IMPROVING KNOWLEDGE, TECHNOLOGY AND FOOD SAFETY IN SCHOOL CATERING SYSTEM IN HUNGARY

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Abstract:
Providing the population by safe and good quality food is one of the most important objectives of every country. Healthy childhood nutrition and diet will basically determine the health state of present children in their adult age, thus it can be stated, that it will influence the future economic and social performance of the society. As children spend most of their time in educational institutions, the school catering programmes have become in the focus of public attention all over the world. This paper introduces the background information about the school catering in Hungary, based upon the results of an overall survey. The effects of catering on human health are determined not only by the raw materials of the food, but also by the circumstances of processing, the used technology, and the practical side of this process. For the appropriate and efficient operation of school catering units (school kitchens), the first step is to make a complex assessment of their state and to recognize the strengths and the possible weaknesses of these institutions. In our survey we examined 22 school kitchens in Hungary. We assessed the physical and technological level, and also the appropriateness of the different technological processes conducted by the employees of the school kitchens. The examined school kitchens showed significant differences both in technological and food safety aspects. The average of the results was 69%; 11 kitchens reached more than 70% (acceptable result) in the course of our assessment, 8 kitchens reached a medium-level result between 60 and 70%, while the result of 3 kitchens was unacceptable (below 50%). The results of our researches showed that the food safety level of the different kitchen units is mostly determined by the level of food processing activities. The technical-technological level of the school kitchens has not influenced significantly the food safety level of the kitchens. According to the results of our survey, improving the knowledge and the attitudes of the employees in the school kitchens is more important than the technical-technological conditions. As human resource is one of the most flexible tools for increasing the competitiveness of organizations, it is very important to find the appropriate tools for improving the knowledge (and, of course the consciousness and the positive attitudes) of differently educated people.

Keywords: school catering, food safety, improving knowledge, process oriented analysis

1. INTRODUCTION

One of the most important marketing channels of sustainable food-systems is public catering, particularly the kindergarten and school catering systems. Public catering is typically that kind of alternative food-systems, which operates the local elements of food production, food distribution and food consumption in a network in accordance with a system approach (Balázs, Pálházyné, & Szabadkai, 2010). Primary school children need food with 2200-2500 kcal containing different types of nutrients, which 60 per cent is consumed during the school time if children take the morning and afternoon snacks and the lunch at the school. It means that in the most active years of their physical and mental development, children's nutrition is consigned for the service of public catering services. Therefore, public catering is one of the hottest topics of interest all over the world, particularly because of the spread of the typical civilization diseases.

Several surveys and researches have been conducted in the past few years for exploring the performance of school catering systems and its social effects and their impacts on human health (Fox, Dodd, Wilson, & Gleason, 2009; Müller et al., 2013; Ohri-Vachaspati, 2013; Vieux et al., 2013; Wordell, Daratha, Mandal, Bindler, & Butkus, 2012). The impacts of catering on the human health are determined not only by the appropriate raw materials, but also by the appropriate physical conditions, the used technology and serving practices. The increased prevalence of food intolerances, food allergies and the increase of diseases transmitted by food require an increased attention from all the players of the food and catering industry. The appearance of food borne diseases (i.e. diseases transmitted by food) has a significant importance both in human health and economic aspects and may carry serious hazards.

In 2013, more than 900 000 Hungarian children have received daily the services of kindergarten and school catering companies. Table 1 summarizes the most important features of the Hungarian school catering system.

Table 1: The most important features of the Hungarian school catering system

	Kindergarten	Primary school		Secondary school
Age group	3-6 years	6-10	10-14 years	14-18 years
Type of catering	compulsory	optional	optional	optional
Number of meals	4	1-3	1-3	1-3
Types of meals	▪ breakfast ▪ morning snacks ▪ lunch ▪ afternoon snacks	▪ lunch ▪ morning snacks and afternoon snacks are optional	▪ lunch ▪ morning snacks and afternoon snacks are optional	▪ lunch ▪ morning snacks and afternoon snacks are optional

Source: own compilation.

