

ARCHITECTURE'S STRUGGLE WITH CONTROL: A DISCUSSION ABOUT "FRANKFURT KITCHEN" AND "FOOD DISPENSER" PROJECTS

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Received: 10.07.2019; Final Text: 09.11.2020

Keywords: Modern Architecture; Frankfurt Kitchen; Food Dispenser; control; anticipation.

INTRODUCTION

In 1928, CIAM's La Sarraz Declaration highlighted the most efficient method of production as rationalization and standardisation by acting directly on working methods both in modern architecture, the ground conception; and in the building industry, the realization of ideals. Two years before that, Ernst May, the head of department of settlements for the city of Frankfurt from 1925 to 1930, asked Margarete Schütte-Lihotzky to design the kitchen of approximately 15,000 residential blocks and terraced houses by promoting modular system as a new technology, which permitted mass production with lowered costs. Frankfurt Kitchen was built in 1926 as part of this comprehensive residential programme; filtered with socialist views of Lihotzky and followed a design strategy based on modularity. Modularity was a key solution for the rising built industry.

In the description of the Exhibition of Projection of 640 images held at the Museum of Modern Art in Oxford in 1967, Archigram Group declared that: "Environment is no longer just a matter of hard buildings. A condition can be summoned-up by the turning of a switch. The old labels of 'building', 'vehicle', 'place', 'structure' are becoming intermixed. A car may be a house or an extension of the foot that becomes an extension of the head. The emancipation of man is the controlling factor" and this approach gave way to their architecturally-designed machines, gadgetry and plug-in units (The Archigram Archival Project, 1967a). The same year, Food Dispenser was designed by the architect David Greene, a member of Archigram, as one of the mobile spaces providing a robotic soul to Living Pod project in 1967, which could replace the definition of kitchen for architecture.

As part of a vigorous enthusiasm that was about changing and improving the society to advance along with spaces they live in, and that was implicating architects eager to experiment for fulfilling developments in the above-mentioned two different eras, kitchen was also an experimenting field. Ernst May was one of these architects who joined some experiments

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about communal and kitchen-less dwellings in 1920-30's for the socialist city of Magnitogorsk; along with Mosei Ginzburg and Constructivist Group OSA (Union of Contemporary Architects) who designed minimal kitchen niches for the Narkomfin communal house in Moscow (Reid, 2005, 289-316). Architects' minds, which were convinced on behalf of technology, were rejecting or at least minimizing the kitchen space that was blamed for backwardness. Not far from these views, the idea of kitchen represented two different meanings for Frankfurt Kitchen and Food Dispenser projects both spatially and formally. The hope for kitchen-less dwellings resonated on two opposite sides of the wand, a 6 m² minimised space on one side and a mobile machine on the other. In this respect, such gradual effort on disappearance of the kitchen requires a discussion if this opposition represented a manifestation towards the control issue in architecture.

Architects' eager for focusing on the needs of users in kitchen space mostly targeted the abstraction in the form of induction of activities into human movements and the design of necessary small-scaled equipment of the entire composition. Therefore, the specific and precise character of the kitchen space inevitably can shed light onto handling of the term control that was established upon the relations among designs of these inductions.

Contrary to theorising within functionalist discussions mostly, Lihotzky's Frankfurt Kitchen project is considered here particular for evaluating architecture's anticipation with control, of which she applied an innovative method for design. The lesser known Food Dispenser project of Greene, on the other hand, was an embodiment of individual creation or an autonomous remark (declaration) in synthesising technology and architecture by taking discipline's boundaries as a motive force.

Although they represented different aspects of control (mechanisms) ideally and experientially in design, both projects were emancipative in reflecting the scientific guidance of control for the development of anticipative role of architecture.

THE IMPLICIT IMPASSE: MODERN ARCHITECTURE'S REFLEX OF ANTICIPATION

A crucial mission for architecture, the responsibility of designation of future events in spaces for people, namely the anticipation of architects, has been a paradoxical situation that identifies a problematic/troubled gap between design and experience of spaces. Architecture theorist Bernard Tschumi (1975) described this unavoidable paradox as an inherent debate, while he was significantly distinguishing "ideal space", which is the space of reason, and "real space", which is the space of experience, in his enlightening article *Architectural Paradox*. The void in modern architecture between ideal space and real space, that paradox in Tschumi's terms, was a comprehensive problem for architecture mainly about the reflex of anticipation.

Establishing strong links rooted back in late 18th century, modern architecture's efforts determined architecture's "ideal space" to be conditioned with modern science, whose construing methods and guidance could be indicated in the chore of emerging approaches in design explicitly at the beginning of 20th century (1).

For the design of ideal spaces, modern architecture borrowed scientific methods admirably for a systematic way of making accurate conclusions.

1. The origins of modern science is regarded as lying in the rapid scientific development that occurred in Europe between the years 1500 and 1750, which is now referred to as scientific revolution. (Okasha, 2002, 2).

