintenance of the formal

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mechanisms and institutions that support it require organizational efforts. The implementation of the “green” strategy is based on a high degree of readiness for transformation of the existing infrastructure for ensuring the health, working capacity, and professionalism of workers, with a view to further developing human capital [1,2,3].

The object of the study is the human and professional capital of workers living in large cities of the Socialist Republic of Vietnam (SRV).

The problems of human capital were studied in many aspects by foreign, Vietnamese, Russian scientists. The interconnections of the development of human capital and innovation, its functions in the intellectual economy, in the management of the service sector, the combination with the development of human potential [1-4] are investigated. It is necessary to point to the fundamental research of G. Becker [5], S. Kuznets. In Vietnam, a number of works devoted to assessing the quality of labor resources and the quality of human capital belong to such authors as Wu Thanh Liem, Mai Tae Hong, Thung Tae Chong [6,7,8]. The subject of human capital was developed in the works of many other authors.

At the same time, insufficient attention has been paid to the study of the impact of the quality of the urban environment of workers, including the degree of greening of cities, on the state of human capital. Meanwhile, the properties of the urban environment should be considered as direct factors in the perceived quality of life of the population. The aim of this work is to identify the impact of landscaping projects in major cities of Vietnam, considered as a direct factor in the perceived quality of life of the population, on the quality indicators of the development of human and professional capital of workers living in the city.

2 Applied methodology, research materials

The work is based on the assumption that the degree of greening cities can be an active environmental factor that can change the perception of workers about their quality of life in the metropolis (affect the perceived quality of life of the population) and, thereby, become a factor in the formation of human capital. The research apparatus of this article uses ideas about the dynamics of the urban (urban) environment, the development of which is determined by the properties of the human and professional capital of the population. A qualitative study of modern urban planning decisions that affect the state and development of the quality of human capital in an urban environment has been carried out. The methods and techniques of system and logical analysis and synthesis, modeling methods, factor analysis, point-rating approach and expert assessment method were applied.

2.1 The impact of urban factors on human and professional capital

Human capital is a combination of professional skills, knowledge, intelligence, education, quality and productive labor, and quality of life. The concept of human capital includes the ability of workers to learn new knowledge, to show one degree or another of flexibility, openness to new knowledge and information, the ability to perceive and apply it. The magnitude and quality of human capital is correlated not only with indicators of knowledge, intelligence, education, health, but also with perceived quality of life [2, 5], with environmental factors, mentality, and culture [1, 7].

A high amount of professional capital is associated with the activities of workers capable of creating unique products in demand in various industries. In matters of attracting representatives of the so-called creative class to the cities, which initiates innovative processes in the economic sphere, factors of design of the living and working environment come to an increasingly important place. [9, 10]. It has been established that the human

capital of workers in “urbanized territories”, in addition to prevailing levels of healthcare and education services, is increasingly dependent on satisfaction with their living conditions in the city — the level of ecology, architectural and landscape design of the urban environment [3, 4, 8].

Proposals to ensure the quality of human and professional capital of workers related to the quality of their living environment, as part of the "green" strategy for economic development, were developed by the UN [11]. In the conditions of modern intellectual-intensive innovative production, in order to create a harmonious environment for everyday work and living of working citizens and pensioners, to provide opportunities for recovery, rest after work, good communication, in “sleeping” and working quarters it is necessary to create green areas, increase the degree of greening in the formation architectural and landscape design of the urban environment.

The leading architects of the 20th century, such as Le Corbusier, Frank Lloyd Wright, Ralph Hancock, the Perret brothers, in the USSR G. Barkhin, I. Leonidov, the Vesnin brothers and many others, proposed and substantiated a number of city-planning solutions that “harmonize” the living and working environment of human activities. Despite the differences, architectural concepts and design solutions proposed by the mentioned authors included the formation of vast green spaces planted with trees, shrubs, grass and flowers, both for collective (common) and personal use.

The final intent of these decisions is to form a full-fledged quality of human capital in the urban environment. Unfortunately, in conditions of rapid industrialization and financial constraints, many of the landscaping decisions in megacities that grew rapidly in the 20th century were implemented only experimentally - in separate office (administrative) and commercial buildings, premium class residences, but were not often reflected in mass building up. Moreover, in many countries, the processes of intensive urbanization in the post-war period led to the formation of vast “gray belts” in which economy-class housing is mixed with industrial zones.