The direct costs of the different meals (i.e. the norms of raw materials) are paid by the parents of the children, but the additional costs are paid by the owner institutions (most of the schools in Hungary are under the control of local authorities). In case of families living in unfavoured circumstances, or having 3 or more children, or raising permanently ill children the parents may apply for a state support for the daily school catering, and a certain part (50 or 100%) of the costs of the meals will be financed by the state (that means, by the local authorities).

A spreading phenomenon of our days is the very low level food culture of the children, which roots in the accelerated life style of our times, and which causes their distorted and deficient eating habits. The former family patterns have been changed, and the children cannot see the good practice of eating at home, they have not got an appropriate model of eating habits and food culture. This gap may be – or should be – filled by a high quality and well operated school catering system.

In Hungary the number of the customers of public catering services is relatively low and the situation is the same in case of school catering services. According to a comprehensive survey of the National Institute for Food and Nutrition Science (with the Hungarian abbreviation OÉTI) in 2008 only 20% of

the secondary school students took part in school catering programmes. According to our survey that was carried out in 41 secondary schools of the capital, Budapest, (24 thousand students in total) this rate was only 7,4% (source: our unpublished data).

Last year, a comprehensive institutional reform was implemented in Hungary in the public educational sphere. The role of the state has been strengthened significantly, but the management and operational background of the public educational institutions (including catering services) have remained decentralized, and it will be the task of the local authorities in the future. The possible vision for a change towards a centralized catering system may give many advantages, because a centralized system may be controlled and managed more easily and the needed corrections could be made in the right time.

One of the aims of our survey is to highlight the problems of the present system, the reasons of the non-effective operation, the compliance level of food safety requirements, and, of course, we also wish to make suggestions for increasing the quality of catering service.

A dominant phenomenon of our times is the transformation of the traditional family model into a new one, the two-wage earner family models, where the parents and the children spent the most of their day at work and school. The traditional family roles have been changed fundamentally, and the lack of time destroyed the traditional family meals. The eating habits are inappropriate and the whole food-culture is very poor.

This is the reason of the new pursuit of the educational system for increasing the number of the students who takes part in the catering system. In the kindergartens the use of the catering system is compulsory, and in the near future the same conditions will be used in primary educational institutions. According to the present strategic policy objectives, the compulsory use of school catering services will be extended for the secondary schools as well. Of course the targets and plans are not enough without ensuring the appropriate circumstances. The centralization may create a concentrated school system, in which the “gigantic-scale” institutions may face new, mainly infrastructural problems.

We can find many good examples and “best practices” for the operation of sustainable catering services in the international literature and practice as well (see Morgan, 2010), which should be taken into consideration even for researchers, professionals and policy makers.

As an example, in Brazil, the NSFP programme (National School-Feeding Program) is operated, which is responsible for the school catering at national level.

In Brazil, there are 345 527 primary and secondary schools, from which 240 000 is state owned institutions. The programme was implemented in 1955, in order to provide the children between 4 and 14 years by food, which nutrients and quality complies with their physiological needs, and help their mental and physical development in their childhood and teenage years (Santana, Almeida, Ferreira, & Almeida, 2009).

In the first stage of our research, besides the Hungarian literature sources and experiences, we made a comprehensive overview of international literature sources in connection with the following fields:

- the international experiences of public catering school catering programmes by summarizing examples from the UK and Portugal (Belot & James, 2011; Cámara, Amaro, Barberá, & Clemente, 2005; Turner, 2009);
- the quality requirements of the food supply chain and sustainable production, which were summarized by publications from Morgan (2010), Santana et al. (2009), Veiros, Proença, Santos, Kent-Smith, & Rocha (2009).
- there are international case studies, which results and information could present a good base for the Hungarian reforms (see Morgan, 2010; Santana et al., 2009)
- the knowledge of modern techologies and the use of up-to-date techniques and methods play a key role in public catering services and may improve their competitiveness (Armstrong & McIlveen, 2000; Pataki & Bányai, 2010.