(Chalmers,1976, 41) Becoming a new knowledge source, scientific way of thinking as one of the motive forces, propelled modern architecture towards an experimental approach that consisted of; observation, measurements, application of quantitative hypothesis, justification, interpretation, objectivism, analytical thinking, reasoning, synthesis, abstraction by de-materialising the objects, and strong links with science and technology.

Similar to scientific knowledge, architectural knowledge started to derive from the theories that were logically borne out as the proven consequences of the relations between facts (Chalmers, 1976, 41). The facts architects were dealing then became constructed with logical reasoning. Problems associated with design and the meaning of spaces could evoke the invention of new hypotheses for creating accurate spatial alternatives.

Learning from this epistemology’s systematic form of knowledge, modern architecture provided an opportunity to create a system of standards. Standards became a disciplinary matrix, or the constellation of shared commitments, or the consensus on exemplary instances, in Kuhnian terms (Kuhn, 1970, 182). Scientific methods informed the material qualities of modern architecture and gave way to their modular use in the form of standardisation. This also evolved towards the systematisation of materials in relation to their uses in design. A two-sided systematisation can be exemplified during this process; in built industry and in architectural education.

Firstly, conceived in the mid-1930s as a compilation of reference articles, Time-Saver Standards features first appeared in *American Architect*, which subsequently merged with and continued the series in *Architectural Record*. The first hardbound edition of Time-Saver Standards was published in 1946, with the purpose then stated as [to assist in] “the greatest possible efficiency in drafting, design and specification writing” (Watson et al., 1999, 1).

Secondly, a standardization of objective truths for architecture; and its conventionalised limits started to be taught in architectural education. La Sarraz Declaration of CIAM suggested the exploration of a body of fundamental truths to establish the basis for a domestic science; formed by the general economy of the dwelling, the principles of property and its moral significance, the effects of sunlight, the ill effects of darkness, essential hygiene, rationalization of household economics, the use of mechanical devices in domestic life ; and carrying out these in architecture schools through educational work. For instance, the preliminary course for year one at Bauhaus outlined by Moholy-Nagy suggested an objectively controlled experimentation to permit the self-experience of students, saying that: “design ends up being the result of a dynamic relationship between art and science, revealed and materialized through technology” (2) (Moholy-Nagy, 1932). He described his strategy that followed scientific methods as three successive stages: “1) observation, perception, and description, 2) systematic exploration and analysis; and 3) conscious manipulation and action, leading to the eventual mastery of design” (Moholy-Nagy, 1932). Such an approach was suggesting a circular relationship between ideal space (theory) and real space (experiment), whose conditions were determined by experience of spaces and not merely by the theories.

2. Moholy-Nagy was the director of the preliminary course and head of the metal workshop of Bauhaus in Weimar from 1923 to 1925.

A deliberate perspective of modern science was given in the description of “The Kuhn Cycle” in 1962 that included three stages; “pre-science”, “normal science” and “revolutionary science”; and Thomas Kuhn’s paradigm theory can shed light on the control mechanism of design between ideal space and real space; where, initial ideas defined new design problems; the design process developed from an experimental work that eliminated inconsistent solutions as mistakes; and ideal space as a paradigm shift that emerged in a whole new way of seeing the problem when outcomes in real space were difficult to explain for anticipation. (Kuhn, 1970)

What has changed in architect’s mind with the development of scientific thinking was analytical thinking in design process that has evolved. Design process became reason-based and pushed back other criteria and concerns. Each element of design process evolved around reasoning. These innovations in industry enabled design in Frankfurt Kitchen project to precisely control all stages of construction and user’s daily needs. The aim was saving in time and motion, and reduction of waste of energy. The similar analytical thinking was developed parallel to technology in Food Dispenser project that reflected a design ideal ahead of its time.

IMPACT OF CONTROL ON THE DEVELOPMENT OF MATERIAL QUALITIES AND IMMATERIAL QUALITIES

Architectural reading of this control mechanism is investigated here through the material and immaterial qualities of Frankfurt Kitchen and Food Dispenser projects. They are two different appearances of control issue in design emerged under modern architecture’s consideration of scientific approach. Control came along with immateriality as architect’s ambition to create spaces for individual of the new age was an important social role that modern architecture gained. Immaterial aspect of architecture had to be the driving force of this agreement based on control. For instance, the glass façade provided an immaterial quality of unity among nature and interior spaces while indicating a certain understanding of aesthetics with many varieties in design, as well as it had a material meaning in production with different standards.