2.2 The current state of urban metropolitan areas of Vietnam

Post-war development of Vietnam, as well as recent decades, are characterized by significant growth in productive forces. The result of the processes of concentration of production activity in a number of geographical regions of the country was the emergence of industrial zones (agglomerations). The emergence of industrial zones is due to the fact that they simplify trade and logistics relations of various manufacturers, focus development and research in one region, which suits international investors. The creation of industrial agglomerations also meets modern trends in the integrated development and redevelopment of territories, which are supported by local authorities.

If we evaluate the processes of world urbanization as a whole, then they are inextricably linked with industrial - innovative agglomeration and concentration of production. In 2018, about 3.5 billion people live in cities of the world, or 49-50% of the total population, and according to current forecasts, by 2030 up to 60% of the world population will live in urban areas, which reflects the high forecasted rates of urbanization and agglomeration.

Large international companies in the context of globalization in Vietnam have created numerous "screwdriver" (assembly) production and production of individual components of the final product. Within large corporations, individual divisions (subsidiaries) seek to acquire greater independence, which would make it possible, using the resources and preferences of a particular territory (country, region) most effectively, to gain greater influence and profit, working not only within the framework of deliveries within the corporation, but also independently in the local market. The desire to comprehensively reduce costs in the process of competition between corporations and divisions of large

companies leads to decisions that do not pay due attention to the quality of human capital development, the formation of a comfortable environment when creating industrial zones and agglomerations.

For its part, for the Asia-Pacific region and, in particular, for Vietnam, the influence of Japanese systems and quality standards and the organization of production cycles is great, according to which long-term competitiveness depends on quality, cost and delivery (QCD - Quality, Cost, Delivery). Human resources along with labor market conditions, infrastructure, natural resources and local government policies to attract investment are the main factors in the formation of quality assurance in the long term. Consideration of these priorities, as well as the environmental approach when creating industrial and innovative agglomerations, is becoming an important development trend in urban areas [12].

Today about 60% of the population of the cities of Vietnam already live in high density conditions. In particular, the city of Ho Chi Minh (formerly Saigon) in southern Vietnam has the highest population density among the cities of the world. Ho Chi Minh adopted programs to improve the quality of the urban environment, which include:

- demolition and renovation of part of obsolete residential areas;
- transfer of a part of warehouse territories and industrial zones to satellite settlements;
- creation of new residential neighborhoods on the outskirts and ensuring their transport accessibility;
- landscaping of renovated territories and newly created industrial and residential areas.

The forecast for the development of urbanized territories of Vietnam showed that at present the economic potential of the country as a whole is most intensified by cities located inside the system of the “spatial triangle” of the Krasnaya River in northern Vietnam [13]. The three peaks of the “triangle” are the cities of Hanoi, Haiphong and Namding, where production is concentrated, investments in which are supported by the Vietnamese government.

Hanoi, the historical capital of the country, is the socio-economic, political and cultural center of Vietnam, in which the Red River branches into two branches. The port city of Haiphong, the third largest city in the country (after Ho Chi Minh and Hanoi), is located on the Kinmon River, which flows into the Bakbo Bay of the South China Sea, acts as the sea gate of Hanoi, allowing the capital to connect with different cities of the world by sea. Its development priority is the production of export goods and the transshipment of products of heavy industrial sectors, produced in other urban agglomerations between Hanoi and Haiphong on the Kinmon River. Shipbuilding, mechanical engineering, automotive, electronics, building materials, steel production are being created in this region.

The city of Namding promotes the connection of the industrial agglomeration of Hanoi with other cities in the southern part of the country by land transport. Light and agricultural industries were developed in the city, including the following priority areas: production of fertilizers and biological industrial sectors serving agriculture (high-tech agriculture); processing of agricultural products from the riverine regions of Hengien, Hanam and Naming; auxiliary industrial branches (textile, footwear, machine-building, electronic information industries, car assembly plants).

Many cities with a population of over one million in developing countries, including the indicated cities of Vietnam, developed in the process of their rapid growth in the second half of the 20th century without taking into account environmental requirements that are acceptable today. There was a so-called slum building, the inhabitants of which formally belong to the urban population, but are able to perform only primitive production functions, which does not meet modern requirements for high-tech production and the creation of innovations.