For exploring the present situation in Hungary, we conducted a survey in the school kitchens and canteens of secondary schools in the capital, Budapest, and in settlements of Pest County, which is in the Central Region of Hungary. The survey focused on food safety issues, but we also made efforts to

determine the most important factors which may influence the number of customers of the catering services.

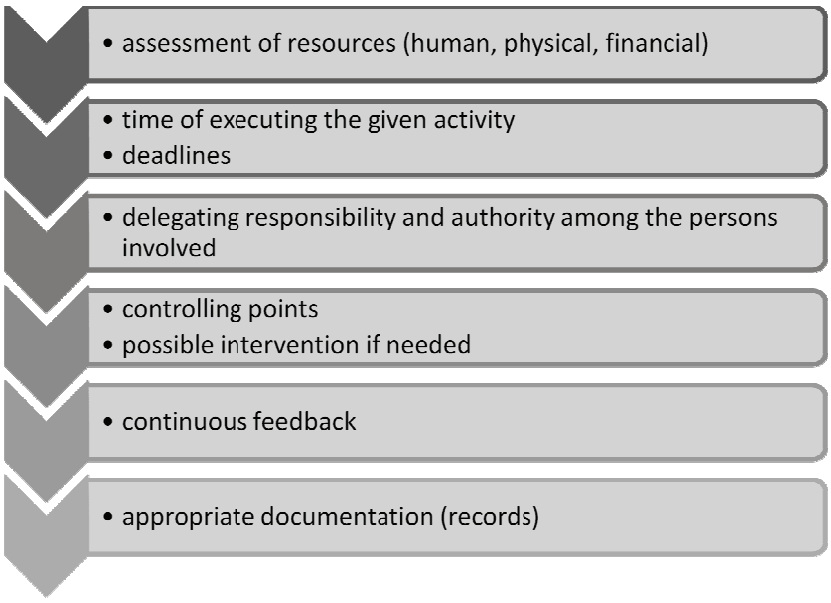
2. OBJECTIVES OF THE RESEARCH

The ultimate objective of our research is to improve the quality of school catering systems in Hungary. During our work, we wanted to explore how the technical and technological level of the recipient institutions as clients of this service (i.e. the serving kitchens at the schools) and the level of the used food safety systems can influence the intensity of using the public catering service. In addition, we wish to analyse the compliance of the different food handling processes conducted at school kitchens by the kitchen staff, and we also assess the impacts of the attitudes and the behaviour of kitchen staff on food safety level.

According to our opinion, a system approach should be followed in the operation of school catering systems, which main element is process-oriented thinking (Bálint, 2008). In general, the different processes of public catering systems and the relations between them are well documented, as a result of the introduction of the different food safety and quality assurance methods. Nevertheless, in the different units of the public catering system, this process-oriented approach may be experienced among the responsible persons only in few cases.

Process-oriented approach is based on the detailed planning of the methods and the conditions of realizing the given process and the connected activities. The elements – i.e. the different steps – of processes according to this approach are summarized in Picture 1.

Picture 1: Elements of process-oriented approach according to the different steps



Source: own compilation.

Our further objective is to adjust the daily routine processes of school kitchens into the right and more effective direction, in accordance with the present rules and regulations of food safety and quality assurance standards. We plan to establish a specific criteria system which deals with the regulatory and quality assurance requirements at the same level, and thus it may contribute to the establishment of an integrated school catering system.

3. MATERIAL AND METHOD

During our research, we made a detailed analysis of the kitchens of 22 schools. In this sample, the food was prepared on the spot in 15 school kitchens while in the other 7 school kitchens only the delivery and the portioning of the ready meals were conducted. The survey was fulfilled through

personal visits. In the school kitchens of this sample 101 workers made their daily routine in different kinds of jobs: catering manager, cook, kitchen maid and storekeeper.

The average age and the average professional experience of the workers in the visited school kitchens are summarized by Table 2.

