

# **BUDAPEST BUSINESS SCHOOL**

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## **Ergonomy in Commercial Kitchens – Challenges of Kitchen Technology in 2018**

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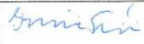

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## DECLARATION

I declare that the dissertation hereby submitted in partial fulfilment of the requirements for the degree of Master of Arts in Tourism Management at the Budapest Business School has not previously been submitted by me for a degree at this or any other institution. This dissertation and the work presented in it are my own and have been generated by me as the result of my own original research; it is my work in design and in execution, and that all material contained therein has been duly acknowledged. I understand that my thesis may be made available to the public.

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## **1. Introduction**

I am positive that in every student's mind who studied hospitality and tourism in college, the thought of opening a new business or enterprise presented itself at some point. Maybe it is a hotel, a café, a bakery or a restaurant. Probably each of those people had this image of perfection in mind, stylish interior design, a perfectly functioning kitchen, friendly employees, happy customers. Let's talk about that perfect kitchen for a moment.

In spite of being an integral and, by all means, central part of any restaurant, it seems to me that we do not talk about the kitchen enough. I believe that is a problem, since based on my previous studies, ultimately it is the kitchen that determines the success of the entire establishment. In this thesis I am going to write about the challenges of creating an ergonomically perfect kitchen for the employees, mainly from a kitchen technology point of view.

The reason I chose this topic is because I wanted to challenge myself. Technical and technological studies was never my strong point – I am not a technologically inclined person. However, I do believe that it is important to learn about this, because the information I gather here could be crucial for me as a future business owner. I hope that my research can be of help to other people in my position as well.

After much consideration, I started writing my thesis in search for an answer to the following question: **is it possible to create an ergonomically perfect kitchen in any establishment, with any kitchen layouts?**

Based on my previous studies, and suggestions from my consultant, my initial hypothesis for that question is as follows:

**It is possible, given that sufficient capital is at the restaurant's disposal. In my opinion, just because a kitchen adheres to the requirements set by the law and has the permit to operate, does not mean that it cannot be improved on ergonomically. Also, while generating profit and customer satisfaction is a direct product of good kitchen ergonomics, the main goal here is to create a good working environment for the employees.**

In order to find an objective answer to my research question, I feel the need to give definitions to some of the terms I am going to work with.

What is ergonomics? In my own words (once again, based on previous studies) ergonomics is the science of creating a good working environment for the employees of a work place. A working environment is considered ergonomically satisfactory if it makes the employees working there comfortable and productive. I consider it ergonomically perfect if there are no circumstances hindering their comfort and productivity. Later on in the literary overview, I will also mention the officially accepted definitions of ergonomics, but as far as the contents of this thesis are concerned, my own definition to the term 'ergonomics' applies.

What do we consider a successful restaurant? I consider the restaurant successful if it has a vision for the future, generates sufficient profit, has a hard core of returning guests, pays off on the long-term, and of course has a productive team to work there. In my opinion, no restaurant can be successful on the long-term without any of these factors.

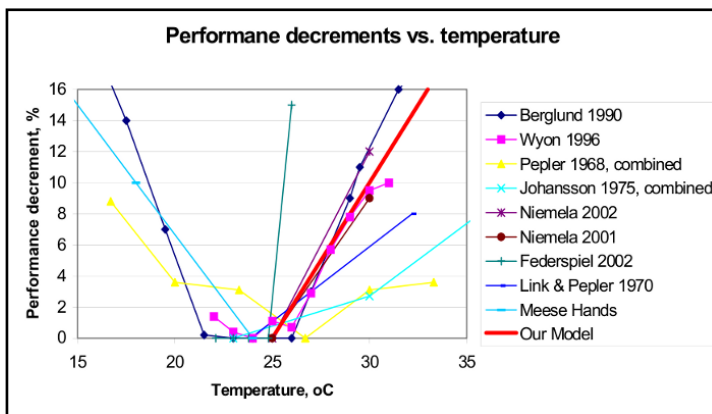
In the following chapters, I am going to conduct my research. First I am going to give a literary overview on the subject of ergonomics, how the concept was born, what its main concerns are, etc. Next I will discuss the methods of my research, and list the results. Finally, I will conclude the research with my own thoughts on the matter, based on everything I previously found out.



## 2. Literary overview

### 2.1. What is ergonomomy?

The word 'ergonomy' comes from the conjunction of two greek words – 'ergon' means work, and 'nomos' means law, rule. As such, ergonomomy is the law of human work. It is a branch of science that examines the connections between humans and technical systems. The goal is to discover approaches to human work that saves energy for the worker, while also maintains his safety and a sensible level of comfort, which subsequently results in higher profit levels for the company. For this to happen, it is necessary to establish the right environment for the kitchen user to work in (D. Balogh, 2008).



Source: <http://www.grokcode.com>

**Figure 1: The effects of temperature on work performance. This graph summarizes several studies, and shows that outside of a 21-26 °C comfort zone on average, performance rapidly decreases in general.**

**Of course the effect of temperature may vary based on the current season, the climate, etc. The studies were taken from an office environment, but it strongly applies to restaurant kitchens as well.**

Over the course of history, many different definitions to what ergonomomy means were born, as the points of view changed over the decades. According to Woytech Jastrzombowsky (1857) ergonomomy is the science of work, that is, the science of human skills and abilities. Grandjean's approach (1967) is slightly different – according to him, ergonomomy is a sum of the different

sciences related to work: physiology, psychology and anatomy. According to the Human Factors in engineering and design, written by Mark S. Sanders and Ernest J. McCormick in 1992, ergonomomy focuses on the knowledge about human skills, blocks and behavioral patterns which need to be considered while planning the work environment, the equipments and the processes (P. Orbay 2001).

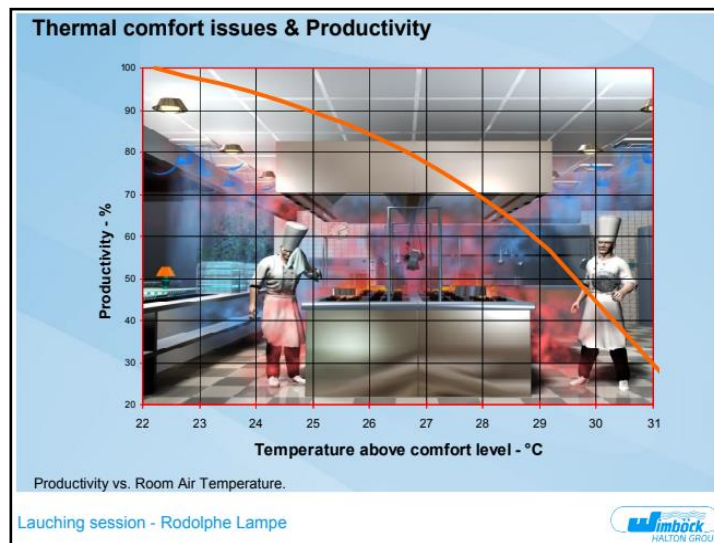
### 2.1.1. The science behind ergonomy

As mentioned above, ergonomy researches different aspects of the human body. It does research on the physiological and anatomical attributes, including reflexes, strength, movements, body sizes and tiring activities. It also researches the nervous system, which means everything from sight, hearing, smelling, the sensation of pain, heat, pressure, vibrations, and so on. Research of mental processes is also important in ergonomy – perception, recognition, attention, thinking, learning, memory, motivations and emotions are all part of this (P. Orbay 2001).

Ergonomy has three main branches – workplace ergonomy, environmental safety and product ergonomy. All of these are important when it comes to planning a new kitchen (P. Orbay 2001).

When working in a kitchen, the user can show signs of wear and tiredness due to different physical, psychological, climatic and other reasons. The user can become physically tired by standing for a long time, walking too much due to inefficient arrangement of equipments, remaining in

a static position for a long time, or moving in ways that overexert the joints and the muscles, like squatting or getting down on one's knees. Psychological tiredness may derive from hectic work, irregular shift of attention between different tasks, having to search for items too many times due to inefficient storing methods, or insufficient room for work. Climatic effect such as heat, smells, wind or steam can also affect the



Source: Rabah Ziane: Halton – Kitchen Design Guide, Halton Foodservice, 2007

Figure 2: This graph displays the reduction of productivity levels on temperatures above the comfort zone. According to the study, in commercial kitchens temperature is considered too high when it reaches 28 °C (which is alarming, considering that in the Summer heat, 40 °C in a kitchen with bad ventilation is not uncommon). The lowest and highest acceptable temperatures are 17°C and 31°C respectively, outside this spectrum employees may suffer various negative health effects, even stroke or sudden heart death in extreme cases.

user's tiredness level – figures 1 and 2 showcase some examples of how work performance decreases when the kitchen temperature is outside the comfort zone. The eyes can also become tired if the lighting conditions of the room are not on a sufficient level. Sounds may also affect the efficiency of work – noise can come from the kitchen equipments, people, or the outside environment (P. Orbay 2001).

## **2.2. History of ergonomy**

### **2.2.1. The beginnings and taylorism**

The history of ergonomy dates back to 1850. The American Ministry of Agriculture, for the first time in history, put the users of the kitchens in the center of their attention. They realized that in order for them to stay healthy and avoid injuries (they had to lean forward a lot when they were cooking, especially while cutting vegetables) the kitchens need to be designed based on the users' heights (D. Balogh, 2008).

The practical shift towards ergonomical thinking started in the 20th century, and it became relevant with the introduction of mass-production. A significant portion of this change happened due to the influence of taylorism (P. Orbay 2001).