The population of Hanoi in the 2010s is about 2.8 million people with suburbs, and the population of the Hanoi agglomeration is 6.5 million people. The development of the

capital in the XX century is characterized by a high intensity of urbanization with a significant expansion of residential areas in the previously suburban agricultural areas, while maintaining the priority of mass housing development and moving industrial enterprises and universities from the city center to its periphery (satellite cities, Hanam and Nam Dinh cities).

If the old quarters of the city (Historical and French), despite the narrowness of the streets, have many trees, there are lakes and spacious parks in the central part of the city, then the situation with landscaping of the quarters built in the 20th century is the least favorable. These quarters are called the “gray belt” or slum building. They occupy about a third of the modern territory of the city and consist of 3–7 floors stretched out, very narrow along the facade of houses built in conditions of a deficit territory, such houses were built up several times. This housing for workers and artisans was created in conditions of rapid industrialization, has significant shortcomings, in particular the lack of trees and regular landscaping.

A similar slum building, where a significant part of the urban population lives (from 25 to 35%), is also characteristic of other large Vietnamese agglomerations.

2.3 Urban landscaping trends in Vietnam

The formation of a high standard of living in cities is impossible without observing environmental requirements, creating an accessible, inclusive and comfortable urban environment.

As a result of military losses and massive deforestation, Vietnamese forest reserves have declined by more than 60%. In this regard, in the 2000s, the country's leadership is firmly committed to increasing the area of forests by the countryside and green spaces inside cities and suburbs [14].

In the direction of solving the environmental problems of cities, compensating for the negative impact of mass production and housing construction on the surrounding ecosystems, a number of trends are currently characteristic of urban planning. The new directions for solving the environmental problems of megacities include certification of settlements, cities, districts and quarters according to “green standards”.

Gardening issues for the leading cities of the world are in the focus of attention of managers and specialists responsible for the quality of the urban environment, planning urbanization of territories, drawing up promising urban planning documents. They are an important component in the implementation of redevelopment projects of territories that were previously industrial or built up with dilapidated housing [15].

In Vietnam, the most relevant is the solution of the problems of gray zones, slum development of urban areas. The possibility of landscaping both the facades and the roofs of similar houses and entire neighborhoods that have not yet fully worked out their deadlines is currently the most realistic alternative to the complete renovation of these neighborhoods, which is extremely expensive. In part, it is decided by the townspeople themselves, in a “artisanal” way, but its systematic solution requires a certain format of architectural and urban planning decisions.

It should be noted that in the recently growing new quarters on the outskirts of the city of Hanoi and on the coastal strip of the Krasnaya River, where residential condominiums are being built, the situation differs by more thoughtful decisions in terms of ecology and landscaping. Despite the insufficient transport accessibility of new areas and the absence of a number of infrastructure facilities in new areas, urban planning errors associated with the lack of greenery and land shortages made in the 20th century were taken into account. Currently, townspeople with the opportunity to settle on the outskirts receive a high degree of greening of the adjacent territories and, as a rule, spacious parks in the neighborhood.

If we judge the rapidly growing Vietnamese cities as a whole in recent decades, the situation with landscaping in them resembles the “gray belt” in Hanoi. The greening of new urbanized territories, as well as the streets, building facades and roofs of residential buildings in the “gray belt” quarters is extremely relevant, albeit an expensive technology for implementing greening programs in major cities of the country, including Hanoi and Ho Chi Minh. Greening roofs and facades is currently one of the most effective ways to solve the problem of greening deficits in hastily erected neighborhoods of large cities. Thanks to this format of landscaping, it becomes possible not only to create and maintain a microclimate that will be comfortable for humans, but also to identify and complement expressive architectural decisions of the building.

Locals are trying to defuse the tedious gray atmosphere of the dense housing of the slum belt with plants and flowers in pots, exposing them on balconies, loggias and window sills. Based on this “popular” idea of revitalizing the urban landscape, some ecological concepts by Vietnamese architects came up to create unique projects called Stacking Green, which means a garden house, in which the main idea is to use landscaping as an element of facades, Stone House is a residential hill and others. In Ho Chi Minh, a “green” eco-quarter was built, consisting of 1-3 storey houses, sheathed in wood or synthetic materials resembling lumber. On the roof of each house there are terraces with lawns, flower beds, and sometimes trees, - “oases for residents.