Table 2: The number, age and professional experience of the kitchen staff in the examined sample (mean ± standard deviation) according to different working positions

Working position	Number	Average age (years)	Professional experience (years)
Catering manager	7	53 ± 5.08	15 ± 13.06
Cook	18	48 ± 9.51	18 ± 14.53
Kitchen maids	67	49 ± 9.61	6 ± 8.68
Storekeeper	7	52 ± 5.68	7 ± 9.11
Total	101	50 ± 8.97	9 ± 11.27

Source: own research.

The different types of jobs, of course, need different educational level. The main tasks of the kitchen staff are the following:

- A catering manager is responsible for the organizing and the management of this organizational unit. His/her tasks are to control the quantities and the qualities of the raw materials for the meals, to prepare the weekly menus in accordance with the needs of the different age groups, to keep the food safety requirements through the whole operation process and to perform the administrative work connected to the operation of the school kitchen.

- The cook's task is to prepare the meals according to the given menu, under the control of the catering manager, and to manage the work of the kitchen maids. The cook is responsible for the appropriate use of the technical equipment and keeping the technological rules, as well as for the prevention of accidents.

- Kitchen maids are responsible for keeping the technology requirements during the food preparation, the handling and the cleaning process.

- The storekeeper is responsible for the stock; workers in this position should take care for stockpiling and stock taking as well, and for keeping the appropriate records.

Our survey is based on a modular compliance checklist, where the environmental, technological, hygienic, food safety and quality assurance factors were assessed. Compliance is an unequivocal indicator; its fulfilment may be answered clearly, by answers "yes" or "no". Either unfulfilment (answer "no") or fulfilment ("yes") will have consequences, which will form a decision This decision will be manifested in different measures or actions. In the course of the compliance checklist, firstly we determined the those features of the process of the system, which may be observed or measured, secondly, we set up requirements and in thirdly, we assessed the results, are they fulfilled or not. In the survey the answers "yes" means that the given indicator was appropriate, while "no" means that it was inappropriate.

In the process of satisfying the consumers' needs it is very important how can we organize and how can we manage our operational or producing processes. According to the definition of Bálint (2006) a process performs the needed steps and activities in the right, and formerly determined order. This process will generate value, because the inputs are transformed into outputs, which may be used by another person or another process, or it may be used as an input for another processes. The transformation process should have a clearly determined objective, and different resources should be used and allocated through the transformation process.

In our survey for determining the food safety features of the Hungarian school kitchens we used the principles of questionnaires of researches which were published in international literature sources (Santana et al., 2009; Veiros et al., 2009) in order to lay down the basis of a future international comparison. At first we adapted the checklist to the Hungarian circumstances.

The checklists were filled in during on-the-spot visits.

Our survey was divided into two main parts. In the first part we assessed the physical and technological level of the working units and the technical level of the used equipment and utensils of the examined school kitchens. In the second part of the survey, we examined those processes which may bear critical points in food safety aspects. In this part of the survey, we assessed the compliance and regularity of the following processes: dishwashing, cleaning, the personaly hygiene of the workers, the food receiving and distribution (food serving) and the food waste management activities.
The results were classified according to the compliance results, and they were expressed by the share (per cent) of the possible maximum result. The data were analysed by statistical methods (Student's t-test, Pearson's correlation).