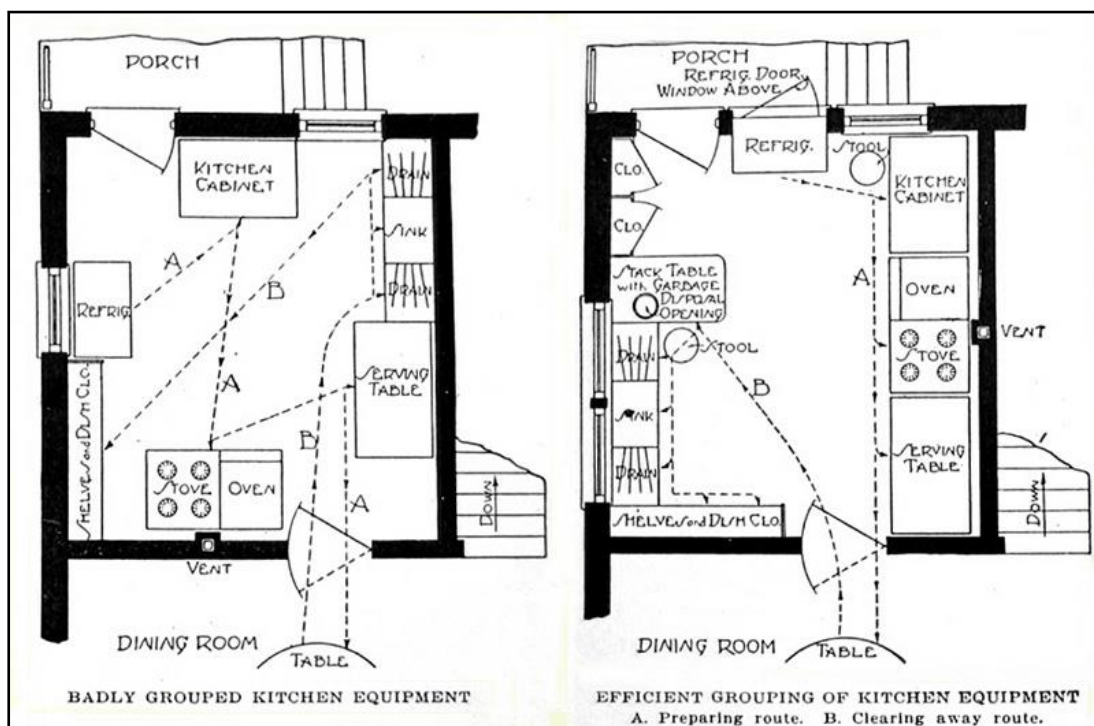
Taylorism was played an important role in the development of the science of ergonomy. In the beginning, however, according to taylorism, people were only an asset to aid the technological environment. At the dawn of the 20th century, most of the work in factories was already done by machines, but human work was still required in order for them to function well. As such, it was important to find the people who could work with these machines. That is an important point, as this means that taylorism puts the machines in the center of attention, not the humans. Humans needed to adapt to the technology, and not the other way round. It was not until the end of the second world war when this view shifted to an employee-centric direction (P. Orbay 2001).

In households, ergonomy became relevant somewhat sooner. When mass production of household equipments, tools and furniture begun, it became impossible to adjust the attributes of the items to the needs of individuals. Ergonomy was important to create the standards which made it possible to cater to the needs of many at once (P. Orbay 2001). This, of course, applies to commercial kitchens as

well, and while in the following chapters I will mainly talk about household kitchens, the basic principles work in restaurant kitchens, too.

### 2.2.2. Christine Fredericks and Erna Meyer

The largest developments in the field of household ergonomics happened in the 1920's. It started with the American Christine Frederick, and her experiments in 1922 to optimize kitchen design. In the experiment, the user of the kitchen was given a task, and she had to accomplish it with a thread tied to her leg. As she moved around the kitchen, the thread slowly unraveled. In the end, they measured the length of the thread to see how much she had to walk around the kitchen (see figure 3). The point of the experiment was that the work in the kitchen needed to be divided into smaller work units, and design respective work stations for them (see the chapter on the kitchen triangle later on). If the furniture and equipment in the room are arranged the correct way, the walking distance will become shorter, the task will be done faster and the user will not get tired too soon (D. Balogh, 2008).



Source: <http://www.spiritualis-terrendezes.hu/christine-frederick-es-a-cernas-kiserlet>

Figure 3: Christine Frederick's experiment in the kitchen. On the left is an inefficient kitchen design. The dotted lines show the walking pattern between the stations, which is proof that with unsatisfactory ergonomics, the user of the kitchen walks a lot needlessly. On the right is a more efficient layout that results in shorter walking distances, as the dotted line shows. The work stations are arranged in a more sensible way, putting similar equipments next to each other, in the correct order.

Even so, nobody did as much for the development of ergonomics in history as Erna Meyer. Erna Meyer was the first person to vouch for the fact that a house is not just a building that protects the inhabitants from the weather, but also a sum of conditions that enables them to perform everyday activities with minimal energy and time input. Because of this, she stated that being a housewife is just as much a work as what their husbands do. As such, it needed to be optimized. Erna Meyer did so with the use of technical equipments, the improvement of working methods, and correct home design (D. Balogh, 2008).

She formed the base of modern kitchen design by creating a series of guidelines. According to these guidelines, the rooms should be designed in a way that walking distances during work are minimized, both during actual work and during cleaning. Tools and equipments should be in good condition at all times, so that they are ready to use at any given point, and the tools should be stored at the work station where it is to be used – *mise-en-place*. In order to avoid physical and mental strain, work should be done in the correct posture without flexing the muscles too much (possibly by sitting down) and sufficient lighting and clean air should be provided. According to her, it is also important to take regular breaks, and to do regular physical exercise outside working time. It is also essential to plan one's work ahead of time, to think through the different steps and the correct order of them before starting one's task in the kitchen. (D. Balogh, 2008).

### **2.2.3. The New Kitchen exhibition**

All of this led to a kitchen reform that drastically changed the layout of homes in the 20th century. In the early 20th century, an architectural society called the 'Der Ring' organized an exhibition in Berlin called „The New Kitchen”. The point of the exhibition was to make a distinction between the two main kitchen types – the living kitchen and the functional kitchen, and which one is more optimal for the average user. The difference between the two was that the functional kitchen solely consisted of the equipments and furniture necessary for housework, while the living kitchen included a dining table and chairs as well. In this exhibition they preferred the functional kitchen, as in a kitchen most of the by-products of the functions (i.e. steam) are hazardous for the health, especially that of small children. The disadvantage of this design was that the actual living area of the home had to be used as a dining area, and as such the smells and vapors contaminated the living room

during dining. American and Swedish kitchens, on the other hand, were living kitchens (D. Balogh, 2008).

Erna Meyer's ideas for optimal kitchen design also led to minimalizing the kitchen area. At a minimum of 10 square meters, they were just big enough for one person to work in it, which was of course the main goal – as stated above, the kitchen was not meant to be a living area. At the same time, the housewife had to pay attention to her children as well, so they decided to make the walls of the kitchen out of glass (D. Balogh, 2008).

#### 2.2.4. The Frankfurt kitchen

One of the questionable parts (at least at the time) of the exhibition was the introduction of the built-in kitchens. The first built-in kitchen was designed by Margarete Schütte-Lihotzky (the first female architect in Austria, and a taylorist) and Ernst May (D. Balogh, 2008). You can see the design of the Frankfurt kitchen, the first built-in kitchen on figure 4.

In the early 1920's there was an apartment shortage in Frankfurt that led to a new home design revolution, the main goal being the optimization of room sizes. The four main functions within a home were dining, sleeping, bathing and cooking. These had to be organized into a seamless system, and the prototype of this system was the kitchen. One of the important



Source: [www.mak.at](http://www.mak.at)

**Figure 4: the Frankfurt kitchen. The size of the Frankfurt kitchen was 5 square meters. The housewife started the preparations at the working area below the window at the end of the room, sitting on a revolving chair. Perpendicular to this area, along the longer wall was the sink, and also the area where she could continue the preparations. Opposite this wall was the furnace (K. Cséplő, 1988).**

technical developments that led to the modern home and kitchen design was the new aesthetic design of kitchen equipments, which eventually led to the mass production of them. It was important that these equipments were module sized, because that way they could easily be integrated into the home's system alongside the other equipments (once again, this strongly applies to commercial kitchens as well). The old furniture that people had could not be used in these homes, so new ones had to be designed. This is where Ernst May and Margarete Schütte-Lihotzky came into the picture (K. Cséplő, 1988).

The design of the built-in kitchen was actually based on the kitchens of dining cars in trains. Dining car kitchens were designed to be separated from other functional areas (dining, sleeping) and to be used by only one person at a time. They were small and corridor-shaped, with built-in furniture and equipments by the walls and the main working area at the end of the room below the window (D. Balogh, 2008).

After the Berlin exhibition, the most vehement critique against this kitchen type was that they were difficult to mass-produce, since they were designed to have a pre-determined layout. They turned out to be wrong, of course, thanks to the aforementioned apartment shortage that made it overwhelmingly popular. With all these new homes being built, Margarete Schütte-Lihotzky's kitchen design became a staple solution in modern home design. Her design was thus labeled the 'Frankfurt kitchen'. Some also called it the 'blue kitchen', as the main color used in the design was blue, in order to keep mosquitos away (D. Balogh, 2008).

### **2.3. Basics of ergonomical kitchen design**

#### **2.3.1. Hungarian laws and regulations on ergonomical kitchen design**

Naturally when one decides to design or re-design a kitchen, one has to adhere to the regulations of the country in question. The booklet called Good Hygienic Practice, coordinated by NÉBIH, gives an approachable overview of the kitchen design principles, and also provides us with the legal background in Hungary.

However, it is easy to see that the recommended guidelines are much more detailed than the legal background. The laws are strict when it comes to hygienic practice but rather vague when it comes to ergonomical design. For example, while

Decree number 852/2004/EK, supplement II., chapter V. talks about the correct cleaning and maintenance of kitchen equipments and tools, and what materials they can be made of, only the supplementary guidelines talk about how the equipments should be arranged in the kitchen to create a good work flow. Also, Decree 852/2004/EK, supplement II., chapter I. states that in any area where food is being prepared, good natural/artificial lighting conditions should be provided, but it does not give actual recommendations on how strong sufficient lighting is (NÉBIH ÉTbI, 2013). Good Hygienic Practice, on the other hand, gives us exact suggestions on how strong lighting should be in each of the rooms within the kitchen area.

