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IMPROVING EXISTING HOUSING STOCKS A MODEL WITH ARTIFICIAL SMART SUPPORT

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ABSTRACT

Habitable housing and a healthy environment are a fundamental human right. In ensuring that existing housing stocks are re-acquired with artificial intelligence support, in making them healthy and sustainable, the development of a support intelligent system is the main topic of this study. The improvement of what is present provides a holistic benefit that has a return in economic, social, cultural and environmental contexts. It is increasingly important to take advantage of technology to make predictions and assessments with effective policies as well as effective strategies, algorithms, software development, and simulation in improvement projects. The goal is to preserve the resources and energy we have, reduce waste production to zero, reduce carbon footprint, and use the smart model supported by artificial intelligence in this study. Demolition and rebuilding should only be considered as the last resort, as the growth of environmental, cultural, waste areas, and waste resources and energy waste. Improving robust and functional buildings without demolishing them, adapting structures with cultural value to current technology, ensuring sustainability with a smart system can be achieved. In this study, it is aimed at achieving a 'Smart Model', which is supported by artificial intelligence, which is designed in light of examples around the world to evolve existing housing stocks with high environmental impact and resource utilization, into buildings with technology-appropriate equipment that have sustainable properties for resource use.

Keywords: Existing housing stock, Intelligent model with artificial intelligence, Improvement, Technology in architecture, Sustainability

1. INTRODUCTION

The main problem covered in the study is to address environmental, social and economic problems created by existing housing stocks, and to ensure that these structures can be dealt with with evolving technology and technological systems. The aim of this is to reduce environmental impact in the dwellings, increase efficiency in resource use, equip and improve the necessary technological systems and transform them into modern dwellings. In line with this goal, the '***Artificial Smart Supported Model Proposal***' is designed to create alternative resources for the dwellings, it has been prepared to establish which types of improvements can be made in the headings identified and to ensure that these improvements are made in the growing number of residential stocks, using artificial intelligence technology, and that the system will use time effectively to learn and solve the next housing problem through these types, to prepare the ground and ensure that the system remains up-to-date.

The changes that started with the Industrial Revolution in the world changed the living conditions, paving the way for new demands. Changing living conditions have also shaped the need for shelter. Housing in people's lives has come to a point, and in certain periods, housing has become the goals of individuals. In the face of this growing demand, housing construction has gained momentum and in line with the advancement of technology and construction techniques, the silhouettes of almost all cities have begun to change.

He has earned his share of these changes in our country. Development of ready-made concrete technology, acceleration of material supply, easy access to workforce, etc. the reasons have caused the

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number of housing to increase day by day. In addition to this situation, economic incentives and economic income expected from the sale of housing have resulted in some changes in the production industry's goal. As a result of these changes, it is possible to make stock of housing that overcomes the demand, plan housing similar to each individual, and start producing foam from the context of the dwellings.

Table 1. Iskan Information received in Turkey between 2018-2020 [1]

	2020	**2019**	**2018**
Number of Buildings	53.986	70.529	88.609
Surface Measurement (m²)	86.198.564	111.645.002	120.100.622
Number of Apartments	423.733	545.006	614.161

Table-1 of projects certified by LEED, including 2020, despite housing data included in Table-1, is 428 according to World Green Building Council (WGBC) data [2].

As a result of these changes, the use of resources in housing has accelerated, resulting in pressure and stress on resources at a certain stage. The reduced resources and increased resource use are not only changing human living conditions, but some of the important vital problems that come up in a variety of ways -- ecological changes, decreasing the number of species of life, etc.