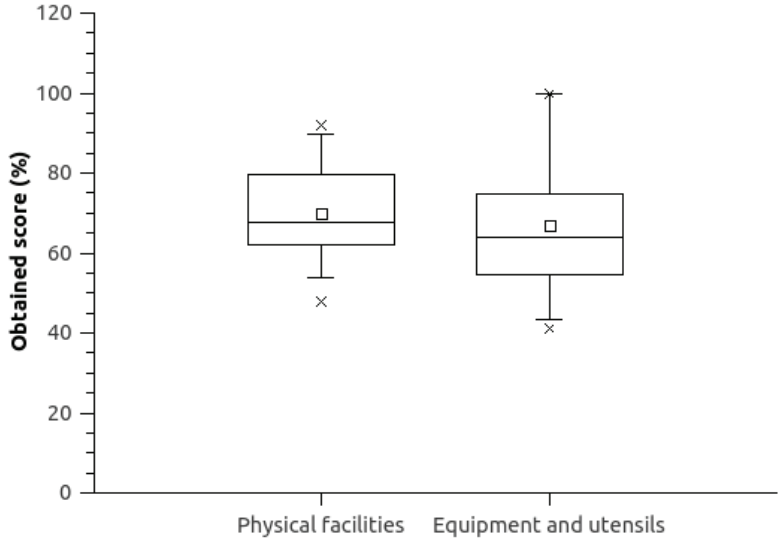
4. RESULTS AND DISCUSSION

The average result of the total examined school kitchens was 69%. From food safety aspects 11 school kitchens reached the acceptable level (above 70%), eight kitchens showed an average result (60-70%) and three of the examined sample failed, that means they did not reached the threshold level (50%).

In the evaluation of the physical conditions and environment ("Physical facilities"), we assessed the present condition and the design of the different kitchens (both the working units and the service facilities), the present state of windows, walls, ceiling and floor, the energy and water supply facilities, ventilation, and waste storage possibilities.

During the assessment of the equipment and utensils, we examined the kitchen equipment (furniture and different devices) and the utensils which are used in the course of the daily routine.
The results of the assessment of the physical conditions and environment resulted an average of 70%, while in case of equipment and utensils, the result was nearly the same, it is 69% (see Picture 2.) In statistical terms, there is no difference between the results of these two factors (Student`s t-test, $p \leq 0.05$), but there is a significant correlation between the two factors, in kitchens with higher physical and environmental level the equipment and the utensils are also in better condition (Pearson's correlation coefficient R=0.783).

Picture 2: The results of assessment of the factors "Physical facilities" and "Equipment and utensils" in percentage points illustrated by box-plot graphs (n=22)



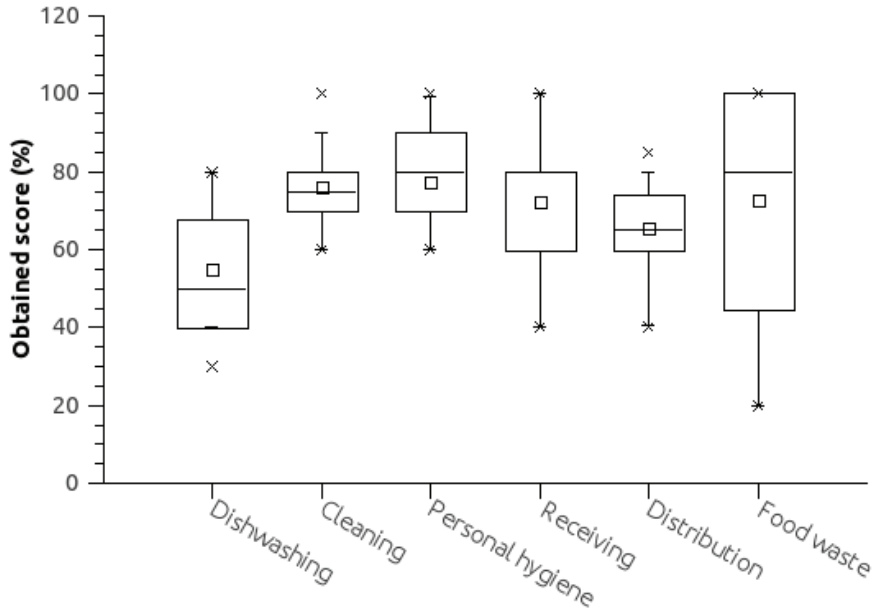
Source: own calculations.

The results of the analysis of the different working processes were illustrated also by box-plot graphs (Picture 3.). The graph visualizes that the most deficiencies may be observed in the correctness of dishwashing processes and management and the management and storage of food waste is a significant problem. The processes connected to personal hygiene, cleaning, and receiving were have

shown appropriate results, but the results of distribution (i.e. heating and serving the pre-cooked food) were slightly lower.

The calculations of correlation have not justified the correlation, neither between the factors of the different processes, nor between these processes and the conditions based on the assessment of the "Physical facilities" and the "Equipment and utensils".