This paper designates the elements of control of design in Frankfurt Kitchen and Food Dispenser projects with different prosperities, which represented two different approaches ideally and methodologically in how scientific way of thinking informed material and immaterial qualities of architecture. The terminology that would help to read both projects in terms of immaterial qualities are abstraction of movement-diagram/machine-plug collage, and human-labour/machine-labour; and in terms of material qualities are modular/machine and fitted cabinet/fitted plug. The exploration of these qualities aims to discuss how much they contributed, challenged and transcended the control issue in architecture, which is considered to establish a flexible area about the paradox between ideal space and real space.

Immaterial Qualities

Abstraction: “Movement-Diagram” Becoming “Machine-Plug Collage”

Frankfurt Kitchen was an assertive representative of Modern Architecture’s systematisation of definitions about the immaterial qualities of spaces in design, which can be collected under the terminology of abstraction,

3. The application of the assigned parts to the pulled down piece and bringing of the additional parts to the assemblers reduced the amount of time spent. The assembly line significantly decreased assembly time and increased profit margin.

diagram, collage, and pattern. Lihotzky's analysis of the kitchen's materialised reality in order to synthesise the crystallisation of human activities into constituent movements took its essence from a science-oriented approach under the influence of an objective point of view.

For the kitchen space, each movement was justified with experiments and related with each other based on these observations. The movements were defined and abstracted in a systematic way for design; yet, it was considered that architect was given a choice to put them together in a freeway. Similar to Le Corbusier's free-plan and free-façade arguments, which allowed architects to organise free movements in space and liberated them from limitations, the discussions about movement diagrams at that time became an enthusiastic field for architects to explore.

Railway and ship dining kitchens, which were industrially created but not categorised as architectural spaces, were inspirational sources for Lihotzky with their efficiency that represented a minimised expression of functionality. Besides, the developments in the work processes of industry were enlightening. Architectural sources point out that, Lihotzky had especially two approved models in front of her, Taylor's systematisation and Ford's assembly-line techniques, as design methodologies of Modern Architecture were referring to new approaches in industrial production (Teige, 2002) (Figure 1). By interpreting Taylor's industrial engineering method of consequential functioning of repetitive tasks for the optimization of employee productivity standards, Lihotzky considered the decomposition of the complex kitchen task into small, simple steps; evaluated the careful observation of the sequence of movements taken by women in performing those steps in order to eliminate wasteful motion; and expounded the measuring of precise time taken for each correct movement. The implementation of installation of gravity slides that facilitated the movement of parts from one work area to the next in production was Henry Ford's most important innovation. The key point of the manufacturing process, which could be broken down into 84 steps, was having interchangeable parts (3). Translating from Ford's method, Lihotzky thought that in kitchen's design, comfortability could be established by organising and designing a machine and its parts. The ensemble of the fitted parts was organized to maximize the basic requirements for living (Teige, 2002, 218-9). Similar to factory or office work, greater production was thought as the result of a reduced time of work.

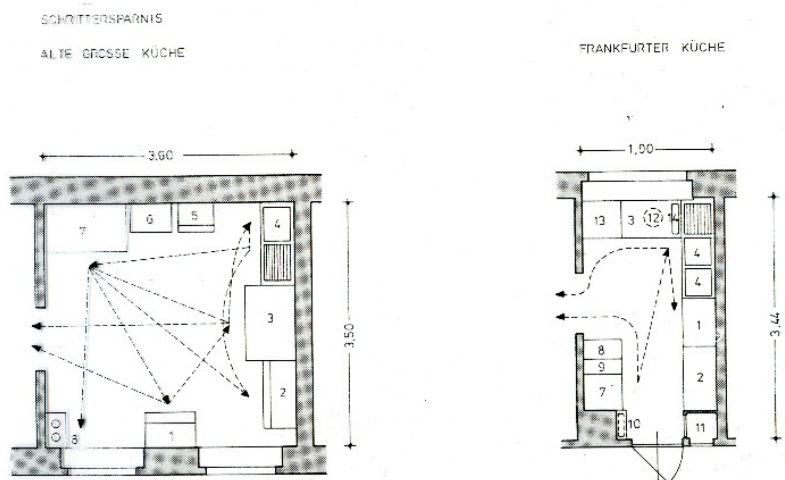


Figure 1. "Frankfurter Küche" - Wegstudien, Schrittersparnis, 1927 Blattmaß (H x B): 20,7 x 29,7 cm, Inv. Nr. 50/43
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The innovations of Taylorism and Fordism were not only changing the production style, but they were also a demonstration of a future reconstruction for the new lifestyles of society. Scientific way of thinking that residually had an adherent relation with technology entered into field of architectural design, as construction technology and material industry were developing towards the reconciled social project of creating new definition of individual in the society. In Manfredo Tafuri's descriptions, the milieus of that individual were the experimental sites of Praunheim or Riedhof-West or the installations of RömerStädt (in which standardisation of the minimum elements of the cell were succeeded) that indicated a future for "the hygienic man in the total introjection of Taylorism" (Tafuri, 1980).

