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**TECHNICAL DESIGN PROJECT
MODERNIZATION AS A BASIS FOR
IMPLEMENTING FOOD SAFETY ASSURANCE
SYSTEMS IN FOODSERVICE**

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Key words: technological project modernization, Good Manufacturing Practice (GMP),
Good Hygienic Practice (GHP).

Abstract

The objective of this study was to modernize a technical design for a student's canteen in the SGGW (Warsaw Agricultural University) Campus. Before the design was modernized, a questionnaire survey had been carried out among students to identify their expectations in relation to foodservice. The modernization took into consideration the technical conditions of the canteen building shown in the design, students' expectations and hygienic demands. The survey showed that the canteen should offer a wide assortment of food products, main meals as well as snacks (e.g. chips, salad) and hand snacks (e.g. bar, coffee). The survey revealed that food products offered in the canteen should be exposed in display cases to allow students to select meal components. The new functional layout was designed to prevent cross contamination between and during operations with foodstuffs, equipment, materials, water, air supply or personnel and external sources of contamination. In addition, guidelines to be followed in order to select the most appropriate equipment and to minimize the risk of food contamination were established.

**MODERNIZACJA PROJEKTU TECHNOLOGICZNEGO STOŁÓWKI STUDENCKIEJ
W ASPEKTCIE MOŻLIWOŚCI WDROŻENIA SYSTEMÓW ZAGWARANTOWANIA
BEZPIECZEŃSTWA ŻYWNOŚCI W GASTRONOMII**

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Słowa kluczowe: modernizacja projektu technologicznego, Dobra Praktyka Producyjna (GMP), Dobra Praktyka Higieniczna (GHP).

Streszczenie

Poddano modernizacji projekt technologiczny nowo budowanej stołówki studenckiej w kampusie SGGW. Zaproponowano poprawki w projekcie technologicznym, uwzględniając uwarunkowania techniczne projektu, wymogi GMP oraz wyniki badań ankietowych ujawniające oczekiwania studentów. Z badań ankietowych wynika, że w stołówce oprócz dań obiadowych powinno się oferować szeroki asortyment przekąsek, w tym również przekąsek na wynos. Posiłki powinny być wyeksponowane w witrynach. Opracowany układ funkcjonalny pomieszczeń wyeliminował możliwość skażeń żywności powstałych w wyniku krzyżowania brudnych operacji technologicznych z czystymi, co występowało w pierwotnym układzie funkcjonalnym. Ilość i rodzaj dobranego wyposażenia umożliwia produkcję różnorodnych dań. Szczegółowe wytyczne zawarte w projekcie, dotyczące jakości urządzeń, ich ustawienia oraz wykończenia wnętrz, dają podstawę do zapewnienia bezpieczeństwa produkcji żywności, a także wdrożenia systemu HACCP.

Introduction

In order to assure food safety, such systems as GMP, GHP and HACCP should be implemented. 5 of the 9 GMP/GHP principles refer directly to the design of food premises:

- appropriate location of the buildings and inside finish,
- proper functional layout of the rooms where food is prepared,
- process lines designed to prevent cross contamination between and during operations with foodstuffs, equipment, materials, water, air supply or personnel and external sources of contamination,
- use of equipment easy to wash and disinfect,
- adequate supply of hot and/or cold potable water, as well as of other media (e.g. steam).

Aim and scope of research

The objectives of this study were to:

- conduct a survey among students representing selected departments at the Warsaw Agricultural University, in order to recognize their expectations concerning university food services,
- analyze and modernize the technical design project of the canteen, with regard to students' needs, hygienic standards and food safety requirements.

Methods

The following methods were used in this study:

- questionnaire. The survey was carried out among students from the Faculty of Animal Sciences, the Faculty of Agricultural Economics and Faculty of Human Nutrition and Consumer Sciences (186 students). The survey concerned students' food preferences. Microsoft Excel and Statistica programs were used for data analysis,
- optimization of the layout and technological equipment made using mathematical calculations (taking into consideration production volume, storage time of raw materials, and machine performance),
- computer design and 3D visualization of the functional layout of the canteen with equipment, performed in AutoCAD.

