

The Role of Architecture and Ergonomics on Shaping the Domestic Kitchen

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Abstract. Acquiring of knowledge concerning problematic aspects of household chores, in particular complex kitchen chores, as well as dining culture can influence the possibility of shaping more optimal living conditions. It is a completion of ergonomic design of particular zones of home. The household living space can be divided into the leisure area (together with rooms and potential outdoor areas) and service area, with kitchen and bathroom. The needs connected with regaining strength needed for further work activities are fulfilled the leisure space, while the service area is designed to complement the functions of the leisure area. However strict appointing of areas for leisure, work and auxiliary activities is often impossible. It is caused, among others, by a necessity of performing such diverse activities as: cleaning works, taking care of children, preserving optimal microclimate conditions.

Concentration on those issues serves as an evaluation of the role of the kitchen in the housing structure, as well as in the daily lives of the householders. Modern housing and real estate market offer houses with diverse programmes and functional and spatial layouts. Nowadays, a kitchen area is planned in every house and flat. However, there are several variants provided: a separate kitchen, a kitchen area joined onto the living room or a small partial kitchen. Despite the functional programme of houses and kitchens, house chores have and still constitute a significant share of daily life of householders. Moreover they are necessary in order to fulfill basic existential needs as well as higher needs (e.g. social integration by activation of members of household).

Keywords: Ergonomics · History of architecture · Housing · Domestic kitchen · Kitchen design

1 Introduction

The type of kitchen equipment depends on individual ways of preparing meals, in particular in relation to the food industry and food service offer. Formerly it was necessary to work singlehandedly in kitchen, especially in extended families and because of lack of processed food. Processing of food produce obtained directly from fields or slaughter (mainly household-based) prolonged the process of preparation and required involvement of several people. Moreover, the offer of food service was not diverse and it was not available for the majority of society. Nowadays many people abandon the idea of having “a traditional kitchen” with three meals a day, and they rely on dishes

prepared outside the household. This phenomenon escalates together with an increase in the number of one- and two-person households. What is more, the extension of time of gainful activity enforces a resignation from performing of some of traditional chores (e.g. preparation of preserves, complex meals, baking, etc.), despite owning a kitchen equipped with numerous technological tools and mechanical devices.

Kitchen equipment is a derivative of current technological progress. What prejudged of its use until the half of 20th was the way of kindling and maintaining fire. It is the hearth which determined the kitchen space of the house. What is more, high temperature did not serve only for heat treating of food produce, but also for heating of houses. Burdensomeness of kitchen chores was related not only to the possibility of obtaining and processing of food, but also to the conditions of clean water access, storing of products and waste disposal. Concentration of work in kitchen caused that it has always been equipped with numerous tools (e.g. cutlery and dishes). Throughout centuries they were very expensive and difficult to purchase. Many of them were used even by several consecutive generations. Only the popularization of industrial production ensured a higher supply and assortment of everyday use equipment. In turn the use of engines (first steam and later electrical) and their miniaturization enabled mechanization of various chores and replacement of the strength of human muscles with machines [8].

Mechanical and engine-driven devices enabled a reduction of physical effort devoted to, i.a. preparation of meals. What is more, permanent access to fully or partly processed food products frees from the necessity of making stock and initial processing of food. The abovementioned mechanization and industrial processing of food however did not result in considerable shortening of time spent on performing kitchen chores [4, 5]. Together with an increase in the standard of living (e.g. hygiene and diversification of menu), the number of possessions etc., a lot of activities accompanying the process of cooking has prolonged. Moreover, new chores and activities have arisen. Running of a modern household requires time-consuming planning. Making savings in household budgets enforces to take on additional activities connected with, e.g. shopping for cheaper goods in further away parts of the city.