The activities in kitchen included everyday rituals as well as varieties. Possible activities and work in kitchen were broken into many steps that determined the limits of this space. Lihotzky obtained time-motion diagrams, which also intended to show the savings in time and work that depended on each step. These time-motion diagrams enabled Lihotzky to position the industrial-style metal sink, the fitted glass-fronted cabinets and the gas range, in optimal relation to each other and suitable for the order of tasks that the preparation of meals and the following clean up required. The old, traditional kitchen required 90 metres of movements made during a day. Compared with that, in the new fitted kitchen, of which the fixed units and equipment have been designed to be an integral part, the same movements were limited to just eight metres.

In this sense, anticipation for modern architecture meant the creation of a fiction for a particular space and can be translated as designing according to its uses and functions. In Frankfurt Kitchen, the spatial consequences of design solutions were anticipated in accordance with a scientific consideration, which were based on spatial analysis that depended upon time and movement diagrams, and that was thought out in detail in respect to the hypothesis put in advance.

Crystallisation of task implied the control of crystallised activities of kitchen tasks. Thus, the overall control of design was constructed with the organisation of these pieces. The abstraction obtained through the diagrams of movements intended to enable anticipation depending on the control of crystallised tasks. A minimal yet deeper abstract space could be constructed on a complex exploration of gifted activities, as modern architecture aimed to control them through crystallisation. The accomplishment of the anticipation realm in science brought modern architecture to a level of control over human mind and design as its product.

In David Greene's Food Dispenser, design methodology was not based on diagrams but depended on collages of plugged elements, whose assembly comprised an alternative design in the form of a machine. The verb "dispense" referred to a production process, which included an ability to divide and share out within the framework of a plan. Thus, the tasks in kitchen were combined in this compact machine whose different parts allowed the transfer of one task to another (**Figure 2**).

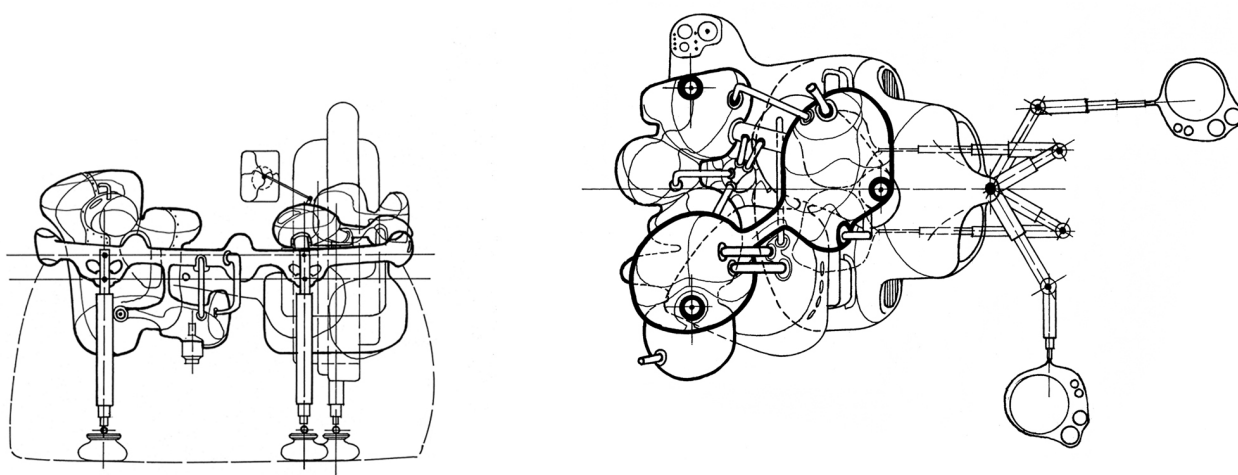
Archigram group's efforts, towards the creative invention of early designs of hybrid machines attached to human body or existing buildings, punctuated an enthusiasm about machines as their power could take over human responsibility. They foresaw the unseen potential of electronic systems as having "greater power control than the obvious, symbolic and

almost humanoid presence of a machine”, which reveal their awareness of the technology with rigorous smartness (Cook, et. al., 1972). Certainly, the earlier developments in machine technology enabled the challenging assembled parts of Food Dispenser. In 1679, French physicist D. Papin invented the pressure cooker, which produced a hot steam that cooked food more quickly while preserving nutrients. J. Mason patented the screw neck bottle in 1858. The waffle iron was invented by C. Swarthout in 1869. The first patent for an electric food mixer was issued in 1885 to R. M. Eastman. In 1907, S. Paper introduced the first paper towels. Developments in electricity advanced the technology of labour-saving kitchen devices. Electric refrigeration unit was invented in 1914. The electric kettle was invented in 1922 by A. L. Large. In 1922, S. Poplawski invented the blender. World’s first kitchen garbage disposer was built by architect J. W. Hammes in 1927. Mixmaster was invented by I. Jepson in 1928. In 1929, Europe’s first electric dishwasher was ready for production after permanent plumbing was introduced in 1920s. Green plastic garbage bag made from polyethylene was invented by H. Wasylyk in 1950. The microwave oven was invented by P. L. Spencer in 1967.