Results

The survey showed that only 8% of students would like to introduce cash meal tickets in the student's canteen; the majority of students did not want the cash meal system in the student's canteen (71%). 21% had no opinion about it. The vast majority of students (71%) claimed that the offered meals should be displayed, so that they could see them before buying. 19% of the respondents said that menu was sufficient for them to select meal components. The students were asked what kind of food they purchased in foodservice facilities. According to the survey, the students consume equally frequently dinners (32.7 points of 100), snacks (30.6 points of 100) and hand snacks (36.8 points of 100). 90% of the students declared that they should have the possibility to compose their meals, and only 4% claimed that already composed meals should be available in the canteen.

73% of the students claimed that the traditional canteen's opening hours (from 12.00 to 17.00) are too short. The students proposed to extend the opening hours (from 12.00 to 20.00).

The results of the survey were used for modernizing the technical design of the canteen. According to the students' expectations, the canteen should offer a wide range of food items (dinners as well as snacks). Food products should be displayed in the serving line, to give consumers a chance to see products before buying and compose their own meals. It was decided that the canteen's opening hours would be fixed according to students' expectations. To introduce these proposals, the design for the canteen was revised. The storage area was expanded, and multifunctional equipment enabling the production and serving of a wide range of products was included in the design.

Analysis and modernization of the design for a canteen

A preliminary design for the functional layout of a food facility (Figure 1) contained many serious defects that could make food production potentially hazardous. In this design the location of the kitchen, expedition and

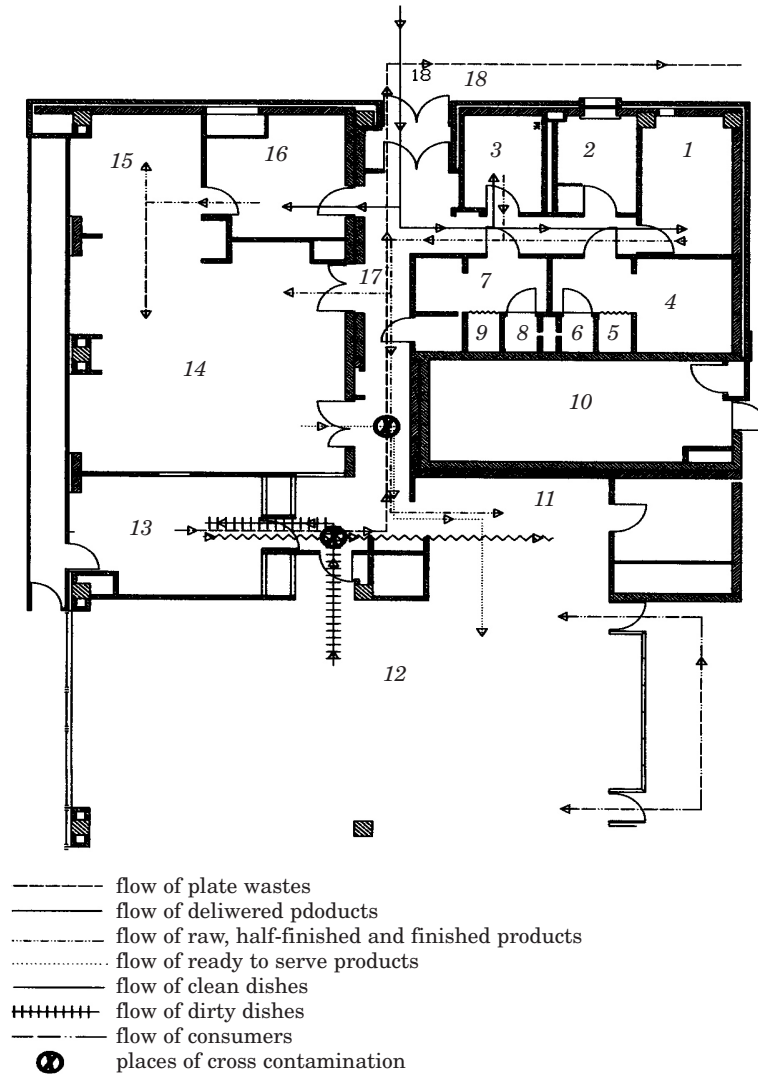


Fig. 1. Functional layout of the canteen before modernization. Rooms description:

1 – storage, 2 – employee dining room, 3 – storage, 4 – changing facility for women, 5 – shower for women, changing facility for men, 6 – WC for men, 7 – changing facility for men, 8 – WC for men, 9 – shower for men, 10 – staircase, 11 – serving area, 12 – kitchen, 13 – dishwashing room, 14 – kitchen, 15 – preparation rooms, 16 – cold storage rooms, 17 – traffic aisles, 18 – porch

dishwashing room made the proper flow impossible due to the cross contamination between clean and dirty technological operations. There was cross contamination between the flow of food wastes and ready-to-serve products, and between the flow of food wastes and clean dishes. In addition, the entry to the changing facilities for personnel led through the sanitary installation center. The original functional arrangement did not assure sufficient food storage area to separate assortment, and fruit and vegetables preparation rooms.

The design for canteen backup facilities was assessed and improved to prevent food contamination hazards. The modernized facility layout enables the implementation of food safety systems. The introduced changes (Figure 2) eliminated the risk of cross contaminations.

Students' expectations regarding the canteen (long opening hours, a wide range of offered products) made it necessary to expand the storage area and include display equipment in the design. In order to offer a wide range of meals, multifunctional equipment was used (e.g. a convection combo steamer-oven, capable of producing different dishes at the same time).

In accordance with GMP and Health Department requirements (Journal of Laws No. 104 item 1096), the storage rooms were modernized to provide space for:

- meat (walk-in refrigerator),
- clean fruit (walk-in refrigerator),
- walk-in freezer,
- dairy products (refrigerator),
- poultry (refrigerator),
- dirty fruit and vegetables (refrigerator in the preliminary preparation room for fruit and vegetables)
- eggs (refrigerator in the egg disinfection room).

The storage rooms were designed so as to enable proper work flow. Proper work flow was designed in the kitchen, serving and dishwashing areas. During the modernization process, the kitchen and expedition were connected, and a separate dishwashing area was designed. Dirty dishes can now be delivered to the dishwashing room using a trolley system. After washout they are transported to the sideboard connected to the serving area. Plate wastes are transported through a separate exit to the wastes store placed outside the building. In the revised design the layout of the changing facilities was also improved (the entry to the changing facilities leads directly from the corridor).

Properly designed and constructed technological equipment is also very important for hygiene assurance during food production. Equipment made of certified stainless steel was recommended in the project. It is smooth, without crevices with rounded edges.

The arrangement of the equipment is also very important to ensure production hygiene. It was suggested to install a block of heating equipment (convection combo steamer oven, grill, two hot-food tables, boiling top, fry-