Therefore, much of the information in this thesis is going to be based on the guidelines that follow the laws, rather than the laws directly.

### **2.3.2. Basic design principles**

When designing a kitchen for the user, the three most important aspects to keep in mind are making the routes as short as possible, making the work processes as easy as possible, and lessening the strain on the human body. For these to happen, we have adhere to some rules in the design process (D. Balogh, 2008). Some of these are:

- The correct order of the kitchen equipments, the sink and the working surfaces.
- The size of the working surfaces required for the different work processes.
- Making the walking time between the work processes shorter.
- The correct height of the kitchen equipment and surfaces.
- Enabling clear movement for the user of the kitchen.
- Providing the correct amount of storage space.
- Designing the interiors of storage spaces the correct way, in order to achieve optimal usage of free space.
- Placing equipments at the right height to enable comfortable usage.
- Providing optimal lighting in the kitchen, especially at the working surfaces.

It is also important to mention the kitchen's connections with the other rooms in the building. This is an area that is highly regulated by Hungarian law,



because it is a critical source of risk for cross-contamination. As ingredients and other food items move through the back office of the restaurant, we have to make sure that it is a one-way route, meaning that they never turn back and routes of ingredients of different cleanliness level do not cross each other. In case of a typical a'la carte restaurant, this means that the ingredients will come through the back door, are taken to the storage rooms close by, then into the preparation rooms, which have direct connections with the kitchen. Creating this flow is essential in order to avoid health risks.

### **2.3.3. The work triangle**

One of the most important things to achieve in order to successfully design a kitchen is the work triangle. The work triangle is a concept that was first discovered in the 1950's (D. Balogh, 2008). The base of this concept is that the different working processes in the kitchen follow each other as such:

- Storage
- Cleaning ingredients
- Washing
- Preparing ingredients
- Cooking/baking
- Serving

In a regular kitchen these processes were combined and arranged into three main stations within the kitchen – storage (usually cold storage, like a fridge or freezer storage), washing and preparation (a work surface accompanied by a sink), and cooking/baking (all the heating equipments). These stations form a triangle in the kitchen that, in an optimal case, makes it possible to achieve the shortest walking distances between them (D. Balogh, 2008).

#### **2.3.4. Kitchen shapes**

The work triangle can take various shapes in different kitchen types (D. Balogh, 2008). The possible kitchen types are:

- One line / Single line / Wall
- Two lines / Corridor
- L-shaped
- U-shaped
- G-shaped or peninsula shaped
- Island shaped

The smallest kitchens that do not enable for a lot of working area are usually one line shaped. This means that every equipment and work surface is placed along one single wall. However, this arrangement does not allow for a work triangle to exist, thus it is the most inefficient way to design a kitchen (D. Balogh, 2008).

Kitchens with two lines have two sets of equipments and surfaces lined up alongside two parallel walls. This kitchen shape is recommended if for any reason it is not possible to place equipments at the narrower ends of the room (i.e. because of doors). This one is a better solution than the one line shape, since it is possible to create a working triangle here (D. Balogh, 2008).

An L-shaped kitchen is used when we have two walls available for our equipments, but this time these are perpendicular to each other. One of the advantages here is that the L-shape's corner can be utilized as either storage or dishwashing area (D. Balogh, 2008).

The U-shaped kitchen usually uses 3 walls of the kitchen, but part of the U-shape can also be placed in the middle of the room. This way that part of the U-shape can be used as a dividing element between different functions within the room, and if the walls of the equipments or furniture on this line are tall enough, we can also avoid people seeing into the U-shape's area. This kitchen type is possibly the most optimal among all the types, since it can provide for the smallest working triangle between the main work stations. However, that is only if the U-shape is not too wide, otherwise the working triangle can elongate and walking distances grow (D. Balogh, 2008).

A G-shaped kitchen is essentially the same as a U-shaped kitchen. The only difference is that for the G-shaped kitchen, we have an extra line of furniture or equipments placed along a fourth wall, or a fourth line that is not alongside a wall. In the latter case, that fourth line can function as a divider within the room between the different functions, similar to what was discussed in relation to the U-shape above (D. Balogh, 2008).

Lastly, the island kitchen has at least one kitchen element that is not placed alongside any of the walls. Similar to the U-shaped kitchen, this one can also be easily optimized to provide the smallest possible working triangle. The island can be used to serve different purposes, depending on the needs of the users. It can serve as a preparation area and working surface, it can be a cooking/baking area, or it can hold a dishwasher. It is also efficient because as this shape does not require every user to face the walls while working, it allows for much better communication between users, which is essential in a restaurant environment (D. Balogh, 2008).

### **2.3.5. Heights in the kitchen**

In order to decide what the correct height of the furniture and other equipments of the kitchen are, we have to consider some basic anatomical principles about the human body (D. Balogh 2008).

The human body is evolutionally built to maintain a standing position for the longest time. Relatively speaking, this is the most healthy position to be in, as the spine remains vertical and unstrained and the legs carry the body's weight. Leaning ahead, on the other hand, is extremely straining on the spine, as it has to uphold the extra weight of the upper body (the muscles on the back help maintaining this position). Sitting down is much more comfortable, as it relieves the strain from the legs. However, sitting for a long time can lead to a habit of maintaining a bad posture, which is once again a strain on the spine (D. Balogh 2008).

We must also make a distinction between static and dynamic strain on the body. Dynamic strain means that we keep our body in a position (let it be comfortable or uncomfortable) for a short time only, as part of a series of movements, and as such it is not a great strain on the body. Static strain can be much more dangerous, since it means keeping the body in the same position for a longer time period. When we stand still while cooking or washing dishes, it is considered

static strain, while leaning down to take something out from a lower cabinet is dynamic strain (D. Balogh 2008).

Based on everything mentioned above, we can make a distinction between comfortable, acceptable and uncomfortable height levels in the kitchen. As you will see, all three of these form a scale from standing upright to leaning forward more and more. The opposite of this (that is, trying to reach up) is not so easily categorized, and they are generally not positions that one often finds himself in a kitchen. However, it is still an important aspect to consider in storage areas, so anything that we cannot reach without leaning backwards or standing on tiptoes is considered to be in the uncomfortable zone (D. Balogh 2008).

The basis for the comfortable height is the standing position. Anything we can reach or see in this position, or by leaning forward no more than 0-6 degrees, is within the comfortable height zone. The acceptable height zone depends on whether we are putting static or dynamic strain on the body. If we are static, leaning forward be 6-20 degrees is considered acceptable. If we are dynamic, and as such we do not stay in this position for long, then an incline of up to 50 degrees is still acceptable. Anything above those respective values is considered uncomfortable, and the body should not maintain such a position for more than what is absolutely necessary. Squatting and standing on all fours is also in the uncomfortable category (D. Balogh 2008).

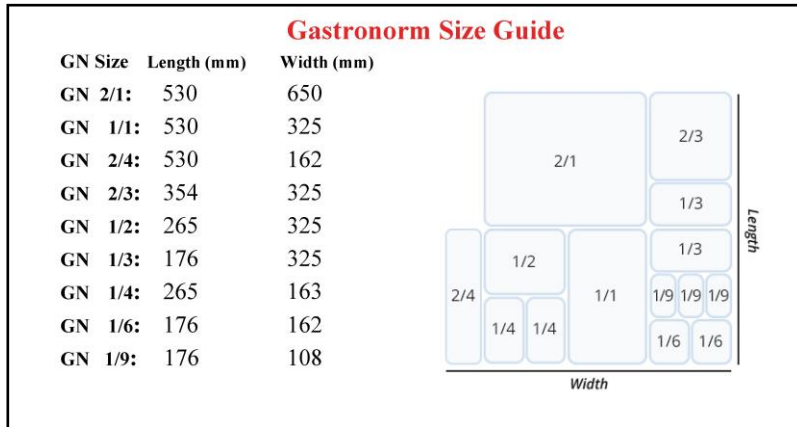
Judging by all this, it makes sense that most of the equipments we use in the kitchen, especially those we stand by for a longer time period, should be placed in the comfortable zone. While that is true, there are two things to consider. For one, remaining in the same comfortable position is still considered a strain on the body, therefore it is important to do some dynamic movements throughout the cooking process (do some exercises or change your position) or take a break every hour or so. Another thing to consider is that even though the kitchen is filled with areas which are uncomfortable to reach, it does not mean that we cannot use them. They are acceptable as storage spaces, or for equipments that we do not use as much or in a static position, although it has to considered what to store in these areas, because if one cannot see the item they are trying to reach, they might end up hurting themselves in the process (e.g. splash hot liquids on themselves) (D. Balogh 2008).

### 2.3.6. Equipment sizes – the Gastronorm system

As mentioned above in the history of gastronomy, when mass production of kitchen equipment began, it was important to create standard dimensions for them in order to cater to the needs of the majority of the population. This view developed over the decades, and the Gastronorm standard was born (M. Bádonyi, 2011).

Euronorm (for bakeries/confectionaries) or Gastronorm (for gastronomy/catering), EN/GN for short, is a European system of kitchen equipment standards. It was developed in order to enable the establishment of the block system within professional kitchens. The equipments need to fit next to each other seamlessly, and the tools used in connection with these equipments also need to fit into them, regardless whether you bought them together or separately. For this, a standard system of equipment and tool sizes had to be developed (M. Bádonyi, 2011).

The basic principle of the GN system is that the width and length of all dishes used in the equipments need to be a multiple of 100 mm. The length of these items are always between 500-1500 mm, while their width (depth) is 700 mm or 900



mm at most.

Generally, their height is 900 mm as well, but 850 is also acceptable. For serving equipments, the norms are slightly different.

Their length is either 600, 1200 or 1800, their depth is 800 and their height is between 850-950 mm (M. Bádonyi, 2011).