For Archigram, new technological developments of its time had to be adapted to design, in order to bring up a fruitful environment to discipline by opening up its vocabulary and nurturing from other fields. Food Dispenser was one of these innovations, which could replace the definition of kitchen for architecture, although it remained outside the production process as an experimental project. The collage of machines for creating a kitchen space placed architect, user and space as counterparts with time, activity and technology. The limitations of the assembled parts in a machine-collage required a research of a more elaborate flexibility among different kitchen tasks.

It can be said that the aim of crystallising the task in Frankfurt Kitchen turned into the endeavour of combining the task in Food Dispenser project. Machine-plug collage was contrary to Frankfurt Kitchen in its objective of combining the tasks. The control, then, borrowed by the kitchen machine, whose body consisted of parts working with the logic of a functionalist approach. As each part was precise, there were not any liberal movement of parts, unless set/ instructed.

Figure 2. Living Pod, Non-static Food Machine section and plan. David Greene, © Archigram 1966. Archigram Archives, Dennis Crompton, Shelly Power © Universität für angewandte Kunst Wien, Kunstsammlung und Archiv © University of Applied Arts Vienna, Collection and Archive, Luzie Lahtinen-Stransky



HUMAN-LABOUR TURNING INTO MACHINE-LABOUR

Museum Derdinge, which holds permanent collection of Frankfurt Kitchen project, admits that the idea of standardisation was not limited to a link with production and industry, but also had an ideological aspect, which supported a uniform design of everyday objects in order to establish equality among classes. Such a statement inevitably balances a reciprocal relation of standard production and its design approach as two interconnected conditions. Frankfurt Kitchen project considered the kitchen work as human-labour and organised the space accordingly. The design had a social impact of reducing the time spent in house work.

The use of machines instead of human labour actually goes back to 12th century in history. In April 1974 issue of New Scientist journal, Norman Smith introduced "The Book of Knowledge of Ingenious Mechanical Devices by Ibn al Razzaz Al Jazari" by Donald R. Hill, in which the work of al-Jazari was described as "al-Jazari compiled detailed descriptions of the construction and operation of a variety of mechanisms, machines and devices, which he divides into six categories; briefly they are clocks, drinking vessels, pitchers and basins, fountains and flutes, water-raising machines and miscellaneous" (Smith, 1974). Ibn al-Razzaz al-Jazari (1136-1206) was a scholar, inventor, mechanical engineer, craftsman, artist, mathematician and astronomer, who was best known for writing the *Kitab fi Ma'rifat al-Hiyal al-Handasiyya* (Book of Knowledge of Ingenious Mechanical Devices) in 1206, where he described fifty mechanical devices along with instructions on how to construct them. He constructed large and small machines with his own hands (Hill, 1984, 10). Those efforts remained as individual remarks, however, technology in 19th century enabled people to consider using machines and this encouraged some architects to imagine literal inclusion of machines in spaces as a functional element of design.

Food Dispenser, in contrast to Frankfurt Kitchen was suggesting the work done by machines and design was following that concern. What has been replaced with the term kitchen was a "non-static food dispenser with self-cook modifications", as defined by David Greene (Cook, et. al., 1972). He described the house as a form of permanent static container and defended the idea that with the impact of the second machine age the need for a house would disappear as part of man's psychological make-up. Greene opposed to Le Corbusier's motto "a house is a machine to live in" by saying that "the house is an appliance for carrying with you, the city is a machine for plugging into" (Cook, et. al., 1972). The consequence of such an attempt was rejecting permanence and security in a house brief and including curiosity which could come along a mobility provided to house (Cook et al., 1972). Although it was labelled as pod, and could be a plug-in structure, Greene was negotiating (appraising) on the idea of it being still a house, by raising the point that an individual's mobility in regard to technology should have been taken into account as an assumption. The moveable machinery parts were "the outcome of rejecting permanence and security in a house brief and adding instead curiosity and search", as Greene put it (Cook, et. al., 1972). The common aspect of this listed gadgetry pointed out problem solving features. The Food Dispenser was a remodelling of living, eating and digestive system in the form of a machine.

The aim in Frankfurt Kitchen was controlling human labour, in terms of minimising efforts and time spent in this space. The control over human labour was succeeded by design. Machine labour enabled the control of space over humans, again by design. A control over human labour was a

first step towards the industrialised, rationalised new era and its subject as human-beings. Referring to Reyner Banham's remark as the "Second Machine Age"; the second step for this challenge was integration of machines to human lives and architectural spaces (Banham, 1960).