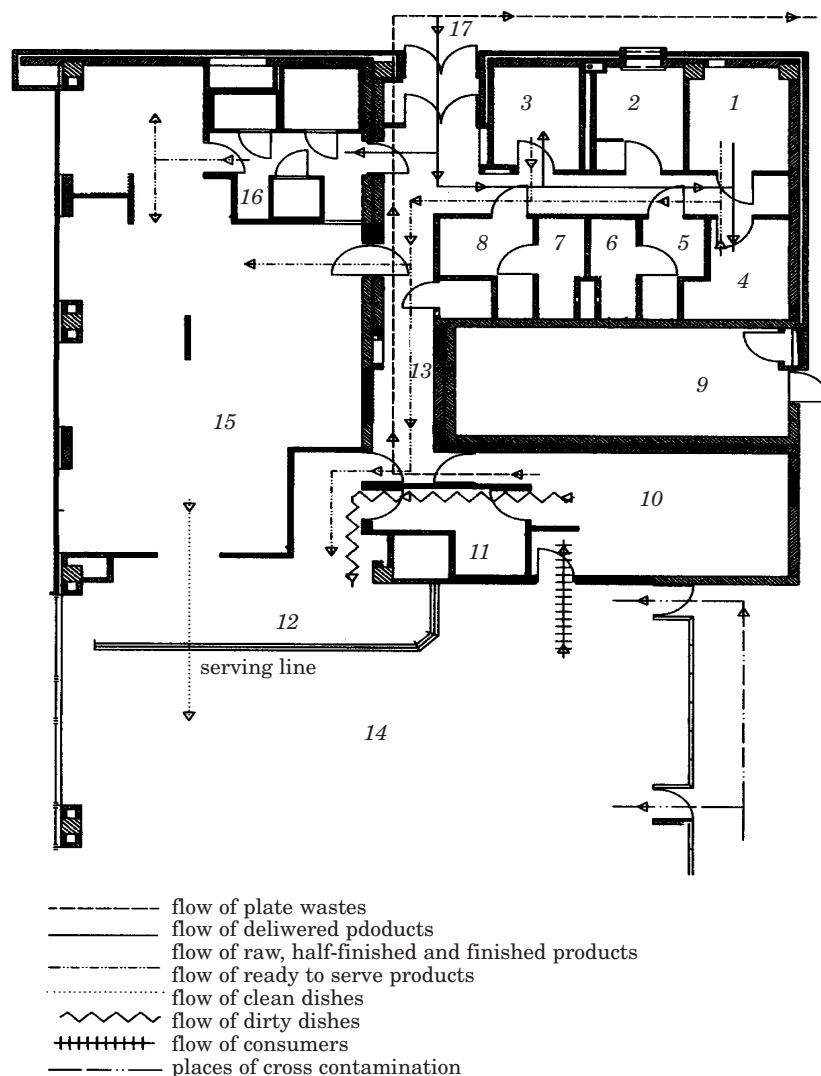


Fig. 2. Functional layout of the canteen after modernization Rooms description: 1 – dry storage room, 2 – employee dining room, 3 – fruit and vegetables preliminary preparation room, 4 – beverages storage, 5 – changing facility for men, 6 – WC for men, 7 – WC for women, 8 – changing facility for women, 9 – staircase, 10 – dishwashing room, 11 – storage, 12 – serving area, 13 – traffic aisles, 14 – dining area, 15 – kitchen, 16 – cold storage rooms with walk-in refrigerators, 17 – porch

er, pan, three steam kettles) with masking and protecting panels in the center of the kitchen (Figure 3).

This solution considerably improves production hygiene, because it protects against the possibility of dirt penetration into the crevices between devices.



Fig. 3. 3D visualization of a heating block in the modernized canteen

To assure production hygiene, appropriate inner finish of the canteen was determined in the design, and the guidelines for the ventilation and sewerage and water system were established.

Summary

Technical design project modernization assured proper work flow. All changes in the design were made with reference to hygienic demands and students' expectations.

Conclusions

1. The following students' expectations should be taken into consideration while designing or modernizing the backup facilities of the student's canteen:

- fee choice of food items,
- display of food items.

2. The students' expectations identified in the study resulted in certain changes in the original design project. The storage area was expanded and a serving line was designed.

3. Computer-aided design, especially 3D visualization, enabled precise project modernization.

4. An assessment of the preliminary functional layout of the canteen revealed that there was improper work flow.

5. The modernized version of the design project provided the appropriate size and number of food storage rooms.

6. The functional layout of the canteen in the new design assured appropriate work flow.

References

Council Directive 93/43/EEC of 14 June 1993 on the hygiene of foodstuffs.

Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

Rozporządzenie Ministra Zdrowia z dn. 26 kwietnia 2004 r W sprawie wymagań higieniczno-sanitarnych w zakładach produkujących lub wprowadzających do obrotu środki spożywcze (DzU Nr 104, poz. 1096).

Rozporządzenie Ministra Pracy i Polityki Socjalnej z dn. 26.09. 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy (DzU Nr 129, poz. 844).