Source: [www.cambriancateringsolutions.co.uk](http://www.cambriancateringsolutions.co.uk)

Figure 5: Gastronorm size guide. The largest size is the GN 2/1, while the smallest size is GN 1/9. All of these sizes fit seamlessly into Gastronorm equipments, and can be used for a wide variety of functions – storing, baking, transferring, etc. Euronorm sizes work similarly, except that the sizes are different. The smallest Euronorm dish is 400\*600mm, while the largest is 800\*600mm.

The metal dishes used for these equipments also adhere to these norms. The standard GN 1/1 dish is 530 mm long, 325 mm wide and 50-400 mm tall. GN 2/1 is the double of this size, and is mainly used for baking, while GN 1/9 is the smallest size in the series and is used for storing sauces (for instance). See figure 5 for the complete list of GN sizes. The reason these dishes are widely used is because (due to the Gastronorm system) they fit into all the kitchen equipments. The same dish could be used to store prepared vegetables in the refrigerator, and the next week it could be used to roast pork in the oven. Another dish could be used to deliver food to the guest area for a buffet dinner, and the same dish can be placed into the chafing from which the guests will serve food for themselves. The same way, ingredients or prepared food stored in the fridge in an EN/GN dish can be directly put into the oven, without the need to transfer the contents from one dish to another. The fact that we do not have to touch the food at this stage is yet another way to avoid food contamination (M. Bádonyi, 2011).

### **2.3.7. Air conditioning in the kitchen**

Air conditioning is a critical point to talk about when it comes to designing a new kitchen in a restaurant, not just because it potentially takes up a lot of place (and also a lot of financial funds) and thus requires thorough planning, but also because clean air is essential for the health and comfort of the employees. There are three main attributes to air that we need to monitor – contamination, temperature and humidity. In order to keep these on a bearable level, it is essential to establish proper air conditioning (F. Taksonyi, 2003).

Inside a building, air can be contaminated in several ways. Dust is always present in the air, even if the room is regularly cleaned. Smells are also an important factor, which may come from the kitchen, the restrooms, or even the employees themselves. Cigarette smoke is also a factor to be mentioned, although due to Hungarian national regulations, it is not so relevant in the country. Air temperature can rise due to several factors as well – the heat the employees produce, the lighting, the natural sunlight that might affect the room, and most importantly, the kitchen equipment that generates heat. Humidity is also mostly generated by using these

equipments, but once again, the employees themselves contribute to the humidity level as well (F. Taksonyi, 2003).

The point of an artificial air conditioning system is to dilute this air to a certain concentration level, and then transporting it outdoors, while also providing clean air for the indoor areas. The air conditioning system's performance level indicates how many cubic meters of air it transports each hour (F. Taksonyi, 2003).

In an artificial air conditioning system, the air is transported by the help of ventilators. Ventilators create a difference in air pressure between the room and the environment. When the air pressure in the room is lower than that of the environment, air will be sucked out of the room. This is mainly used in restrooms,

where it is important that the smells do not reach the other rooms. An equal air pressure between the room and the environment is used in kitchens, because when the smoke generated by certain equipments leave the kitchen through chimneys, any other system would cause it to recirculate into the room. A higher air pressure in rooms and a lower air



Source: Rabah Ziane: Halton – Kitchen Design Guide, Halton Foodservice, 2007

**Figure 6: Air ventilation types. The picture on the left depicts low velocity or displacement ventilation. The cool air is distributed with a low velocity, which does not disturb hood function and distributes fresh air to where it is needed. On the right you can see high velocity or mixing ventilation. Supply air is mixed with the air released from cooking, and therefore it disturbs the hood function. Both ventilation types leave 20% of kitchen users dissatisfied, but the displacement ventilation creates improved feeling of comfort over mixing ventilation.**

pressure in the environment is used in hotel rooms and any other guest areas (F. Taksonyi, 2003). For different air conditioning types, please refer to figure 6.

As mentioned above, the system has to also take care of filtering, heating/cooling, raising/lowering the humidity, and under special conditions sterilizing the transported air (F. Taksonyi, 2003).

It is of course possible to use natural air conditioning as well. Since the temperature in the kitchen is almost always higher than that of the environment, air is going to travel between them. Opening doors or windows can create a similar air circulation as in the artificial systems. However, the performance of this type of air conditioning highly depends on the outside temperature, and as such it cannot be controlled. It is also impossible to clean and temperate the air to the ergonomically optimal level (F. Taksonyi, 2003).

### **2.3.8. Lighting in the kitchen**

Correct lighting conditions are an important element in the ergonomics of any establishment. It is not just the strength of the lamps in the room, there are several other attributes to keep in mind (F. Taksonyi, 2003).

Within a restaurant, not every room requires the same lighting conditions. Storage areas require less light than guest areas or restrooms, while the kitchen requires the most light. In the areas where food is prepared, it is important to have strong lighting, as the cooks constantly rely on their sight to determine the quality of the food, the ingredients, to navigate through the kitchen and to use the equipments and tools correctly. (F. Taksonyi, 2003). The table below shows the GHP recommendations for the proper lighting of different areas in a restaurant (the actual laws do not mention specific numbers, only that sufficient lighting is required at all times) (NÉBIH ÉTbI, 2013).

<b>Illuminated spaces</b>	<b>Minimum lighting conditions</b>
<b>Any area where food/ingredients are checked, prepared, cooked, packaged or served, and where dishwashing/maintenance occurs</b>	300-500 lux
<b>Storage areas</b>	150 lux
<b>Restaurant area, changing rooms, restrooms</b>	250 lux
<b>Other areas</b>	60-125 lux



Lighting in our kitchen can either be artificial or natural. Natural light is always a better option, as artificial light hurts our eyes on the long term, natural light is stronger, and not to mention that it is free. However, it is not a viable solution in a household kitchen, and definitely not in a commercial kitchen. A restaurant's kitchen is often too large to be completely illuminated by natural light, glare and shadows are going to be a constant problem, and most importantly, it is not available twenty four hours a day (D. Balogh 2008).

Artificial lights can be grouped into three categories – general lighting, functional lighting and mood lighting (D. Balogh 2008).

The role of general lighting is to illuminate the entire kitchen, to provide sufficient visual conditions for the users to navigate through the room and to see the contents of any shelves, cupboards and drawers. The sufficient strength of this lighting is 300 lux, and at least two such lamps are required in order to avoid glare and strong shadows. The exact number depends on the size and shape of the kitchen (D. Balogh 2008).

The problem with general lighting is that in a kitchen we have to accomplish several tasks with our backs to the light source (when we work with an equipment along the wall, for example) and we cast a shadow on our work station. This is why we need functional lighting, too. Functional lights are designed to provide light for individual work stations where the strength of the general light is insufficient, since the work there requires exceptionally good lighting conditions (D. Balogh 2008).

Mood lighting is usually not an important topic in a restaurant kitchen, as we do not spend our leisure time there. These are light sources which serve a solely decorative purpose, and they are usually present in household kitchens where the kitchen is also a living area (D. Balogh 2008).

It is also generally important for the light to not only be strong enough, but to be consistent as well. Flickering lights are distracting and create unpleasant working conditions. In a kitchen (and any other areas for that matter) the light needs to vibrate at a frequency that human eyes cannot follow (F. Taksonyi, 2003).

Strong lighting can create glare, either because the light coming from the light source is focused on an area too small, or because the objects in the room have highly reflective surfaces (which is especially the case in a kitchen, since many equipments are made of polished stainless steel). Strong glare can be distracting, and may even have a blinding effect, which is especially dangerous in an environment such as the kitchen. If the light from the light source spreads out in the room, this effect is negated (F. Taksonyi, 2003).

In a kitchen, it is important that objects do not cast shadows. If an object gets light from different directions, and also if the light from the light source is spread out more evenly, then the shadows will not be as strong either. In the kitchen, the important work stations will have their own light sources, for example the ventilation hoods above stoves usually have lamps built into them, providing strong and shadow-free lighting (F. Taksonyi, 2003).

The color of any light can be cold, neutral or warm. In a restaurant, we only use neutral and warm lights. This creates a subjectively pleasant effect in people, which creates a better guest experience and working conditions (F. Taksonyi, 2003).

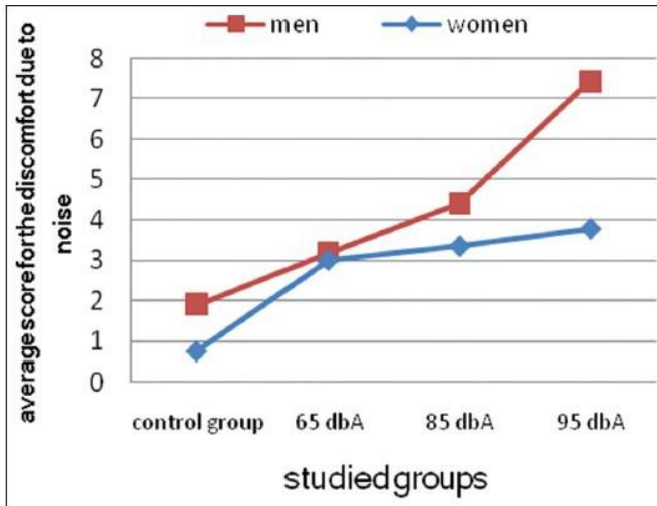
It is also important to mention that once the light sources have been installed in the kitchen, they have to be checked and cleaned regularly, because even the smallest amount of dirt on the surface of the lamp can decrease the quality of the light drastically. This is especially true for the lights under ventilation hoods, since they are constantly exposed to grease, oil and smoke. Because of that, these usually have to be cleaned on a daily basis (F. Taksonyi, 2003).

### **2.3.9. Noise level in the kitchen**

When we are planning a new kitchen, or we are replacing any electronic equipments in it, we always have to consider the noise level of the new equipment. Minimizing the noise level in the kitchen is an essential ergonomical task, because noise has several negative effects on work efficiency. The strength of these negative effects depend on the intensity of the noise, whether it is high or low, how long it lasts, what its frequency is, and of course the personal preferences of the user of the kitchen (D. Balogh 2008).