The analysis of the role of kitchen in the structure of housing requires i.a. stating of basic human needs, such as: the need of providing of fullness (understood in both literal and metaphorical sense), as well as the need owning a house. Moreover, the paper elaborates on the role of work in human life, as well as the distinction between the gainful and household activities. It also focuses on the distinction of the specificity and complexity of kitchen, and indication of the role of architecture and ergonomics in shaping of the material environment of people. Architectural designing further creation of a sense of comfort and space necessary to fulfill various needs. "Classical ergonomics" used to concentrate on individuals in their work environment. However nowadays the scope of interest of modern ergonomics was broadened also by the household environment, which serves people, among others, to maintain an optimum psychophysical condition and the ability to perform gainful activity. The paper will presents several theses validating the choice of the selected topic, such as:

- kitchen chores are among the most complicated and time-consuming household activities;

- running of a kitchen is as complex economical (managing of the budget), organizational (the order of chores and managing of the resources), culture-forming (maintaining of traditions and relations), as well as preventive (managing of diets and psycho-physical condition of householders) activity;
- household chores are usually performed at the expense of so-called “free time” which theoretically should be devoted to relaxation;
- preparing of meals can mapping a particular lifestyle and culinary tastes.

2 The Role of Fire in Households and Lives of People

Possession of fire or heat of the oven supports running of a household chores and importance of availability of food resources and rules concerning in formulating of work conditions, as well as the kitchen space itself.

Throughout centuries, the central place outlining the living, and especially kitchen, space was the hearth. Fire was necessary for heating of rooms and for heat treating of food products into easily assimilated and warming meals. Together with gasification and electrification the form of the heating medium has changed. Traditional flame was replaced by invisible thermal radiation transferred directly into the dishes. As a result the integrating role of fire ceased to exist. Directed heat is available instantly, without having to perform previous laborious activities, such as: kindling of fire, providing of firewood or cleaning of fireplace.

3 The Role of Organization and Rationalization of Work in Forming of Households and Comfort of Home Life

Technological development was accompanied with gradual rationalization and organization of work. Even in ancient times the issues concerning functioning of households were intuitively and scientifically considered. As the annual cycle of chores (also kitchen-related) enabled people to systematize certain regularities and recurrences of some activities. Specific rules were passed on to following generations by participation in everyday chores. Possible changes and improvements aimed at a reduction of effort or expenditure of supplies. The abovementioned issues also received attention from researchers of various aspects of human life. The most famous authors were inter alia Xenophon, Aristoteles, Leon Battista Alberti, Catherine Beecher, Christine Frederick, Bruno Taut, Margarete Schütte-Lihotzky. Their observations and results were presented in numerous tracts and textbooks. A number of particularly old publications nowadays have only a cognitive value, however, all of them confirm the importance of household chores in everyday life, as well as in shaping of household forms and organizing of households.

4 The Role of Kitchen Chores and Dietary Habits in People's Lives

The work conditions in kitchen are not only a derivative of the development of civilization, but also development of culture, culinary tastes, tradition and dietary possibilities. Obtaining and processing of food produce, preparing and consuming of meals required a proper organization of household, and often engaging of work of even several people. Shared meals might be an opportunity to develop closer relations between the members of family and close friends. Serving varied meals and the culture of their consumption influence the character of chores connected with food preparation and cleaning up, and, as the result, the functional and spatial layouts of kitchens and whole households.

5 The Changes in Kitchen Layouts and Equipment Against the Changes in Housing Development

The analysis of the evolution of the household environment shows the placement and role of kitchen space in the house structure. It influenced the shaping of the living conditions, performing of household chores and ways of meals preparation in the context of constantly changing construction conditions, social relations (mainly in the scope of functioning of single households), and even everyday life. The previous diversity in wealth influenced not only the forms and decor of houses, but also the organization of household chores and ways of preparation of meals.

The "artisanal" character of production throughout centuries resulted in individual character of constructed buildings. Spatial functioning of houses was also influenced by numerous gainful activities. Kitchen with the source of heat (hearth), in particular, concentrated the majority of everyday chores. Multifunctional rooms were also places of fulfillment of other needs, such as: sleeping, studying and hygienic and sanitary activities. Functioning of bigger households and having bigger families in former centuries required hiring service. It was not until the industrialization of production, in 19th century, when the work environment was gradually assigned. The range of household activities was therefore limited to performing cleaning and kitchen chores. The disappearance of gainful activities and share of service in performing of everyday chores considerably influenced the change of forms of houses and shaping of their contemporary models.

The modern types of housing and kitchen obtain from the early 20th century. In 1920's there was the concept of the "laboratory kitchen". It was introduced together with popularization of the Frankfurt model. This probably was the time of the most intensive interest in the issues concerning housework and striving for achievement of a high hygienic and functional standard in houses. It was believed back then that systematizing and shortening of the kitchen work zone closed in a small room was the key to limit everyday laborious effort and "free" the householders from house chores [12]. However, latter savings resulted in discreditation of the laboratory standard, as often the kitchens were too small and dark and were designed for only one person to work in.