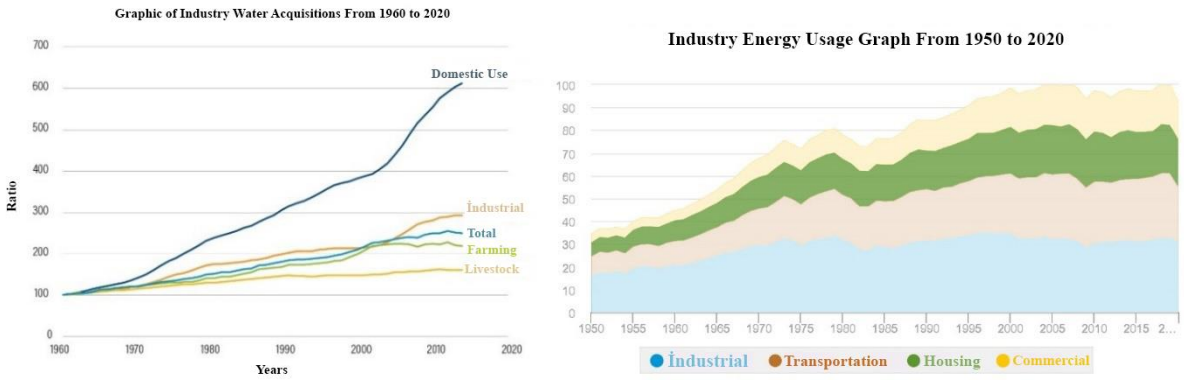

Figure 1. Housing Resource consumption Left Panel water Acquisition, right Panel Energy use [3]

The fact that the activities and forms of the past continue in the same way without meeting the requirements of today's world is one of the key factors at the heart of these issues. The development of technology and the rise of quality standards of life has brought a great momentum especially to the construction and construction industry. The rate of use of resources, nature and its resources, in line with the number of households and the number of housing, has been under pressure and stress by putting this momentum behind it. At this point, concepts that can respond to the age by using the support of developing technology, which have systems that can improve resource utilization, must be the main target in the construction industry, and existing housing stocks must be integrated into that goal.

2. FOR A BETTER FUTURE, SOLVING TECHNOLOGICAL DEVELOPMENTS IN ARCHITECTURE

It is undoubtedly sustainable, one of the concepts that has emerged in recent years, especially against changing world conditions and ecological conditions. Sustainability is defined as the definition of meeting today's needs without disclaimer of the ability to meet the needs of the next generation in

development and progress [4]. One of the key points in this definition is that it reveals a wide range of situations without pointing to a specific area. In this way, sustainability can be described as a universal concept.

The main idea in the architectural design dimension of sustainability minimizes the negative side of existing building systems, putting environmental factors in focus for the product with features that internalize the natural one [5]. This is the case of the objectives of sustainable architecture [6]:

- Maximize human comfort
- Design for change
- Protection of the natural one
- Reduced costs and increased efficiency.

Sustainable architecture integrates technology and human goals to achieve these goals. The International Council of structures defines sustainable architecture as a concept based on resource efficiency, creating healthy space, which is the lowest in natural/artificial environmental incompatibility [7], and considers it a parameter that contributes technological developments to the process in achieving this situation. This also combines the objectives of the Artificial Intelligence-supported Model proposal with the sustainability goals of architecture. The Intelligent Model proposal with artificial intelligence will provide a system that will support sustainable architecture through an improvement method in existing housing stocks, and will develop this support on the technology base.

Technology systems are often present as systems that make human life easier in many areas that depend on world development in a short period of time. "How can technology help sustainable architecture?" in its relationship with sustainability, which is an important concept in the building sector, particularly in the solution of problems in the world he can be asked a question.

Technology systems and sustainable buildings are basically [8]:

- Provides sustainable requirements that represent continuous adaptation with the technology systems it has.
- Supports sustainability by increasing efficiency in resource utilization through its hosted automation and technological systems.
- The flexibility of the overall structure of the system and the concept of architectural design and sustainability.

In general, the concept of technology offers healthy and comfortable locations to help people and their lives through the social, economic, environmental components of sustainability. Therefore, they support the concept of sustainability from the design of the structure to the destruction of the structure, which creates basat systems in achieving the basic concept of sustainability.

3. FOR A BETTER FUTURE, KAPFENBERG HOUSING BLOCK EXAMPLE

There are many households in Europe that offer sustainable housing solutions, especially with the necessary measures after the war. One of these examples is the housing block in Steinmark, Austria.