Material Qualities

Modular As a Control Element in Frankfurt Kitchen and Food Dispenser

The first use of the term modular in architecture was in early 1920s. The module, which forms the modular is a fragment, and has intrinsic properties with a minimum constant ratio (parameter or coefficient) to compose the specific setting by lining next to each other. The dimensions of modules are derived from multiples of this constant ratio. The separate modules have the ability to dismantle from the modular system when necessary and join together to form the modular again, so as individual bodies, they are demountable and interchangeable. If the constant ratio is regarded as control element in modular scheme, then the choices of predefined situations designed by the architect can be elaborated as independent factors and theoretical agents to rethink how architecture can anticipate with different methods in design of projects.

Taken together with changing social conditions that were urging for developments in design with regard to technology, the two different versions of modular situations reflecting their own time's conditions in Frankfurt Kitchen and Food Dispenser projects can be said to possess scientifically grounded experimental understanding. Considering the modular as a situation designed for adapting itself to different conditions with the determinable organisation of fragments, is more fruitful than elaborating it as a system that depended on merely the mathematical ratios. These projects built the idea of modular upon creating situations with fictions, which were imagined to be adaptive enough for further developments. Behind this imagination was the confidence architecture gained from scientifically developed knowledge as a prior source. The modular approach in these projects included an experimental process rather than an end-product of a system formed by predefined fragments, yet their founding components (including proportion, standard and ratio between the standardised elements) can be elaborated as synchronously and creatively well-thought for responding to future necessities with their valid use.

In these experiments, for Frankfurt Kitchen, the control element in the abstract scheme of modular understanding was constant ratio of the modules, whereas for Food Dispenser, it was the constant structure of the machine for modules to be plugged in. Nature of time-movement diagrams, mounting of modules, materials and architecture's fictions about function of the kitchen can be described as the changing variables; due to their relation with technology, social conditions urging for novelties and architecture's own objectives.

Although the principle of modular design was the abstract foundation that both projects raised upon, their constant elements were different; one was linear, the other was three-dimensional. In Frankfurt Kitchen project, the modular situations pointed out to a planar quality, where the component modules were dependent upon the whole and had limited integrity abilities. In Food Dispenser Project, the modular system had three-dimensional quality, where the component modules could have individual features and act as individual bodies. One was manufactured for hand-craft

assembly; whereas the other was manufactured as automated production and assembly.

Different human needs, technology, materials, changes about the type of food to be prepared in kitchen (as ready-made food was available) were the factors that caused the varieties in their design methods. For Frankfurt Kitchen, the term modular pointed out a situation for which the constant ratio of standardised elements that were forming different configurations were controlled elements in the design experiment of Lihotsky. Time and movement were variables. Alternative uses were about the fiction of adaptability of each situation. The same understanding was also valid for manufacturing processes, as different parts could be integrated into production process as separate elements. Therefore, modular had the potential of creative alternative uses as variables of the same standard modules. The era's intensive concern for functionality echoed itself in how this kitchen's modular elements could be dimensioned. The standards of material qualities were the rational properties (including dimensions) of any element ranging from walls to floor strips. All these standardized elements were forming the whole of the kitchen. The control element of modular in Food Dispenser was the constant framework of the machine for modules to be plugged in. The fiction of adaptability was due to conditions of changes.

Each part of Frankfurt Kitchen was designed in standards to be available for mass production and the whole kitchen to be produced in a factory with new technologies for reduced costs. The construction firm was Philipp Holzmann A.G. of Frankfurt. The kitchen's industrial production was liable to strict budgetary restrictions as the local government limited the cost of each kitchen to one-and-a-half times an average worker's monthly salary, an amount amortized through rental fees. The cost of this first modular kitchen was added to the apartment's rent. This additional monthly cost of one Reichsmark was so low a worker could earn it in an hour. A social consciousness of equality in each element of design was seeking possible design solutions as new discoveries. For instance, due to architecture's changing relation with technology, structure became technology's crucial partner and technology-oriented and construction became market-oriented. Material parts of design became more linked with socio-economic conditions.

Fitted Cabinet in Frankfurt Kitchen Becoming Fitted Plug in Food Dispenser

Lihotzky applied an innovative method for design of the kitchen which in turn created a built-in and fitted kitchen. She was inspired by the developments in industry and its work processes, especially railway and ship dining kitchens, whose efficiency represented functionality for her.

Reflections of this method on fitted parts of design and development of a standardized modular system made it possible to reduce the required floor area. There was a work surface under the window, of which one could operate the kitchen from a swivel stool. On the right side of the work surface, the counter with a sink and hanging cupboards were placed. A slatted wooden dish-drying rack was set into a shelf over the sink, which let water drip directly down the drain. The faucet could be utilized with one hand. Products such as the dish drainer and cutting board could fit over the sink.