Placement of basic equipment and the countertop made it impossible to set apart even small dining areas, which hindered the possibility of integration of household members.

Houses “without servants” with monofunctional rooms (and kitchens) were popularized during the interwar period, thanks to various social trends and “modernism” in architecture. This type of housing became popular after the II World War as a result of, among others, the development of industrial technology in housing and class-less societies. This period distinguishes itself by significant culture and civilization progress, reflected also in new forms of housing. Nowadays is possible to choose the type and size of house and mono- and multi-functional character of the kitchen, which depended not only on individual needs, but even more so on specific situation on the real estate market.

Modern house kitchens are places of merging of contrary behaviours of their users. On one hand householders use there numerous improvements, technological novelties and kitchens are places where “modern” lifestyle is popularized, on the other hand, kitchens are also places where old recipes are reused and former well-known cooking and baking techniques applied. Kitchens are also places of family bonding and maintaining traditions. Therefore kitchens are spaces where old tradition and new trends meet. Moreover using of advanced gastronomic techniques strengthens their specialist character, as modern kitchens are often referred to as “house laboratories” [1].

Nevertheless regarding technical and cultural issues of modern kitchens one may notice certain dissonance. Together with increasingly better equipment of work areas with various devices, often a decrease in the cooking abilities of users can be noticed [6]. Those lower predispositions towards kitchen chores result mainly from lack of time and willingness to continue former culinary traditions, as well as the availability of highly processed food and a growing demand for ready-made dishes and increasing number of households with only one or two householders. As single people often find preparing three courses a day as irrational for economic reasons (e.g. time, usage of energy and water).

The course of the kitchen work can be divided into four, the most important functional zones: thermal heat treating, food storage, water supply and doing the washing-up and waste and sewage disposal. Spatial distinguishing of specialist zones used for performing certain activities results from the complexity of the whole course of action and process of meal preparation. Rationalization and shortening of time spent on performing chores required a selection of proper and modern equipment. Currently used technical conveniences previously often were not known. What is more, the prototypes of nowadays popular devices were often considerably difficult to operate in everyday use.

The most attention deserves the evolution of the heating medium, which throughout the centuries determined kitchen space and the scope of activities related to broadly understood heat treating of food. The evolution of heating device resulted mainly from a need to reduce exhausting heat during work, as well as use of fuel and increase the efficiency of heating of prepared meals. Initially fire was lit on bare ground. With time hearths were placed on elevated podiums. However, preparation of meals with an open fire was time-consuming and not effective, and the work itself was exhausting. A significant convenience was the use of manufactured coal ovens with a closed hearths. Nevertheless they were not popularized until 19th century. Since the turn of 19th and 20th

century, gas and electric cookers have gained considerable popularity. Finally they replaced coal ovens and are still widely used. Modern kitchens are places where more devices used for heat treatment of food can be found, among them we can distinguish: microwave ovens, food steamers, coffee presses, barbecues, deep fryers. Currently produced devices are high quality both in case of usability and technology, what is more they are more energy saving [2, 10].

The quality of food depends on the conditions of maintaining and extending of use-by date of various food products, as well as the ways of their preservation and evolution of space and devices used for their storage. Formerly their storage required a big space, even having separate rooms (pantries, cellars). The most effective and popular means of storage was maintaining food in low temperatures. Initially the refrigeration technique was used in food industry and then in single households [2]. In contemporary kitchens refrigerators and freezers are commonly used, and they are often combined in one device.

The running of a household and meals preparation requires the use of water. In industrialized countries its abundance was ensured thanks to a well-developed water-works infrastructure. However, clean water used to be a commodity in short supply and was available only for the minority of population. As a result, the majority of population drank contaminated water. This condition was partly caused by everyday activities of people and penetration of human waste into water intakes. What is more, among people there was a lack of basic knowledge of bacteriological threats, which prevailed until the second half of 19th century [10]. It is only then, when more complex actions concerning the amelioration of bacteriological quality of water were undertaken.