The process of greening roofs in the largest cities of Vietnam has been launched, but requires further development. In Japan, the problems of lack of air and greenery in cities, typical of Vietnam today, began to be actively addressed since the 1990s. So, the roof gardens of train stations throughout the country are rented out annually in plots of three square meters in size - consumers are mainly pensioners, many of whom use this space for gardens. The most greened roofs are in the central areas of Osaka and Tokyo, where, according to estimates, their area is 4.5-5% of the total roof area [16].

In Beijing and a number of cities in Vietnam, plans have been developed for the creation of so-called green belts. The fastest growing landscaping is in the territories owned by city administrations. The presence of a separate landscaping plan, which is developed independently of the master plan of the city, makes it possible to give weight and priority to greening projects in comparison with development projects.

3 Results

The results of the study of the effect of the degree of gardening on the quality of human capital in urban areas allowed: to highlight a number of basic types of gardening in the urban area; identify the main features of the quality of life and the characteristics of the human capital of permanent residents / workers (users) of the urban territory, assess the cost of the specific implementation of landscaping projects (table 1).

A significant part of the urban areas of the major cities of Vietnam in terms of landscaping are underdeveloped. The quality of life of workers in these territories has significant drawbacks, which determines the actual restrictions on the development of human capital of workers.

The effectiveness of investments within the framework of various types of landscaping can be made by comparing the costs incurred (a known amount) and the results achieved through the index $PI = E / C$ where:

- PI - investment performance index;
- E - result meter (effect);
- C - investments (costs).

Table 1. The Impact of the degree of landscaping on the quality of human capital of urban areas in Vietnam

Type of landscaping in urban areas	Specific area of land green spaces and green facades / roofs, sq m per inhabitant	Estimation of the specific gravity of this type of landscaping in the total area of urban areas of large cities in Vietnam	Main features of the quality of life and human capital characteristics of permanent residents / workers (users) of the urban area	Estimated unit cost of realizing this type of landscaping in Vietnam, euro per m ²	Examples
1. "Abandoned", undeveloped, slum quarters	0-10	25-35%	1. Place of residence of the poorest segments of the population with no or significant shortage of social infrastructure. Displaced people from rural areas and poor migrants settle here. 2. Places of employment for residents are positions of auxiliary workers in the fields of handicraft / manufacture and craft, local non-state transport, retail trade, and other options for unskilled labor. 3. Assessment of the level of monthly income per employee - 100-150 euros. An estimate of the average level of unemployed among the working population is 20%. Assessment of the average level of disabled people (children, pensioners, disabled people) in the general population - 12-15%.	0-20	Most of the "gray belt" areas of large cities - Ho Chi Minh Hanoi, Haiphong Hanam, Namding, others
2. Areas quarters with unexpressed ("sporadic") landscaping that is not regularly maintained	10-20	25-30%	1. Place of residence of a part of the middle class, There may be a lack of modern social infrastructure. Housing is popular among senior citizens who grew up and lived in this part of the city. 2. Places of employment for residents are positions of specialists and managers of the lower and middle level at large-scale production facilities, including international companies, state transport, network and wholesale trade, owners of small local businesses, and other options for medium-skilled labor. 3. Assessment of the level of monthly income per employee - 150-300 euros. Estimation of the average level of unemployed among the working population is 5-7%. Assessment of the average level of disabled people (children, pensioners, disabled people) in the general population - 35-45%.	25-70	A smaller part of the "gray belt" of districts of large cities - Ho Chi Minh Hanoi, Haiphong Hanam, Namding, others
3. "New buildings of economy class" - mass quarters designed and built in the XXI century. Gardening is maintained or created	20-50	25-30%	1. Place of residence of a part of the middle class, at the initial stages of functioning there may be a lack or lack of social and service infrastructure. Housing is most popular among relatively wealthy migrants from other cities or rural areas. 2. Places of employment for residents are positions of specialists and managers of the lower and middle level at large-scale production facilities, including international companies, state transport, network and wholesale trade, and other areas. 3. Assessment of the level of monthly income per employee - 120-250 euros. An estimate of the average level of unemployed among the working population is 3-5%. Assessment of the average level of disabled people (children, pensioners, disabled people) in the general population - 15-20%.	30-100	As a rule, the nearest suburbs, previously villages around large cities with remnants of forest and farmland nearby
4. Prestigious neighborhoods in the city center and elite suburbs with thoughtful landscaping, which is maintained on a regular basis	20-150	10-15%	1. Place of residence of the managerial and creative elite, as well as the "creative" class, as a rule, provided with modern facilities social and service infrastructure. 2. Places of employment for residents are positions of middle and senior managers in private and state institutions and enterprises, and representatives of highly skilled labor also settle here. 3. Assessment of the level of monthly income per employee - 250-700 euros or more. An estimate of the average level of unemployed among the working population is 2%. Assessment of the average level of disabled people (children, pensioners, disabled people) in the general population - 25-25%.	50-150	Quarters in the historical center of the city and in the elite suburbs of large cities, usually with access to water - rivers, lakes