Among Lihotzky's design of labour saving devices were aluminium containers that were produced at Firma Gebr Haarer, Frankfurt am Main. The built-in grid of eighteen drawer-like aluminium containers was used for sugar, flour, rice, and other dry foodstuffs (The Museum of Modern Art Collection). Each of them was clearly labelled, the removable compartment had a handle and spout that allowed it to be lifted out and the contents could be poured. The staples were stored in modular glass bins. A hinged upright ironing board pivoted horizontally next to the window to take advantage of daylight. Electric-Coal Combination Stove, one of the functional improvements, had 3 electric plates and one oven, coal drawer with warming drawer and plate above. The kitchen didn't include a refrigerator, which was a luxury at that time, because people had daily shopping habits and in summer it was rarely hot in that region (Knaack et al. 2012, 20). Three decades after the fitted cabinet, for the first time in architecture, the term plug was initiated by Archigram Group as a flexible design instrument that enabled de-mountable elements in 1960s. In accordance with discussions in Archigram 2 and 3 about “expendable buildings”, Archigram started to consider the whole urban environment to be programmed and structured for change, which evoked the “Plug-in City” project in 1964 (Cook, et. al., 1972). Namely, plug meant that “each part would be exchangeable” and they were units that were planned for obsolescence and which could be placed into a network in order to cater for all needs. Archigram Group developed a project in 1967 for the Paris Biennale des Jeunesses that was “a tuneable system allowing individual control of mechanised environments” (Cook, et. al., 1972). They described it as “Control or Choice”, which was actually the embodiment of their idea of “metamorphosis” in design. Their description of control was as such:

“The determination of your environment need no longer be left in the hands of the designer of the building: it can be turned over to you yourself. You turn the switches and choose the conditions to sustain you at that point in time. The ‘building’ is reduced to the role of carcass – or less.” (The Archigram Archival Project, 1967b).

Living-Pod was a capsule (Greene's description) that could be hung within a plug-in urban structure or could sit in the open landscape, but he was still emphasising its use as a house. For Greene, rejecting permanence and security in a house brief would add curiosity and search, which could result in the possibility of increasing personal mobility (Cook et al., 1972).

The prototype of how the system of machine structures can be integrated into architectural design can be regarded as the “Living Pod” project by David Greene, which consisted of two components; the pod, a “sculpted shell” and the attached machines (4) (Crompton, 1998). The machinery component had various special device designs such as the food dispenser, legs, apertures, ramp, wash capsules, silos, climate unit, working unit, screens and mats. The four automatic self-levelling compression legs had maximum 5 feet of water or 40-degree slope that could adapt the building to any terrains. There were two transparent sectionalised sliding aperture seals with motors; and transparent entry seal with ramp and hydraulics. Two wash capsules with electrostatic disposal, air entry, and total automatic body cleaning equipment were replaced with bathroom. There were two rotating silos for disposable toilet and clothing objects. The vertical body hoist was replaced with lift and stairs. Climate machinery for temperate zone with connections to inflating sleep mats and warm section of inflating floor were used instead of radiators. Non-static work and teach

4. Dennis Crompton describes “Living Pod” project as: “A combination of two passions of Greene: the first towards the idea of the sculpted Shell”, his enthusiasm for Friedrich Kiesler's ‘Endless House’ which informed Greene's own ‘Mosque’ project as featured in Archigram 1 and the idea of burrowing explored by Greene in Archigram 2. The second towards the ironic as well as problem solving aspects of gadgetry. The pod is the natural fusion of them both. Yet it can also be regarded as the most sophisticated of the ‘capsules’ – there are a number of Greene suggestions for the stacking of the pods in a frame structure.

machine with instant transparent cocoon ring was designed instead of another space for working. The Food Dispenser that was part of the Living Pod project followed the same principles of design and same fitted plug method.

CONCLUSION

The above mentioned material and immaterial qualities reveal that design empowered its position over human activities as technology developed. The theoretical background took its essence from architecture's approach to science and its construction as a more systematic discipline. Afterwards, architecture's reflexes towards any internal developments were guided by this strong scientific thinking, which is still influential. The enlightenment period (in philosophy) is still guiding contemporary thinking after its emergence over 500 years. What architecture learned from the systematic elaboration of ideas and constructing design strategies from this thinking method is the ground that contemporary architecture is built upon including the developments in machine-aided and generated design researches and practices. Not any other thinking method has changed that strong leaning of architecture to science despite the questionings of many anti-grounding challenges, which enabled revisions and developments to overcome the primary paradigms about design's success towards the anticipation of human activities.

The discipline of architecture requires anticipation for self-confidence and science provided control as a methodology of thinking empowered by technology, as evaluating Frankfurt Kitchen and Food Dispenser reveals, although it should renew its anticipation by revising scientific methods and technology or questioning its guidance.