Lack of direct water intakes in former houses impeded fulfillment of nutritional and hygienic needs, as well as cleaning activities performed in houses. The need of brining the water from outside resulted in an increase of time and burdensomeness of everyday chores. Currently water is available even in several places in houses (usually in kitchens and bathrooms). However its effortless and carefree consumption, not to mention its wasting, is no longer possible, as high payments and ecological awareness impose rationalization (saving) actions, aiming at limitation of its excessive use. Special water taps and modern devices using smaller amounts of water gain popularity and are installed in an increasing number of households.

Nowadays, together with meal preparation and other household chores there is a necessity of waste and sewage disposal. While former household managing did not generate big amounts of waste, as a lot of it was reused [11]. The development of hygienic and sanitary standards at the end of 20th century forced food manufacturers to pack even the smallest quantities of food. The most commonly used packaging is made of plastic. Current, broadly understood consumption is therefore related to a growing quantity of various, usually non-biodegradable, waste. Its disposal is usually troublesome for single households, especially in small flats and in municipal services. Therefore many countries decided to undertake complex actions aiming at limitation of waste in already congested landfills. Various initiatives also focus on households themselves. A proper recycling taking place already in the household kitchen is supposed to further separation of biodegradable organic waste and recycled materials, as well as reduction of the amount of waste.

Other waste created in the course of performing of chores requiring the use of water is sewage. Its disposal used to be particularly inconvenient and non-effective. Pouring them in front of the house only partially solved the problem. Dampness of the environment, bacteriological contamination and irritating foul odor were the causes of a low quality of life, frequent illnesses or even epidemics. An evident improvement of sanitary conditions took place only thanks to installation of sewage systems and draining sewage outside houses into combined sewerage networks or holding tanks [7, 11].

The abovementioned functional zones should be analyzed according to the ergonomics, load and burdensomeness or efficiency of work, as well as threats to both health and safety, hygiene, and even the influence on the environment. The latter issue has a particularly important meaning in current times. Modern societies show a better recognition and understanding of the influence of even the smallest households on the condition of the environment. It is also postulated that the “consumption” of certain raw materials and products, in particular water and energy should be reduced.

6 The Evolution of Kitchen Equipment and Furniture Forms

Since the appropriate furnishing decides on the level of work comfort in kitchens. Formerly the kitchen chores were performed by the members of lower-class. That is why the rooms where the work was done were less representative, particularly in wealthier houses. Therefore kitchen equipment (together with furnishings) was quite poor. The majority of dishes were left out, next to the hearth. Technical equipment was manufactured using craft production, that is why it was expensive and inaccessible [3]. Only thanks to the development of industrial production a bigger supply of furniture and household goods was provided. What is more, various mechanical devices became available at that time. However, the development of mechanization of household chores was possible only after the popularization of miniaturized electrical engines. Which became the basis for the development of new branches of production, manufacturing household goods.

The specificity of production required a certain degree of unification of products, and, in case of maintaining of the kitchen layout, also the size coordination. The introduction of modular typification of furniture and devices in the half of 20th century completely changed the look of kitchens, and the built-in equipment became popular. This also coincided with an increase of hygienic requirements [13]. Maintaining the continuity of furniture enabled keeping kitchen rooms cleaned easily. Those technical solutions come from the pre-war “laboratory” kitchen models. Despite an advanced standardization, it is possible to create all possible spatial, functional and aesthetical layouts in household kitchens. Modern furniture systems come in a rich offer of finishing materials and colours, while household goods are able to satisfy even the most refined culinary tastes and prepare all imaginable dishes. The functional quality of household equipment is comparable with professional gastronomic devices [10].

The supplements to the furniture systems provide a possibility of a more concentrated and ordered storage of tools, dishes and tableware, as well as food products. This is particularly important in case of houses and flats without such storage spaces as: pantries, cellars and utility rooms.

7 The Influence of Technical Progress on Time and Labour Input in House Kitchens

The changes in the housing development, functional layouts of flats, furnishings, tools and use of mechanical devices and machines may positively influence the organization and efficiency of housework, shortening of its time, lowering of burdensomeness and effort, as well as increase the sense of security. However, the aforementioned changes resulted neither in “freeing” of householders from the chores, nor in a considerable reduction of their number. The amount of time spent on meal preparation almost has not changed. However, many of former, laborious activities, which required substantial physical strength have been reduced or eliminated. On the other hand, the intensity of performing of other activities has increased, and new chores have occurred. The evolution of kitchen chores and accessibility of increasingly diverse food products result in disappearance of various devices, which used to be applied in the majority of households [9].