Noises can hinder our ability to concentrate on our task, to pay attention to details. If it is loud enough, it might deter people from hearing each other talk, which

is detrimental in a facility where constant communication is essential. When people cannot concentrate on what they are supposed to do and they are forced to talk louder than the already loud noise, it makes them frustrated and work will be even less efficient. In extreme cases, loud noises can damage the hearing of the users (D. Balogh 2008). For a study made on the effects of noise on work performance, please refer to figures 7 and 8.



Source: www.ncbi.nlm.nih.gov

Figure 8: A study was made on the effect of noise on the comfort and work performance of people. The participants had to rate their level of discomfort on a scale of 0-10. The results record a leap of discomfort over an exposure to noises higher than 85 dbA. Also, men seem to experience higher levels of discomfort due to noise than women.

Noise intensity is measured by decibel (dB), in case of electronics it is dB(A) – this is the noise level of an electronic equipment measured in laboratories. 0 dB is the noise that is so quiet that we can just barely hear, while 120 dB is the noise that causes us physical pain to hear. Loudness of equipments in a kitchen is much lower than this of course, and that is because they are built with ergonomics in mind. The three noisiest machines in a kitchen are the ventilation

Test for coordination of both hands	Duration of confrontation (minute)	Control group		Case group			P value
				65 dB (A)	85 dB (A)	95 dB (A)	
Speed rate (seconds)	0	71.94 (18.57)*	77.88 (29.83)	79 (26.32)	76.18 (18.47)	0.749	
	20	56.87 (16.75)	68.43 (22.4)	59.66 (19.3)	54.23 (16.61)	0.06	
	40	45.34 (12.4)	59.82 (17.37)	41.15 (9.11)	34.17 (5.23)	0.000	
Error rate	0	4.5 (3.21)	3.7 (4.27)	4.5 (2.02)	4.83 (2.08)	0.622	
	20	3.7 (2.05)	2 (2.48)	2.62 (3.68)	7.08 (6.06)	0.000	
	40	2.25 (1.96)	1.34 (1.46)	2.45 (1.91)	6.46 (2.34)	0.000	

\*Average (standard deviation)

Source: www.ncbi.nlm.nih.gov

Figure 7: The study also shows that at higher noise levels and longer confrontation to the noisy environment, participants showed an increased speed rate in the task they were allocated, probably due to the fact that they wanted to get the job done faster and escape the uncomfortable environment. The error rate increased by increasing the noise, however, by increasing the exposure time no significant difference was recorded.

hood, the dishwasher and the refrigerator. In case of the refrigerator and the dishwasher, their engines are made to be as quiet as possible, and in case of the ventilation hood, the engine is often placed in a different room outside the kitchen. It is important to note, however, that completely silencing these machines is impossible. Even with the ventilation hood, where the engine is separated from the kitchen, we have to calculate with the noise generated by the air flow (D. Balogh 2008).

#### **2.4. Kitchen ergonomics in the 21st century**

In order to gain some insight into the role of ergonomics in the 21st century, I researched information on its prevalence in different professional magazines. I found three articles written in the past twenty years which stood out to me for different reasons.

##### **2.4.1. Renovation of an old kitchen**

In 2002, Szikora Katalin writes about the renovation of the kitchen of a traditional Hungarian restaurant in Siófok (the city is an extremely popular tourist destination in the Hungarian high season). The goal of the renovation was to replace the old, albeit still working equipment, to better optimize the capacity of the kitchen, and to generally modernize the establishment. Another important goal was to prepare the restaurant for the upcoming HACCP standards (K. Szikora, 2002).

The interesting thing about the renovation, which stands as an example to all other restaurants, was that this was a truly traditional, old-world Hungarian restaurant, yet they managed to modernize it without losing its trademark qualities. It did require considerable investment, but the works were done in a little more than two months (in the off-season of course) and on the long term it paid off in several respects (K. Szikora, 2002).

Now they were able to cook the same menu items much faster, as they had better equipment in the kitchen – a blast chiller and a combination oven are just a couple examples. They also had room for more equipments, since the layout of the kitchen was changed in order to optimally use the available space. They were able to make everything fresh, which at the time was not yet a requirement, but customer view on the matter was already undergoing a shift towards recognizing and appreciating freshly made dishes as opposed to pre-made ones. Even more

recognizable was the reduction of electricity bills. While the equipments were costly to purchase, they were more optimally built than the replaced equipments and used less electricity. The new kitchen also adhered to the HACCP guidelines in an exemplary way for the decade (K. Szikora, 2002).

This article goes to show that investment in improving kitchen ergonomics is worth it in more regards than one would initially think. Better working conditions lead to better production value, which in turn leads to both improved revenues and optimized overheads.

#### **2.4.2. A new approach to ergonomical design**

In 2004 Pécsek Brigitta writes about a new kitchen design that was innovative at the time both ergonomically and from a food safety point of view.

The 2zones<sup>2</sup> kitchen was first showcased in France in 2003. It was originally designed for kitchens that serve a large amount of customers at the same time (mainly institutional catering) but it can also be used in any restaurant type. The idea behind this kitchen is that they wanted to come up with a layout that allows small kitchens to have a large output, and in the meantime creates a chain of processes in the kitchen that ensures that the ingredients are always kept fresh and up to HACCP standards. To do this, they separated the kitchen by metal walls into three parallel sections, one for receiving, one for ingredient preparation and one for cooking/baking. The sections are climatized in a way that the ingredients and the hands of the cooks are always kept cool, but otherwise the temperature in the rooms is pleasant to work in. Fresh air is also always provided, and air moves in the opposite direction of the ingredients' route, which means that air from the section with the dirty ingredients never get to the section where the clean ingredients are cooked. This and the separation of the work areas ensures that there is zero cross-contamination of ingredients – a basic HACCP standard (B. Pécsek, 2004).

The 2zones<sup>2</sup> kitchen also makes use of the Gastronorm (GN) system. All of the equipments and containers are GN standardized, and the containers are used to transfer ingredients of different preparation levels between the kitchen sections. These are also easy to clean by machine. All of the above, along with the well-designed sections, minimized walking times and the need to carry objects around the kitchen (B. Pécsek, 2004).

Another factor that makes 2zones<sup>2</sup> an ergonomically good solution is that at the far end of each section there is a large window that provides natural light to the section. As I previously mentioned, natural light is generally better for the eyes than artificial light and it creates a more pleasant working ambiance. Of course, general and functional artificial lighting is still required (B. Pécssek, 2004).

The concept of separating work stations was nothing new in 2003 (B. Pécssek, 2004). The reason I found this article interesting is that the 2zones<sup>2</sup> kitchen worked with an old concept and put its own twist of innovation on it, in order to create even better working conditions for employees and raise the efficiency of work. As technological development moves forward throughout the decades, new and interesting innovations arise, and we must be aware of what can be utilized in our own fields, this time, in kitchen ergonomics.

#### **2.4.3. Dangers of modern kitchen design**

A more recent article written by Ipacs Tamás in 2017 puts a large emphasis on the mistakes people can make when designing or renovating a professional kitchen. The journalist asked three professionals of the trade about the so-called 'gastro-revolution' that took place in Hungary in the past decades, that is, the modernization and rationalization of restaurant kitchen work (T. Ipacs, 2017).

To begin with, all of them agreed that in the past ten years no substantial revolution occurred. There are a few technologies that saw some advancement – combination ovens, dishwashers, air conditioning systems – but we saw most of the development in the rationalization of the technologies – energy-saving methods, using green materials and technologies, hygiene etc. There is even an opinion that a revolution did not happen at all, since these technologies are not yet wide-spread these days. The issue is that many restaurants either refuse to modernize due to their irrational trust in old technologies or because of the high cost, or they implement some modernization but they do so in an unprofessional manner. Buying new equipment is not enough, because if one does not understand how it is supposed to be used, or it is not implemented into the pre-existing kitchen well, then the restaurant is going to make the same mistakes as they did with the old equipment (T. Ipacs, 2017).

In order to design a satisfactory kitchen, three people are necessary. First is the owner of the restaurant, who provides the funds and states his expectations. Second is the kitchen technologist, who knows the legal background, the available technologies and can provide alternative solutions to meet the owner's expectations. Third is the chef, who – based on the owner's expectations – knows the work processes in the kitchen and who is going to lead the kitchen work in the end (T. Ipacs, 2017).

Even then, it is still possible to make mistakes in the design process. It is a common mistake to design the kitchen completely to the taste of the chef. It is not too common that a single chef leads the same kitchen for several decades, and his leaving can lead to several problems afterwards, for instance if he was left-handed and the kitchen was designed for a left-handed chef. It is also a mistake to buy new equipments, but not leave enough room for work surfaces. Instead, people should focus on buying fewer equipments that work better and faster. It is also a tendency to ignore the air conditioning system in the design process, which is one of the most expensive elements of a kitchen and takes up the most 'unnecessary' space. However, proper air conditioning is of high importance, because not only it creates a pleasant working condition for the users, it is also a work safety issue (T. Ipacs, 2017).

I found this article enlightening and relevant because it talks about the more recent examples and aspects of designing an ergonomically acceptable kitchen, and provides a more critical view on the matter than the previous two articles. It also recounts some of the extremes one can go to if the design process is not handled in a professional manner.

### **3. Research methodology**

The literary review I conducted gave me a basic concept on what ergonomics is, where it comes from, why it was needed and how it evolved over the decades. I gained some insight into the different aspects of ergonomic design.

The next thing I set out to do was to get a more thorough picture on where ergonomic kitchen design stands at this point in time, in 2018. What are the goals? What are the challenges? How is everything I learned from my secondary research applied in real life situations?