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Alındı: 10.07.2019; Son Metin: 09.11.2020

Anahtar Sözcükler: Modern Mimarlık, Frankfurt Mutfağı, Yiyecek Dağıtıcısı, kontrol, öngörme.

MİMARLIĞIN KONTROL İLE MÜCADELESİ: "FRANKFURT MUTFAĞI" VE "YİYECEK DAĞITICISI" PROJELERİ ÜZERİNE BİR TARTIŞMA

Bir ölçütler sistemi - yani bir disiplin matrisi - yaratma fırsatı, bilimsel düşüncenin bilgi kuramının bahsettiği şekilde Modern Mimarlığı sistematik bilgi oluşturmaya yönlendiren önemli bir odak noktasıydı. Bu yazıda bilim ve Modern Mimarlık arasındaki ilişki, kontrol konusu sorgulanarak değerlendirilmektedir. Kontrol teriminin temkinli, tereddütlü ve öngörülü olma özelliklerinden bahsetmeden Modern Mimarlığı anlamak yetersiz olacaktır. Bu nedenle, moderniteden bilimsel yöntemleri ödünç alma çabasının bir sonucu olarak "kontrol" teriminin örtülü anlamlarını tasarım metodolojilerine yüklemesinin mimarlığın öngörü refleksini yeniden şekillendirdiğini öne sürmek mümkündür. Bilimsel yöntemlerin kullanılması, bu terimin mimarlıkta öngörü kavramıyla ilgili bir deney olarak değerlendirilmesi açısından bir fark yarattı.

Bu makale, bilimsel düşünme şeklinin mimarlığın somut ve soyut özelliklerini nasıl biçimlendirdiği konusunda fikirsel ve metodolojik olarak iki farklı yaklaşımı temsil eden farklı başarılarla sahip Frankfurt Mutfağı ve Yiyecek Dağıtıcısı projelerinde tasarımında kontrol unsurlarını belirlemektedir. Margarete Schütte-Lihotzky'nin Frankfurt Mutfağı projesi tasarımında yenilikçi bir yöntem uygulaması ve mimarlıkta öngörü fikrini kontrol kavramı ile değerlendirmesi bakımından burada tartışılıyor. David Greene'in daha az bilinen Yiyecek Dağıtıcı projesi ise bireysel yaratıcılığın somutlaşmış bir halidir; ve teknoloji ve mimarlığı sentezlemesiyle mimarlığın sınırlarını itici bir güç olarak değerlendiren özgün bir yorumdur (ifadedir). Her iki projenin somut özelliklerini okumak için, modüler / makine ve hazır dolap / hazır eklenti terimleri; soyut özelliklerini okumak için ise hareket şeması / makine-eklenti kolajı soyutlaması ve insan emeği / makine emeği terimleri kullanılmıştır. Tasarımda fikirsel ve deneysel açılardan kontrol mekanizmalarının farklı yönlerini temsil

etmelerine rağmen, her iki tasarım da mimarlığın öngörülü olma rolünün geliştirilmesi için kontrol teriminin bilimsel rehberliğini yansıtmaları konusunda farklı ve yaratıcı projelerdir.

ARCHITECTURE'S STRUGGLE WITH CONTROL: A DISCUSSION ABOUT "FRANKFURT KITCHEN" AND "FOOD DISPENSER" PROJECTS

An opportunity to create a system of standards - namely, a disciplinary matrix - was a focal key point for Modern Architecture towards a systematic form of knowledge bestowed by the epistemology of scientific thinking. In this paper, the relation between science and Modern Architecture is evaluated by questioning the issue of control. It would be inadequate to understand Modern Architecture without mentioning the prudential, hazardous and predictive aspects of the term control. Thus, it wouldn't be assertive to claim that the term "control" recast architecture's reflex of anticipation, as the discipline's eager of borrowing scientific methods from modernity installed a veiled meaning of this term to design methodologies. Employment of scientific methods on that term marked a difference about the concept of anticipation in its elaboration as an experiment in architecture.

This paper designates the elements of control in design in Frankfurt Kitchen and Food Dispenser Projects with different prosperities, which represented two different approaches ideally and methodologically in how scientific way of thinking informed material and immaterial qualities of architecture. Margarete Schütte Lihotzky's "Frankfurt Kitchen" project is considered here particular for evaluating architecture's anticipation with control, of which she applied an innovative method for design. The lesser known Food Dispenser project of David Greene, on the other hand, was an embodiment of individual creation or an autonomous remark (declaration) in synthesising technology and architecture by taking discipline's boundaries as a motive force. For reading the material qualities of both projects, the contrary terminology of modular/machine and fitted cabinet/fitted plug are applied; while for reading the immaterial qualities, abstraction of movement-diagram/machine-plug collage and human-labour/machine-labour are used. Although they represented different aspects of control (mechanisms) ideally and experientially in design, both projects were emancipative in reflecting the scientific guidance of control for the development of anticipative role of architecture.

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