Technical conveniences are used in kitchens mainly in order to improve the work conditions and the quality and diversity of prepared meals. They play an important role in achieving satisfying conditions for running the whole household. Additionally, they influence planning and the course of household chores, social relations between householders, ways of guest entertaining, pro-ecological actions, as well as a subjective sense of comfort at home.

8 Summary

Presented analyses includes a synthetic glance at a short view of problematic aspects concerning shaping of household environment, especially the kitchen space in relation to everyday chores, eating culture, as well as fulfilling human lower and higher needs. However, the scope of the research paper was not limited only to the kitchen itself. The paper also takes into account the technical and social factors shaping houses and conditions of running of households in different times. The obtained results enabled me to examine everyday effort put in household kitchens and appreciate not only the culinary effects of work. Among the most crucial findings there are:

- technological and social changes led to undermining of the traditional order and division of roles in households, as well as to devaluation of the prestige of the role of a “housewife”;
- currently there is a trend of dividing household chores based on partnership and including all householders in running a household;

- more freedom and new situations taking place in households, unlike the organized activities in the work place, can incentivise more creative behaviour, further advance in civilization, as well as arising of new threats to health and accidents;
- kitchen chores are still the most complicated among all the household chores;
- in many households, householders prefer using processed foods and food services in order to shorten the time of kitchen chores (part of former food preparation activities was taken over by food industry);
- functional and spatial programme of kitchens is influenced by lifestyle of householders: types of prepared meals and ways of their consumption;
- the significance of kitchen in the household structure and lives of families used to be determined by the attitude towards work (household chores used to have a low social status);
- proper layout of technological process and usage of increasingly more technologically advanced equipment enables a reduction of physical effort and the most burdensome and unfulfilling tasks;
- replacing of human effort with machines is limited and does not ensure “freedom from household chores”;
- form of kitchen (open and separate kitchens, laboratory or multifunctional kitchens) is a result of the size and layout of houses or life style;
- proper choice of furniture and technical equipment may be assisted expertise from such fields as: architecture, interior design, industrial design, catering technology, household economy, etc.;
- care concerning functional and aesthetic qualities of kitchens furthers more positive attitude towards chores, increases motivation towards household activities and elevates the rank of kitchen both in house structure and everyday life of householders;
- there is a rise in awareness of the influence of households on the environment, which enforces, i.a. saving actions concerning the use of energy, water and reduction of wasted food products;
- running a household requires constant, laborious organization of work, division of responsibilities and performance of additional chores, unknown in the past;
- nature and burdensomeness of household, and especially kitchen, chores currently is a derivative of lifestyle, ergonomics awareness and technological progress.

The issue of shaping of housing environment, mainly the matter concerning work and relaxation, is rarely researched. There is a particular lack of cross-sectional research depicting course of historical change in broadly understood comfort of life in the household environment.

The paper can become a publication enabling acquiring cross-sectional knowledge concerning the conditions of shaping of housing architecture and interior design, with a particular focus on kitchen space, as well as used technical conveniences. It can also be used in practice. Analyses of functional and spatial layouts and technical solutions in kitchens supports the process of interior design and selection of equipment which can answer diverse and changing needs of their users. Acquiring the knowledge of technical progress and characteristic traits of devices provides awareness concerning validity of

using of certain conveniences. Such knowledge can contribute to functional programming of kitchens, as well as entire houses, according to traditional and current (modern) requirements and expectations.

Researches concerning culinary habits required looking at kitchen space from a broader perspective. The shaping of kitchens should be seen in relation to social and civilization changes. It may be useful to use various information, not only from the field of architecture and interior design, but also concerning social environment and economic and technological conditions, and such technical fields as: architecture, interior design and history of technology, as well as humanities: history of everyday life, material culture, family, customs and work rationalization. Wider scope of research may be used by specialists from fields other than architecture, such as: economists (especially house economy specialists), specialists of organization and management, health and safety advisors, mechanical engineers, technicians of catering quality and technology. It can be useful when analyzing the changes in running of households, especially in relation to technological determinants of human environment.

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