Note: table 1 compiled by the authors.

As a measure of the result, the growth of the market value of the property due to landscaping was chosen. The value of this indicator was obtained by an estimation method using a number of projects as an example (table. 2).

Table 2. The effectiveness of investments in landscaping projects

Type of gardening	Project data	Implementation cost	Effect obtained
Programs for greening roofs and facades of the "gray" belt	Greening for the repair of facades and roofs on 12 buildings built in 1975-1978: 850 m ² of roofs; 185 m ² of facades (performed by a private investor)	135 857 euros, including: roofs 109 680; facades 26 177	Reconstruction was carried out without evicting residents, with the creation of a single walking space of the roof, flower beds, lawns. The market value of 119 apartments in aggregate rose by an estimated 251,412 euros, so PI = 1,851
Creating squares in new buildings	Square with an area of 1890 m ² in a new quarter of 7-9 storey houses (performed by a private developer)	85 016 euros	The presence of a square is a prerequisite for the sale of apartments. The total nominal value of the square for buyers of 205 apartments is estimated at 108,117 euros, so PI = 1,272
Integrated greening of the industrial territory.	Creation of green spaces in the industrial park for innovators (suburb of Hanoi) - negotiation and relaxation area 1270 m ² - Walking alley 515 m ² (financed from the city budget)	297 455 euros, including: negotiation area 201 552; alley – 95 903	The technology park for innovators has implemented the concept of creating an office and production unit. An open meeting and walking area has been allocated in the office block, an alley has been laid between the blocks. The estimated consumer value of green areas for residents of the technology park is 399,115 euros. Thus, PI = 1,342

Note: table 2 compiled by the authors.

Value indicators from Vietnamese Dongs have been converted to Euros at the cross rate on 09/25/2019.

Thus, after the study conducted by the authors, the results of which are shown in Tables 1 and 2, it can be concluded that landscaping is currently a popular type of improvement that affects the market value of residential and commercial real estate. Moreover, the growth of the market value of real estate (assessment of consumer value) was used as a quantitative indicator of the quality of life, and investment efficiency - as an indicator of the effect of landscaping on human capital.

4 Conclusion

In the issue, the following main conclusions were obtained.

1. The degree of urban greening can be an active environmental factor that can change the perception of workers about their quality of life in the metropolis (affect the perceived quality of life of the population) and, thereby, become a factor in the formation of human capital.

2. The human capital of workers in “urbanized territories” is increasingly dependent on satisfaction with the conditions of their living in the city - the level of ecology, as well as the architectural and landscape design of the urban environment. The formation of a high standard of living in cities is impossible without observing environmental requirements, creating an accessible, inclusive and comfortable urban environment.

3. In the course of rapid urbanization under conditions of accelerated industrialization and financial constraints in the cities of Vietnam and other countries of the Asia-Pacific region, many environmentally friendly urban planning decisions were implemented only experimentally. A significant part of the urban areas of the major cities of Vietnam in terms of landscaping are underdeveloped. The quality of life of workers in these territories has significant drawbacks, which determines the limitations inherent in human capital.

4. A number of main types of landscaping of the urban territory and the main features of the quality of life and characteristics of the human capital of permanent residents / workers (users) that are consistent with these types of landscaping have been identified. The effectiveness of investments within the framework of various types of landscaping was made on the basis of a comparison of the costs incurred and an expert evaluation of the results achieved.

The directions of further research should be the identification of priority landscaping zones of urban areas, including the arrangement of parks and lawns at ground level, the greening of roofs and facades of buildings. It is advisable to make: a comparison of the cost of their creation and brought economic, environmental and social effects; assessment of the impact on improving the perceived quality of life of the population and the qualitative characteristics of human capital.

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