In order to delve deeper into this subject, I interviewed three of the most esteemed kitchen technologists in Hungary. Two of them are Aczél Pál Tamás and Gauland András, from them I asked a set of questions which are not specific to any real life restaurant, but a la carte restaurants in general (hypothetically set in central Budapest). From the third kitchen technologist, Szabó Tamás, I asked questions specific to one restaurant he worked with, which is the Vintage Garden Restaurant in Budapest. The ergonomical planning of this restaurant posed a set of unusual challenges that required special solutions, which makes it an interesting and illuminating subject matter.

My research method, as mentioned above, was conducting individual interviews. I do not believe that questionnaires or any other quantitative methods would have done this topic justice, as kitchen ergonomics is, when it comes to individuals, a highly subjective topic. It is subjective from the point of view of the employees who work in the kitchen, and it is subjective from the technologist's point of view as well - even though the actual execution of ergonomics is based on science. Furthermore, while it was a possible solution to conduct on-site observation or use other qualitative methods, I believe that asking kitchen technologists' opinions furthers my research better.

It is important to note that the interviews were conducted entirely in Hungarian, since both the interviewees and I are Hungarian. In this paper, each time I cite from these interviews, they are actually translated into English from Hungarian. I have done my utmost to preserve word-by-word everything that was said to me during these interviews.



### **3.1. Questions for Aczél Pál Tamás and Gauland András**

First of all, I asked them to describe the process of planning a kitchen from the ground up, and also when there is an existing kitchen to revamp. I also asked what the optimal duration for such a project is.

My second question was whether there is perfection in kitchen ergonomics, and whether the ideal kitchen exists. I also inquired about how well this particular field is regulated by the law.

After this, I started asking about the different people they had to cooperate with in the process. I asked about the owners of the restaurants, and how specific their ideas usually are about the kitchen when they seek out the help of a kitchen technologist.

I also felt it important to ask about the employees in the kitchen (since they are going to be the ones using it). I asked whether their opinions are ever asked in the planning process, what their usual complaints are, and what the chef's role is in the process.

Since, based on the magazine articles I researched, there is a tendency on the owners' part to cut down on spendings when it comes to kitchen design, I asked what they usually want to cut from the kitchen technologist's plan in order to save money on investment. I also asked what the kitchen technologist would cut from the plan, if it was absolutely necessary.

My sixth question was about the short and long-term consequences of the kitchen not being ergonomical. I wanted to also take note on whether such mistakes can be fixed in the future, either with technology or with financial investment.

The seventh question was about whether there is a service that people can use, where they are given suggestions about how to modernize an existing restaurant. I inquired about how often people use such services, if they exist.

As my final question, I recited the original research question and hypothesis of this thesis for the interviewee, and asked them about their opinions on it. This was a key element of the interviews in my eyes, since this served as final proof of my original ideas being either right, partially right, or completely wrong.

## **4. Research results from the first two interviews**

### **4.1. Aczél Pál Tamás**

#### *The process of planning a new kitchen*

When asked about the process of planning a kitchen, Aczél Pál Tamás made a clear distinction between whether the kitchen is built completely from the ground up or if it is an existing kitchen being modernized. In the former's case, he made yet another distinction between creating a kitchen in a pre-existing building or a building that still has to be built. A pre-existing building gives a set of limitations, but otherwise one has to determine what function the kitchen will serve, which leads to certain outlays the official standards describe, and after that we have to fill it with the right number of equipments, of the right quality.

If the kitchen already exists, then it is either functional and you just need to replace old machines with new ones, or it is not functional and it has to be re-organized and re-designed.

As far as the duration of these processes go, he says that while it can be done in a matter of months (and sometimes it is necessary to work that fast) generally speaking a year on average is more accurate, although according to him, it should be one and a half to two years, which nobody has time for unfortunately. That year involves all the authorization processes, which by themselves take months, the actual planning process that several experts have to work on, and finally the execution itself.

#### *The question of perfection in kitchen ergonomics*

Aczél Pál Tamás is firm in his belief that perfect kitchen ergonomics does not exist, he has seen no example to prove its existence, and the perfect kitchen will not exist in the future either. The reason for that is that ergonomics as a field of study is extremely sensitive to the subject, meaning that one chef might like a certain kitchen design that another chef might not, due to personal preferences (he gives a classic example of design differences between right and left-handed chefs). This, however, does not mean that one should not strive for an ideal state. 'Perfect' is an unattainable quality, but 'ideal' is much more approachable.

#### *The question of official regulations*

The system of standards regulation in this field loosened up quite a bit in the last few years, and several new medium arose to help attain good kitchen practice (GHP, HACCP, etc). However, there are two problems with this system. One is that some rules are still not black and white and give room for authorities to interpret them in whatever way they want. The other is that because of this, authorities (especially on the countryside) often disregard these directives because of personal beliefs. He says that in his opinion the solution is not to make the rules more exact, but to have the right people in the kitchen planning process and have them bear the responsibilities that come with it.

*The question of the involvement of the owner*

The involvement of the owner in the planning process depends entirely on his hospitality experiences. Whether they currently have or had restaurants in the past, and therefore also have a chef to help with the planning, or he is merely an entrepreneur who only knows some basic parameters of what he wants, plays a big part in answering this question. In the latter case, the owner will rely much more on the kitchen technologist's expertise. There is still room for error there, but that is usually due to bad business planning from the business's side.

*The question of the involvement of other employees*

Apart from the chef, the kitchen staff is left out entirely of the planning process. This is due to the fact that they do not know trends and current technologies in the field of kitchen technology, and therefore cannot be trusted to give valuable feedback on what they want. The chef is the person to ask about these things, because he represents the entirety of the kitchen staff. He also has a broader knowledge about equipments, and what he wants to work with. That being said, it does not mean that the chef and the kitchen technologist will always agree on the choices being made. The technologist will probably suggest more modern equipments, while the chef might stick to older ones, the ones he learned to cook with, the ones he knows. In this case, the technologist will of course give him what he wants without much argument.

*The question of cutting costs*

According to Aczél Pál Tamás, owners like to cut costs everywhere and technologists will suggest to cut costs nowhere. Owners are going to want to cut costs because what they see is that the price differences between different options for the same equipment can measure up to hundreds of thousands of forints. He elaborated on the example of HVAC (short for Heating, Ventilation and Air Conditioning), which is one of the most expensive parts of the kitchen. It originally did not use to be an element of kitchen technology, building engineers dealt with it, but the job got pushed to the kitchen technologists in order to better communicate with the owners that expensive equipment is necessary for a well-functioning kitchen. It did not work, however.

On the other hand, kitchen technologists will never suggest to cut costs anywhere because the plans they make represent the ideal state of the kitchen, and anything less than that can only be accomplished by lowering their standards. What Aczél Pál Tamás would suggest in this situation is to simply not build that section of the kitchen, but have that section's job done by external contractors.

*The question of consequences of unsatisfactory kitchen ergonomics*

There are more costs to a kitchen that is not up-to-date than one would anticipate. The main issue here is the energy consumption. For one, we can talk about the energy that goes to waste by not having properly insulated windows (for example in older buildings). Then of course it is important to mention the equipments themselves. A new one can consume half the electricity and a third of the water than a machine made twenty years ago, while also releasing less sewage. The costs generated this way add up over the years to an amount that would enable us to build an entirely new kitchen only after four years (the usual amortization period of a kitchen is ten years). Another important resource one can save on is human resource. If you have a more modern equipment that works faster, you need less employees to work in the kitchen, or the same employees can be assigned to different functions.

If the restaurant failed to modernize properly, by cutting costs in certain parts of the planning process, it is possible to rectify these problems, but it will be costly for more reasons than what was mentioned above. The owner and the

technologist have to start the process all over again, the restaurant has to be closed once more. To sum up, it is more efficient to do everything the right way the first time around.

*The question of an advisory service that helps people with modernization*

The option exists, but whether it is utilized or not depends on how flexible the owner is. According to Aczél Pál Tamás, the best option for the owner is always to ask for the advice of a professional, because it is the cheapest way to go.

*Aczél Pál Tamás's opinion on my hypothesis*

*Research question: is it possible to create an ergonomically perfect kitchen in any establishment, with any kitchen layouts?*

*Hypothesis: it is possible, given that sufficient capital is at the restaurant's disposal. In my opinion, just because a kitchen adheres to the requirements set by the law and has the permit to operate, does not mean that it cannot be improved on ergonomically. Also, while generating profit and customer satisfaction is a direct product of good kitchen ergonomics, the main goal here is to create a good working environment for the employees.*

*„...it is possible, given that sufficient capital is at the restaurant's disposal.”*

As he mentioned above, he still believes perfection is unattainable, but an ideal state is not. The word 'perfect' should be treated with caution, since it is a highly subjective term. The kitchen should be ideal for the people working there, including not just the kitchen staff, but also the person responsible for purchasing, the one responsible for storage, etc.

*„...just because a kitchen adheres to the requirements set by the law and has the permit to operate, does not mean that it cannot be improved on ergonomically.”*

According to him, the problem here is that there are not enough qualified professionals in the kitchen technology field in Hungary (since it is not a subject taught in detail here). While they will plan for the type and number of equipments,

they will forget about providing enough surfaces to put things on. This sort of well thought-out planning is not typical in Hungary as of today.

*„...generating profit and customer satisfaction is a direct product of good kitchen ergonomics...”*

He disagrees with this part completely. Guest satisfaction leads to a successful restaurant, and many successful restaurants have less than satisfactory conditions in the kitchen. Furthermore, guests are not interested in what happens behind the kitchen doors.

#### **4.2. Gauland András**

##### *The process of planning a new kitchen*

Concentrating more on the tasks preceding the planning process itself, Gauland András explained some of the basic inputs one needs to make a plan for a new a la carte kitchen. Depending on whether there is an owner or not, we can get more information on what they want or just the basics. Some of the important aspects are how many people the restaurant is supposed to serve and what food it will provide – based on this, we might not even want to create a full kitchen, just a finishing kitchen. Also, based on where the restaurant is located, it could have access to supplies daily, weekly, etc. This will determine the size of storage spaces.

