Investigating Evolutionary Construction Systems and Computational Approaches in Traditional and Modern Architecture

Abstract

In today's era, despite software advances and the use of various approaches such as evolutionary design and computational approach, designers are less successful in connecting their ideas to the final product. The evolutionary construction approach targets the issue of sequence and formation processes more; while the computational approach is more product-oriented and has the ability to provide sophisticated designs. Therefore, by combining these two approaches, the process of design to construction may become more coherent and the final product will be more similar to the initial idea that was in the mind of the designers. This research is based on the goal criterion, in the applied research group; moreover, it is based on the data collection time criterion in the survey research group. The statistical population of this research includes people who have research background in this field and the information obtained in this way has considerable validity and reliability. The sample size in this research using SPSS SAMPLE POWER software is equal to ٢٠٠ people and the sampling method in this research is simple random sampling. SPSS & AMOS software are used to analyze questionnaire data. In order to investigate the hypotheses of the research, one-sample t-test and first-order factor model were used. The findings of this research indicated that the realization of the correlation and coherence of the idea-product process at the present time depends on the correct and appropriate use of the evolutionary construction approach and computational approach. The variables in the designer include guesswork, evaluation and decision-making; whereas the instrumental variables dependent on the computer include performing complex calculations and presenting multi-dimensional and complex designs.

Research aims:

١. Explanation of the idea-product correlation in the process of evolutionary construction and computational approach.

٢. Investigation of evolutionary construction system in traditional and modern architecture.

Research questions:

١. What role does the product idea play in the evolutionary manufacturing process and computational approach?

٢. What are the differences between evolutionary construction system and computational approaches in traditional and modern architecture?

Keywords: idea, product, evolutionary construction, traditional architecture, modern architecture.

Introduction

In contemporary designs, despite the many available advantages such as creativity, complexity, beauty, appropriateness with the context and energy saving, there is a large gap that causes the intimacy that was in the past to fade away and create lesser sense of belonging. This point is evident when in the past with simple and basic tools but with great perseverance and skill, these two basic elements - design and construction - had an unbreakable link, but today, with the existence of complex and computational tools in architectural designs, it is possible to recognize the traces of connection and belonging to the idea. In fact, contrary to the belief of many experts who consider the users of architectural works and buildings as lacking a proper understanding of the hierarchy of design and the construction process, it should be acknowledged that users have a very accurate discernment, which helps to determine whether the work or creation is idea-oriented. Although the computational approach in its nature is not a negative issue and has created many advantages for designers. (Turpin, ٢٠١٨:٥٤) In the creative process of idea-making, three major activities are carried out based on the evolutionary approach, which are: first, collecting and recording information, second, analyzing information to achieve an understanding of the design problem, and third, providing solutions for design issue (Crowe & Laseau, ١٩٨٤: ١٧). Today, some architects have adopted a new method in design, which is called evolutionary architecture, and with the aim of achieving compatibility in architecture, they use the process of evolution in nature. In order to achieve the desired result like nature, samples cannot be made in the original scale and

from the evaluation of the made sample, the evolution of the design can be reached (Slessor, ۲۰۰۷:۱۲).

In evolutionary design, computer virtual space is used to simulate the process of formation and evolution of nature. Of course, the purpose of using computers in evolutionary design is not only simulation, although it deals with simulation in a way. The special feature of this method is that one factor can be changed and its effects can be observed and checked. In other words, evolutionary design demands a new use of the computer, that is, as a tool for thinking. Of course, there are steps that can only be done by the human brain. What we should be looking for are ways of cooperation between the computer and the human brain. It means to consider the computer as a tool for thinking and the trace of the human brain, not the trace of his hand as a drawing tool (Thijs, ۲۰۱۵:۳۱).

Research history shows that so far no independent work with this title has been published in the field of writing. The scope of research in this article includes a framework in which a case example in the past was compared with traditional architecture in Iran and a case example with modern architecture abroad in order to measure the correlation between design and construction in them, and the merits and the disadvantages of each of them should be explained along with the basis of the formation of those works. The process of evolutionary construction was an approach that was valued more in the past, but in the contemporary era, it is used in a deceptive way, for the purpose this process in the past caused the connection of the idea to the product, but in the present era, only it is considered a decorative approach, consequently, it is preferable to examine this approach in a case example of the past tense. On the other hand, the computational approach, which has been discussed since the beginning of architecture until the present age, was very simple and primitive in the past, but in the present age, it has gained considerable complexity. Therefore, this approach is used in contemporary case examples and in other countries. Finally, these two series of samples are examined as extensible instances and are generally compared with each other so that the idea-product process is evaluated in both sets. The purpose of this research is to compare the two processes of evolutionary construction, computational design and construction in order to find the ratio, adaptation, and difference.

Research methods can be divided based on different criteria, nonetheless, it should be noted that the criteria should be comprehensive. The chosen method in this research is based on different

criteria. This research is based on the target criterion in the applied research group on various foundations including: data collection time criteria in the survey research group; criterion of the nature of the data and the research basis of a quantitative research; the criteria of the characteristics of the subject or the research problem of a correlational or congruent research; the criteria of types of research and the type of data of a research with first-hand data, the criteria of the data collection method of a field research using the questionnaire technique and the criteria of the depth of a comprehensive research. The main tool for collecting information in this research is a researcher-made questionnaire. The spectrum used in the questionnaire of this research is a ٥-point Likert scale. The reliability of the research tool has been confirmed based on Cronbach's alpha test of ٠,٧٨ for the research questionnaire. The statistical community of this research includes all the people who have studied and researched in this field and have sufficient information in the field of research. The sample size in this research using SPSS SAMPLE POWER software is equal to ٢٠٠ people and the sampling method in this research is simple random sampling.

Conclusion

This research was carried out with the aim of explaining the idea-product correlation in the process of evolutionary construction and computational approach and beholds four hypotheses. Its results are as follows. The result of hypothesis ١: According to the one-sample t-test that was used to investigate this hypothesis, this proposition has been confirmed. The realization of correlation and coherence of the idea-product process at the present time depends on the correct and appropriate use of the evolutionary construction approach and computational approach. The result of hypothesis ٢: according to the one-sample t-test used to investigate this hypothesis, this hypothesis has been confirmed. The variables in the designer include guesswork, evaluation and decision-making; While the instrumental variables dependent on the computer include performing complex calculations and presenting multidimensional and complex designs. The result of hypothesis ٣: according to the one-sample t-test used to investigate this hypothesis, this assumption has been confirmed. In today's era, despite software advances and the use of various approaches such as evolutionary design and computational approach, designers are less successful in connecting their ideas to the final product. The result of hypothesis ٤: according to the one-sample t-test used to investigate this hypothesis, this theory has also been confirmed. The evolutionary construction approach targets the issue of sequence and formation processes more, while the computational

approach is more product-oriented and has the ability to provide complex designs, thus by combining these two approaches, design to construction may become more coherent and the product should be more similar to the initial idea of the designers. The first-order confirmatory factor model that was used to rank and explain the correlation components of the idea-product in the evolutionary manufacturing process and the computational approach in this research also showed that the most important to the least important in explaining the correlation components of the product idea in the evolutionary manufacturing process and approach have calculations, which are: ١. The feasibility component of the design and construction process; ٢. The difference component in traditional and computer design processes and features; ٣. The ineffectiveness of software developments reduces the success of designers in linking ideas to products and ٤. Link component of evolutionary construction approaches and computational approach.

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