Explain the Methodology for Decision Support Systems in the Early Stages of the Landscape Architecture Design Process Based on the Systemic Design Approach

Parichehr Goodarzi, Mojtaba Ansari,
Mohammad Javad Mahdavinejad and Mahdi Haghighatbin

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Parichehr Goodarzi: PhD student in landscape architecture, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran. Email: p.goodarzi @ modares.ac.ir

Mojtaba Ansari: Associate Professor, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran Email: Ansari_m@modare.ac.ir

Mohammad Javad mahdavinejad: full Professor, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran mahdavinejad@modares.ac.ir

Mahdi Haghighatbin: Assistant Professor, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran. Email: haghighatbin@modares.ac.ir

Abstract:

The basis of computational design systems in landscape architecture is systemic design thinking, the developments of its two parts, namely systemic thinking and design thinking, have not been homogeneous. This approach was considered from the 1970s onwards with the expansion of design movements, the critique of design thinking, and the adaptation of systems thinking to the vocabulary of landscape architecture education, but did not become a dominant trend in landscape architecture. In today's world, research in landscape architecture is expanding again as a field of belief. Decision-making in complex natural-human systems, including landscape architecture, requires a transition to robust model-based interfaces. Strong decision support requires a range of interactive methodological options for setting the context of the problem, framing the decision-maker, evaluating possible solutions, and presenting theories. Based on systemic design approaches, we introduce a methodology for producing an adaptive decision support system in the early stages of landscape design. Landscape architecture as a complex system has no solution other than systematic design to face and solve its complex problems in today's world. Re-study that platform to form the foundations of self-adapting systems, to be designed as an advanced decision support tool in the early stages of the process.

Key words: systemic design, decision support system, self-adaptive systems, landscape architecture, design thinking.

Introduction

Describing scientific revolutions, Thomas Cohen (1962) sees each particular period of science as dominated by a single "principal paradigm" which is, indeed, a very comprehensive and powerful scientific conception of the natural order of reason, which follows all scientific discoveries. It dominates. The dominance of computations and algorithms over the world today is an example of Cohen's description.

Ray Kurzweil describes the increasing speed of computing technology as "The Law of Accelerating Returns", in which the speed of change in technology and its powers is accelerated dramatically (Kurzweil, 2005). Randy Deutsch (2020) explains how current and near-future advances in technology are creating a new paradigm known as "Superusers" for architects and designers, people who go beyond a design technology expert with specific skills, mindsets, abilities Problem solving, and leadership characteristics for shaping the future of the design industry, are needed. In the current complex age, creative solution to complex problems in various fields requires decision support tools based on holistic and integrated approaches to manage the design process. This is due to the second digital turn that has profoundly changed the way we thinking(carpo,2017) and new paradigms are emerging. The question now is what and how to explain the framework for methodology in various fields of design. Systemic design is having a very significant impact on the field of design. In this short article, we discuss it in the landscape design process.

- **Systemic design for decision support system tools in landscape architecture design process**

Perhaps, the most prominent interdisciplinary approaches of systemics and design thinking have been developed in the Ackoff and Banathy era social system design schools that promoted whole system approaches to the challenges of the modernist technological era (Jones, Kijima 2018). The basis of computational design systems in landscape architecture is systemic design thinking, the developments of its two parts, namely systemic thinking and design thinking, have not been homogeneous. This approach was considered from the 1970s onwards with the expansion of design movements, the critique of design thinking, and the adaptation of systems thinking to the vocabulary of landscape architecture education (Berger, 2009) but did not become a dominant trend in landscape architecture. Ian McHarg's studies in landscape planning and Alan Berger's in-depth studies in landscape architecture design are enduring examples of systems thinking and systemic design that are critiqued from several perspectives. Due to superficiality in the field of thinking, holistic design and nonlinear thinking do not have a systematic design approach. Therefore, despite holistic theorizing, it suffers from a relative reduction in practice; accordingly, even though knowledge, cognition, and awareness of a landscape as a subject have become a very important issue in recent decades, there is still a lack of decision support tools designed specifically for the landscape theme. (Gabriella Trovato, et al, 2017). In today's world, with the beginning of the critique of computational thinking in the landscape with Picon's critical views, it is again emerging and expanding as a field of belief in research in landscape architecture. Decision-making in complex natural-human systems, including landscape architecture, requires a transition to robust model-based interfaces. Strong decision support requires a series of interactive methodological options for setting the problem context, framing the decision-making problem, evaluating possible solutions, and presenting theories (Moallemi et al, 2019). Despite the evolution of computational tools Landscape architecture in the context of systemic thinking has gone through different generations and has paved the way for the formation, scientific events, the establishment of journals, theories, and changes in important paradigms in landscape architecture design; But it has not been successful in producing an adaptive computational framework as opposed to representation in the design process. Based on the six main activities of Systems Design Methodology: framing, formulating, generating, reflecting, inquiring, and facilitating (Ryan, 2014), we introduce a methodology for generating a "3D adaptive decision support system tool" in the early stages of landscape design. Landscape architecture as a complex system has no solution other than systematic design to face and solve its complex problems in today's world. Systemic design merges the existing territorial dynamics, with multi layers strategies and historical transformations understanding how natural and artificial systems

dynamically operate at the regional and local scale, and how are interrelated is the base for an innovative design. (Berger, 2009) This mode requires a different design attitude.

We know that the emergence of design knowledge is essential to update the problem space, which in turn leads to new structures in the solution space (Nelson, 2020). Design or co-evolutionary knowledge has linked problem space and solution (Dorst, 2019). Computational design is a systematic approach to critical thinking that emphasizes the process of thinking and repetition rather than retention and replication. This emphasizes the connection of ideas and the interaction between the parts of the problem and the solution or co-evolution.

Computing in landscape architecture provides more than just opportunities to develop current design tools, frameworks, and methods. Although flexible and scalable architectural design spaces using self-adaptation approaches based on feedback loops, in particular, the use of design theories for self-adaptive systems, as an advanced decision support tool - as an important challenge, Is still in its infancy; Re-studying systemic design in landscape architecture and aligning its intellectual infrastructures in this field can lead to the formation of new theories for decision support tools in the early stages of the landscape architecture design process. The adaptive systems feedback cycle is not only a framework for understanding the dynamic processes of flexible systems but also illuminates innovative opportunities at all stages of design.

As Carl Steins emphasizes, the methods and ways we use to do our work in landscape architecture are in a state of great evolution. The social and environmental issues we face and can focus on, the scales and content of the designs, the decision models in which decisions are made, the process models that address current and potential future conditions we evaluate, the actual methods in which we design and the technologies we use are all rapidly changing (STEINITZ, 2010). And this is an emphasis on creating dynamic and adaptable design systems. Two important issues, scale, and complexity are important in creating the tools of decision support systems in perspective. Landscape architecture has placed great emphasis on systems thinking and large projects over the past decades, and central technical tools such as GES are the product of this vision. Geo Design as a Model Target Although it also considers the field of design thinking, it has many ambiguities in its definition and approaches. Addressing mid-scale projects and explaining meta-models, and creating support tools for decision-making at this scale can both help to make the model target more transparent, and to solve complex problems at this scale by paying more attention to design thinking along with the system thinking. In fact, by designing dynamic systems designed for change, We are constantly managing landscape changes through the management of the design process.

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