The time the planning and implementation takes varies, but he says that the minimum is usually a month. If it takes six months, something definitely slowed down the process. Also, based on his experiences, deadlines set for finishing this process are never met. This is either due to mistakes made during the execution phase, or poor planning. If everything is planned out well, the restaurant should have a few weeks before the actual opening to test the new kitchen's capabilities and rectify any mistakes that might arise.

##### *The question of perfection in kitchen ergonomics*

Gauland András says that perfect ergonomics does not exist as of now, but it could possibly be created if there is enough space available in the kitchen. However, space is always very limited. If it is limited, you sometimes have to arrange things in the kitchen in a way that makes it possible for people to work in it, but not in an ideal way. As an example of why perfect ergonomics does not exist, he mentions an

initiative for the perfect kitchen he saw at one point. The kitchen in question had no corners anywhere, all of the counters had an amoeba shape, but because of this some square equipments that were put on top of them had corners off the counters, and it was also difficult to integrate outside equipment into this system.

#### *The question of official regulations*

Regulations in Hungary are generally a lot more strict than in Western EU countries. This gives much more freedom to Western countries, they do not have to build as many separate rooms for different processes as we do, therefore they can establish kitchens in smaller spaces, while we have to build more walls, connect the HVAC to more rooms, etc. However, these lighter regulations are for a reason, for example in Western restaurants most of the ingredients arrive in the kitchen already washed, peeled and cut, therefore they do not need preparation areas and separate storage rooms for contaminated ingredients. On the other hand, it gives them more freedom to make unhygienic decisions in the planning process. Hungary's stricter regulations protect us from food contamination.

In spite of that, the problem remains that these strict regulations are not always well-defined, which gives authorities more freedom to say no to anything they do not like than what they should have.

#### *The question of the involvement of the owner*

Once again, based on his past experiences, the owner will or will not have definite ideas about the kitchen being built. Because of this, the chef becomes an important player in the planning process. There are two problems with this. One is that the chef might decide to leave the restaurant before it opens, in which case we have a kitchen built for the needs of someone who is no longer there, which the next chef might not appreciate. The second problem is that chefs are usually not knowledgeable about technological planning, and it is difficult to make them understand what the technologist drew on the plan.

#### *The question of the involvement of other employees*

Gauland András agrees that the rest of the kitchen staff are not involved in any way in the planning process. The chef represents the entire kitchen in this regard.

He once again reiterates how difficult it can be to cooperate with a chef when the chef does not see the big picture of the planning process.

*The question of cutting costs*

The owners like to cut costs on the entire kitchen. When one builds a new restaurant, the last thing to deal with is always kitchen technology, so it is usually the phase where the funds run out. At that point the owner is mainly going to save costs on brands, going from a more expensive version to a cheaper one. They also like to cut costs on things that are seemingly unimportant, like the bent plinth you place on the edges of the floor or the quality of the tiles. These omissions are going to possibly raise serious health issues on the long term.

The technologist will never suggest the owner where to cut costs, mainly because owners do not ask them for advice. In the course of the planning process, it is very rare for a restaurant to ask for the technologist's advice on exactly what equipments to buy, and to supervise the project from beginning to end. Only large, serious companies do that.

HVAC is one of the areas that suffer a lot in this regard. The main problem is that when it comes to calculating the air exchange needed in certain rooms, wrong numbers are used, because the standards are not clear enough. One example of when the implementation of HVAC is problematic is when you try to open a restaurant on the ground floor of a residential building. To conduct the air you usually need to use the pipes in the elevator shaft, but those are rarely ever satisfactory, they cannot conduct the amount of air necessary to provide the right air exchange for the kitchen. Another problem is the price of the ventilation hoods. These can range from 400 thousand to 2.5 million forints, and while it is tempting for a lot of restaurant owners to choose the cheaper one, it will not be able to do its work properly.

*The question of consequences of unsatisfactory kitchen ergonomics*

The answer is higher costs. The difference between a cheaper and a more expensive equipment is that the more expensive one was developed with greater care. That machine was not just assembled, but tested and carefully developed. Producers of cheaper equipments want to sell as many of them as possible, they are



not interested in fixing broken ones. More expensive equipments are going to last longer, and they also consume less resources.

In theory, these mistakes can be corrected after the fact, but it is going to be costly. Re-selling the old equipment used is not an easy task either. In practice, however, people usually commit to the bad decisions they made, and they are going to keep using the faulty equipments until its amortization period (according to bookkeeping) is over. It is also important to mention that getting the right equipment does not always lead to a successful kitchen either, because if the staff is not prepared to operate it correctly, then the purchase was in vain.

*The question of an advisory service that helps people with modernization*

It does not have much to do with the kitchen technologist. It is usually up to the chef if he decides that he wants to work with a new piece of equipment (for example if he saw it at an exposition) and whether the owner is going to agree to buy it.

*Gauland András's opinion on my hypothesis*

*Research question: is it possible to create an ergonomically perfect kitchen in any establishment, with any kitchen layouts?*

*Hypothesis: it is possible, given that sufficient capital is at the restaurant's disposal. In my opinion, just because a kitchen adheres to the requirements set by the law and has the permit to operate, does not mean that it cannot be improved on ergonomically. Also, while generating profit and customer satisfaction is a direct product of good kitchen ergonomics, the main goal here is to create a good working environment for the employees.*

*„...it is possible, given that sufficient capital is at the restaurant's disposal.”*

That part is not true. For example, if you want to create the perfect kitchen in a historical building, you will not be able to knock down walls to make enough room, no matter how much money you have. From that point on, the kitchen cannot be perfect because you have to arrange equipments in a way that works, but is less than satisfactory.

*„...generating profit and customer satisfaction is a direct product of good kitchen ergonomics...”*

That part is not true either, because guests can be completely satisfied with the service they get without knowing how bad the situation is in the kitchen.

*„...the main goal here is to create a good working environment for the employees.”*

The most important employee is the chef, of course. The kitchen has to be tailor-made to him, and what is good for one chef might not be good for another one. This is why it is important to have the chef at hand at the planning process – it is possible to create a generally satisfactory kitchen for any chef, because there are general ergonomical guidelines that one can follow, but these are not set in stone, and the best results will come from cooperation between the chef and the technologist.

On a different note, Gauland András also mentions the importance of working surfaces in the kitchen, and how a lot of technologists do not calculate with having enough of those. This is a vital part of any kitchen, and their absence is clearly felt when the staff starts using the kitchen.

## **5. Analysing results from the first two interviews**

### **5.1. The distinction between „perfect” and „ideal”**

When I first started writing this thesis, I used the word „perfect” rather frequently. As I went on and conducted my interviews, I learned that „perfection” is a highly subjective term and should be treated with great caution. One cannot create an objective definition for perfection, because the elements of such definition depend highly on the person in question.

The same applies for kitchen technology and ergonomics. The reason it is not possible to create an objectively perfect kitchen is because no two chefs are the same, and if it was perfect for the first one and then a second one comes, the new one will most probably find something he is not satisfied with. The solution here is to abolish the term „perfect” and create an „ideal” solution instead.

An ideal solution means that we create a kitchen that is going to work for the average chef. This means that it does not matter if the chef happens to be exceptionally tall, because if we purchase furniture that is ideal for him, it is probably going to be unusable for the rest of the staff, if they are of average height. This is what the theory of kitchen ergonomics tells us (that is, everything I have uncovered in the literary overview). While it is possible to completely cater to the needs of the chef we currently have in our restaurant, it is unwise to make such a large investment for one of the mobile elements of the restaurant team. An ideal solution also implies that while we do not always have the best equipment in the market, at the point of acquisition we made an ideal choice based on long-term payoffs in mind (more on this point in later chapters).

### **5.2. The reasons for unsatisfactory ergonomics**

The truth is, however, that in spite of the kitchen technologists’ understanding of the term „ideal”, ergonomical conditions in a lot of a la carte kitchens are still less than ideal. In my research above, I set out to uncover some of the bigger reasons why that is so.

The essential element that pre-determines whether the kitchen has the possibility to become ergonomically ideal is its location. The type of building or establishment the kitchen is part of is crucial for its ability to function in a

satisfactory way. The ideal solution is always to build the kitchen and the building around it from the ground up, and everything else will face us with a certain degree of limitation. If we want to establish it in a pre-existing building, that will limit us. If the building happens to be of historical value, that gives us even more limitations. The worst case is usually when the kitchen is not even in a building, but on a ship. In such places it is almost always impossible to create ideal ergonomical conditions, because the available space, the heights, the unavailability of satisfactory HVAC system, etc, will not allow it.

That is not to say that small spaces cannot be used for certain types of kitchens. What any owner should consider is that a kitchen does not have to be able to do everything. If we do not have the space for certain functions (i.e. a pastry kitchen) then the owner might want to consider outsourcing that function, or maybe even abolish that function from the plan altogether, instead of including it to the detriment of the other kitchen functions.

Another reason for unsatisfactory kitchen ergonomics is the lack of real qualifications on the technologist's part. While the subjects of this thesis are based in Hungary, it is safe to assume that this issue is not exclusive to this one country. In Hungary there is no university where one can major in kitchen technology. If one wants to become an expert in this subject, they have the chance to study abroad (i.e. in Germany) but the best way is to gain knowledge and experience throughout years of professional practice. A large number of kitchen technologists in Hungary do not have either of these. Therefore it is highly possible that an owner might put his faith into a technologist who is actually not an expert in this subject.

The chef can also be a detrimental element to the overall ergonomics of the kitchen. What I learned from my research is that chefs do not always want what is best for the kitchen, but rather they want what is best for their own personal professional needs. Sometimes they would rather use an old, obsolete piece of equipment rather than the modern, cost-effective one, because that is what he learned how to use, that is what he believes in. If the kitchen technologist gives enough room for the chef's wishes, the chef will create working conditions in the kitchen that is going to be unprofitable on the long-term.