Figure 2. Kapfenberh Structure Left Panel previous carpet - right Panel New carpet [9]

The existing residential block has been improved by refreshing it with a number of systems to be able to use energy efficiently and improve the quality of life in locations. Improvements to this purpose [10]:

- Energy Rehabilitation
- Material Renewals
- Improved Location Quality
- The Solution of Accessibility issues is collected in the headings.

With energy rehabilitation in the structure, it is aimed at significantly reducing energy consumption with the help of today's technology. 80% of heating was achieved by renewable energy in CO2 and 80% of the heating system.

A contemporary solution has been developed for the construction to achieve renewable energy. The steel construction, integrated outside the structure, is equipped with solar panels to provide renewable energy. The resulting solar power works by feeding a layer of thermal storage tank through a feeding system that fills the storage units in each circle.

In addition, a new prefabricated facade has been developed for the existing facade for construction material. With this prefabricated front, the service channels of the entire building have also provided the advantage of directing them behind the outer shell.

For improved location quality, sun control is provided by adding a porch to the east-facing facade of the building. In addition, new ventilation systems, expanding living spaces and adding balconies to each apartment are aimed at improving quality of life. In addition, improvements have been made by offering flexible solutions within the structure for disabled and wheelchair circulation.

In general, the structure has developed different solutions to improve vital quality and contributes to the sustainable environment. With these solutions in the structure, PlusEnergy in Austria won the renewal award.

4. SMART MODEL WITH ARTIFICIAL INTELLIGENCE IN TRANSITION FOR A BETTER FUTURE

The reflections of the development of technology in the world have affected the construction industry as well as any industry. The shortening of time in construction has caused the increased demand in our country and the number of housing in cities to increase in a short period of time, and this has started to create housing stocks, combined with economic expectations. The disintegration in the context of these structures has influenced the process of resource use by establishing the basis for other problems. The

proliferation of such structures has caused similar problems due to the similar similarity of existing housing stocks.

In this part of the study, the aim is to reduce the environmental impact of these existing housing stocks, promote renewable resource use, improve spatial quality and remain up-to-date with the concept of artificial intelligence [11]:

- **Intelligent Systems**
- **Energy Management**
- **Water Management**
- **Material Management**
- **Biological Management**

To ensure that these structures are ***'unbroken'*** by re-evaluating them with their headers.