Picture 3: The results of assessment of the compliance of different working processes performed by the kitchen workers in percentage points illustrated by box-plot graphs (n=22)



Source: own calculations.

According to our results, the technical level of the kitchens does not influence the compliance of the processes to be performed, thus it will not influence the food safety level of the kitchens as well. If the kitchens have the minimum necessary tools for the different processes, then kitchens which have a lower level of physical facilities also may be operated in an appropriate way. It means that the key to the compliance of the different kitchen processes is determined by the right attitudes and behaviour of the kitchen workers. This result was confirmed by other researches in different countries, see the works of da Cunha et al. (2013), Jevšnik, Hlebec, & Raspor (2008), Liz Martins & Rocha (2014).

A key result of our research was that the attention of the local authorities (who maintain the different educational institutions) has been drawn for the non appropriate food safety conditions in the school kitchens. In addition to financing the different non-food costs of school catering, the local authorities shall deal with the appropriate conditions of the school kitchens. It means a significant cost for almost every institution, because the number of those schools which has appropriate conditions is very low.
Although the local authorities have already established the regulatory background for the different processes, the individual units cannot work properly in an unified way and in compliance with the regulations, because neither their environment nor the devices and utensils and even the different working processes are not in accordance with the good practice of food processing (Luning, Chinchilla, Jacxsens, Kirezieva, & Rovira, 2013). Our researches highlighted that the overall assessment of all Hungarian school kitchens should be conducted, for which the methodology of our researches could present a good base.

5. CONCLUSIONS

In Hungarian educational institutions there is an increased interest in connection with the food of school children. The nutrition content and the quality of food determine both the physical and the mental development of the children, thus it will strongly determine their health status, their performance and life quality in their adulthood, that their life as active employees.

There is a programme which support these goals, the so-called “Mintamenza Program” (its English translation is “Healthy School Canteens Programme”), and a regulation is under construction (which is to be implemented from September 2014) which will determine the nutrients and the quality of food and meals to be served for schoolchildren.

Besides these very important central measures, the physical circumstances of catering have less public and official attention. Our results highlighted that it is possible to operate school kitchens at appropriate food safety level even with bad physical and technological facilities. The key determining factor of appropriate operation level is the attitude and the behaviour of the kitchen workers.

In school kitchens, the last players of the food distribution chain are those workers, who serve the food to the students, therefore their responsibility in the protection against food borne diseases is very high. This responsibility starts from receiving the ready-made meals until serving; therefore the staff needs knowledge about the impacts of non-appropriate food handling practices. This knowledge will be the prerequisite and the motivating factor of changing their attitude, and the acceptance of the appropriate food handling processes (Clayton, Griffith, Price, & Peters, 2002; McIntyre, Vallaster, Wilcott, Henderson, & Kosatsky, 2013).

Some authors (Bylok, 2012; Cichoblazinski, 2010) underlined that improving the knowledge level is one of the most important tools for improving the performance of different organizations, because the knowledge level of the human resource is very flexible and it can be improved easily. Slocinska (2010) added that knowledge is such a resource which does not have limits and which multiplies if shared and used. Those employees who manage their knowledge may be the most perfect component of the company’s assets.

The above-mentioned concept is the true even in case of employees with lower educational level, but their education is different from the “traditional” educational courses. In the training of less educated adult people, who have practical experiences, is more complex. Besides the transfer of theoretical knowledge, the use of the theoretical part in practice should be in the focus. The trainers and teachers should base on the former practical knowledge of the employees, but they shall emphasize the importance of the right methods and the hazards of the inappropriate techniques. It is very important to raise the interest of the kitchen workers and motivate them to change their old habits and methods if needed. It is suggested to keep the practical training in their own workplaces, in the well-known circumstances.

The Hungarian educational system together with the national food safety authorities now works on the development of a vocational training course by which the knowledge level of kitchen staff may be improved. Before the implementation of the planned programmes, a detailed situation analysis and a comprehensive assessment of the deficiencies is inevitable, for which the methodology of our researches could represent a good base.

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