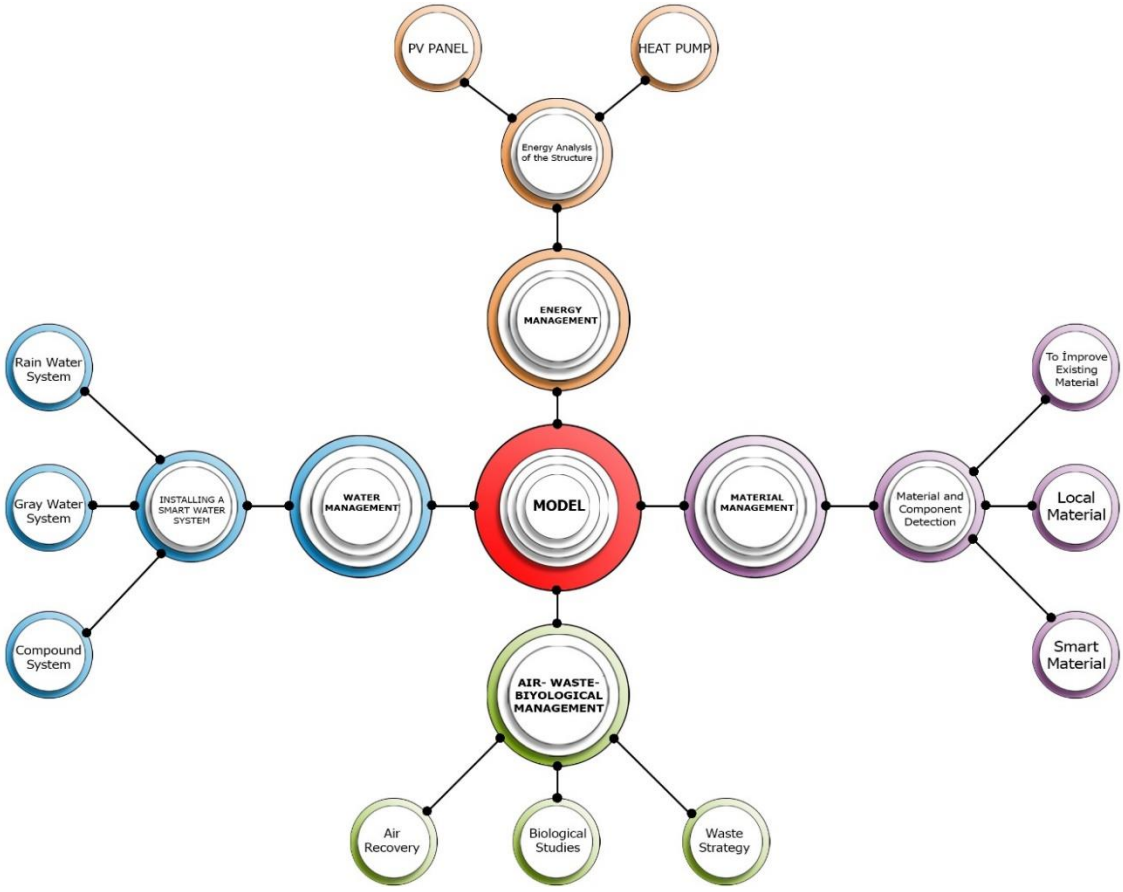

Figure 3. General strand of the recommended Smart Model during the transition (created by the Author).

The top headers and a brief summary are provided in Figure 5, which provides an overview of improvements to existing housing stock.

- ***Energy Management;*** the energy needed in the dwellings in general is intended for electrical and heating/cooling. In the fulfillment of these energies, the 'PV Panel and earth-welded heat pump' are two current concepts. With evolving and changing technology, the effort to improve

the efficiency of these two alternative sources is crucial to renewable energy resources in the construction industry.

- ***Water Management;*** the increasing water stress on countries in parallel with the developments in the world has made it clear. The United Nations water Development Council [12] has shown our country that water stress will be intense in its recent release. This is a clear indication that our strategy should be reorganized in the dwellings. Therefore, the aim of this administration is to reduce water exposure by creating alternative resources by adding 'rainwater systems and gray water systems'. In addition, the work carried out is expected to reduce the need for water by %94 by using these two systems together [13].
- ***The Biological Environment Management***, aims to reduce the environmental impact of structures and improve the quality of life. "Green front, green roof, etc." in structures the use of 'green dividing elements' in the interior will contribute to the development of both the spatial quality and the healthy environment.
- ***Material Management***, aims to reduce the environmental impact of the material used, improve the impact on human health, and promote the structure 'local material and natural material'.
- ***The concept of AI***, will be with 'artificial intelligence technology' in ensuring system continuity and the model can improve itself by rebuilding itself over the course of the process. The system's data inputs will be the main component of the artificial intelligence technology system to evaluate this data and to develop solutions that match this data, but will also be aimed at improving efficiency in future issues. With the concept of artificial intelligence technology (human-in-loop) [14], it will be aimed at making the system more stable, bringing the system to the desired accuracy, including the human into the loop, and using the human efficiently.

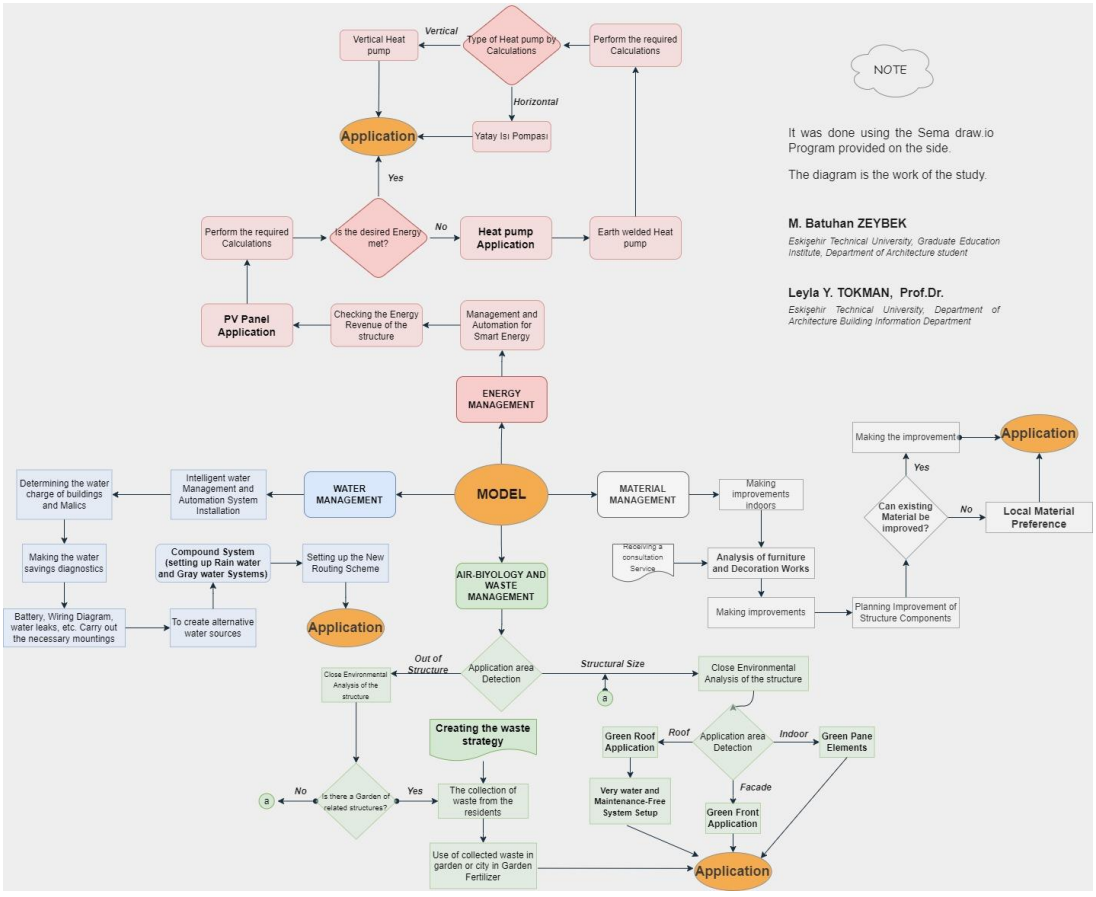

Figure 4. Recommended Artificial Smart supported Model proposal (created by the Author)

As a result, reducing the environmental impact of existing housing stocks and making improvements to certain headlines of these structures will help save cities before they become construction sites, and then regain them without adding extra burden to the country's economy. This system and model have aimed at a long-term perspective where structures improve in the short term, where cities improve.

5. RESULT

The developments in the world that the Industrial Revolution and its foundations have defined new standards of living for humans. By adding the increasing population in the world to these developments, the consumption of existing resources has increased and has a negative impact on these resources. One of the largest stakeholders in increased resource consumption is the construction industry. The production activities that continued with the past-term systems have often overlooked technological systems, creating a natural pressure on which it has reduced resource utilization efficiency.

The expectations of the dwellings must change. The existing structures should now be designed to be able to use technological systems actively, and the existing structures should be expected to participate in this change. The parameters set by the American Green Building Council in the 'Smart Model with Artificial Intelligence' proposal prepared for this purpose [15]:

- **Smart Systems**
- **Energy Management**
- **Water Management**
- **Material Management**
- The basic diagram and objectives of the system are prepared using **Biological Environment Management.**

In addition to these goals, the concept of artificial intelligence, which is effectively integrated into all systems in the changing and evolving world, is one of the key components of the study. In general, the artificial intelligence system will ensure that the model remains up-to-date in terms of 'using it to automate jobs that require human intelligence and be able to do much superior tasks and calculations than the human brain can afford' [16].

It aims to 'protect the natural one, provide sustainable quality of existing structures using artificial intelligence technology, improve quality of life for residents, improve economic direction and manage it' through existing housing stocks with an intelligent model built with artificial intelligence system (human-in-loop).

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