Time is a limited resource when it comes to building or modernizing a kitchen. Depending on where the kitchen is, it might not be possible to give the process the time it ideally requires – for example, if the kitchen is part of a tourist attraction, it is probably not possible to close down the area for construction for more than a few weeks. However, poor planning may contribute to this issue as well. When we plan, we have to calculate with possible delays, and we should also give the kitchen enough time to conduct a test run at the end of the execution phase. The latter is something that is often left out of the planning process, even though it is a crucial step in order to make sure that everything in the kitchen works well.

Apart from time, obviously money is a limited resource. It is true that restaurant owners will create an initial budget and they will have the plans done based on that, but more than often they fail to calculate with two important factors. One is inflation, meaning that at the end of the execution (which might be years after the original planning) he will essentially have less money left for the last phases than originally planned. The other factor is not calculating with possible extra costs that arise during the execution. The result is that there will not be enough money for the last phase, which is always kitchen technology. This is where owners will want to cut costs, which leads to unsatisfactory ergonomics.

At this point, owners often fail to realize an important point, one which is one of the main findings of this thesis – that anything less than ideal is lacking. Qualified kitchen technologists will make their plans to make the most out of any kitchen layout. This includes taking the measures to avoid safety and health hazards, and also purchasing the right equipments of the right quality. This, of course, costs considerable amounts of money, and owners and investors will be tempted to choose cheaper alternatives that get the job done, only not quite as efficiently. However, that way of thinking is incorrect. Cheaper alternatives will never be able to do the same job as the expensive equipments. In fact, beside not being able to function up to the restaurant's (and sometimes the law's) standards, they are going to generate considerably higher costs, will amortize faster, and it will be almost impossible to re-sell them.

At this point I started to wonder why these cheap alternatives are even on the market. The manufacturers know that their equipments are sub-standard, they do

a poor job compared to the quality counterparts, and they often do not even offer a repair guarantee. I found two reasons for the availability of these machines. The optimistic route to take is that these cheap machines are actually good, only they are not good for commercial kitchens. It is not a rare occurrence that an owner will invest in an equipment (i.e. a stove) designed for home use, and the equipment will not survive long since it was not tested for the strain of commercial use. The less optimistic approach to the matter is that some manufacturers produce cheap items especially for the people who are not willing to pay the price for the good equipments. This goes to show that in the capitalist market, where there is demand, there will be a supply.

### **5.3. The effect of regulations, or lack thereof**

It is easy to see that the regulation system in Hungary is rather more strict and complicated than in most Western countries, which shows a contradiction with the fact that most of these regulations can be and are loosely interpreted. First I am going to address the first half of that statement – whether such a strict regulatory system is necessary?

Every country has to consider what their priorities are when they put new regulations in effect. In case of rules that regulate the workings of commercial kitchens, rulemakers have to consider that if the rules are too strict, it will discourage people from opening new businesses there. If the rules are too loose, they are going to pose a threat to work and food safety – in theory.

The interesting thing about this is that Hungarian directives are generally overly strict when it comes to commercial kitchen regulations, as opposed to those of Western EU countries, yet you do not hear news of food safety epidemics from Western countries any more than from Hungary. From this I deduce that in Hungary, some or many of the directives are unnecessary. That raises the question why that is so. My theory for that is that this is part of our tendency to show to the world that we want to belong to the West, and we take these matters seriously. This particular point requires further research and discussion, though.

These latter points are also somewhat ironic, seeing that although the directives are strict, the system of authorization is often loose and subjective. It seems to be a problem in general that the power is often in the hands of people who

are not up-to-date on the changes in the regulatory system, and they are not held accountable for the decisions they make.

#### **5.4. The problem of the chef**

I have begun to discuss some issues that arise from the subjectivity of the chef earlier. I find it important to mention a few more points in this regard.

What I gathered during my research is that in an ideal planning process, the chef is going to take part. I also deduced from the two initial interviews that in many cases chefs have the final say in most matters – for instance, what equipments to use (based on personal preference). The chef is also the only person asked for his opinion among the kitchen staff when it comes to re-designing a kitchen. Based on these points, one would assume that the chef is a highly powerful character in the process of technological planning.

This idea goes against the fact that chefs are normally not experts at the subject of kitchen technology – they do not know the technical background of the equipments, they do not know the full range of machines currently on the market, and they are usually not really good at interpreting plans on paper, since they are practical people. Another counter-argument to the power of the chef is that the chef is not always even present in the planning process, or at the restaurant at all. Sometimes kitchens have to be built without any of the staff members in mind.

One could argue that in spite of these counter-arguments, in reality the presence of the chef always has an influence on the planning process, and as such will pose a threat to kitchen ergonomics. In my opinion, that does not have to be so. Creating the ideal kitchen should not come from the involvement of the chef. This, however, goes against my initial definition of „ideal”, which is why I am going to create a new double definition for the word. What is subjectively ideal is ideal for the person currently working in our kitchen. What is objectively ideal is a solution that will cater to the needs of the average person, and in turn to most people.

#### **5.5. The effects of good ergonomics**

Apart from listing the innumerable consequences of faulty kitchen ergonomics, it is important to mention the benefits of a good one.

One of the main reasons ergonomics exists (especially from the authorities' point of view) is to create a safe and healthy work environment for the people working there. If you have the right kinds of equipments, if you do not cut costs on the safety measures, your kitchen is going to be easy to clean, easier to keep clean and to avoid an infestation of bacteria and larger critters that may carry them. Also, as I mentioned in the literary overview, the correct heights, seeing and hearing conditions, etc, will contribute to healthier, more productive employees.

Employee productivity is one of the end goals of creating an ergonomically satisfactory kitchen, but it is also important to mention machine productivity. By having the right kind, quantity and quality of equipments, the employees will have the opportunity to work more efficiently, but the machines themselves are also going to be more efficient. They consume less electricity and water, emit less sewage, and going to amortize slower than their cheaper counterparts. All of these will result in an optimization of costs. It will also result in an optimization of productivity, since these equipments work faster than older ones.

This in turn creates a loop that I found rather interesting. If machines work faster and more effectively, then the workload of the employees whose job it was to work on these machines will reduce. These employees can be assigned to other work stations, which is unlikely to happen unless the kitchen is expanded to serve more functions. This results in employees being fired. To sum up, the ideal state of kitchen ergonomics will result in the reduction of the kitchen staff, meaning that ergonomics is actually actively working against employees.

This goes completely against my initial literary research. One has to keep in mind, though, that the literary review talks about the history of kitchen ergonomics, and this field of study was mostly developed with residential kitchens in mind. I believe that what happened is that when the idea of ergonomics was transferred to commercial kitchens, it branched out into two separate fields of study – ergonomics of the people and ergonomics of the machines. These days, while both are relevant (especially since the human touch cannot be completely excluded from the kitchen as of today) the ergonomics of the machines seem to take a more central role these days, because, as discussed above, they are the cornerstones of kitchen productivity.



### **5.6. Re-visiting my hypothesis**

In this part I am going to go over the different points of my research question and its hypothesis, in order to evaluate them in my own words, based on my research so far.

*„Is it possible to create an ergonomically perfect kitchen in any establishment, with any kitchen layouts?“*

No. The decisive answer to that question is that no matter how much capital one has, there are certain situations where money will not be able to solve the ergonomical issues – lack of space, immovable walls, impossibility to install the correct HVAC system, etc). Another reason why the answer is no is because as of now, the ergonomically perfect kitchen does not exist. The only way at this point to make a „perfect“ kitchen is if we exclude all humans from the kitchen operations, and even then it might not be entirely possible, for the reasons mentioned above (lack of space). Replacing the term „perfect“ with „ideal“ in the question will not make the answer yes either.

*„...just because a kitchen adheres to the requirements set by the law and has the permit to operate, does not mean that it cannot be improved on ergonomically.“*

This part of the hypothesis is true. Authorities inspect some, but not all aspects of ergonomics when authorizing a kitchen. They will evaluate the kitchen from a work safety and food safety point of view, but whether it is ergonomically ideal for the people working there is not their concern. If one visits some Hungarian a'la carte restaurant kitchens, it is easy to see that it is possible to run a prospering business with less than ideal kitchen conditions.

*„...generating profit and customer satisfaction is a direct product of good kitchen ergonomics...“*

This statement proved to be half true. Profits should definitely increase if the ergonomics in the kitchen is up to standards. With the right equipments and the right organization, productivity on the machines' and employees' part should increase, while the costs should decrease (material costs because of utilities, and labor costs because we will need less employees in the kitchen). This does not mean,

however, that it is impossible to create a prospering restaurant with a substandard kitchen, but the kitchen should see a profit increase once the kitchen is modernized, given that no other circumstances change.

The part about customer satisfaction is not true. One could find ways to imply that a faulty kitchen ergonomics will indirectly affect the workings of the frontline of the restaurant, and thus result in guest dissatisfaction. However, generally speaking the two are not correlated in any way. As long as the guests receive what they came to the restaurant for – pleasant ambiance, excellent service, delicious food – then they are going to be satisfied, no matter what goes on in the kitchen.

*„...the main goal here is to create a good working environment for the employees.”*

While this is true in theory, it depends on what we call the „main goal”, and whose goal it is. Directly the goal is to create good working conditions for the employees, but the end goal of the owner is to increase profits, the end goal for the chef is to create the right conditions for himself (generally speaking) and the end goal of the authorities is to make sure that the kitchen is up to work safety and food safety standards. Good working conditions for the employees are merely the tools to achieve those end goals.

If we accept my previous statement that kitchen ergonomics branched out into two different fields of ergonomics – employee and machine ergonomics – then we could argue that this part of my original hypothesis is false for even more reasons. As of today, the ergonomics of the equipments seem to take a more central role in commercial kitchens than the ergonomics of the employees. Also, good kitchen ergonomics results in the reduction of the number of employees, so it is near impossible to side with the statement that ergonomical improvements are for the benefit of the staff.

## **6. Research results from the third interview**

### **6.1. Interview with Szabó Tamás**

As mentioned above, the third interview I conducted is somewhat different from the two above. In this interview I did not ask questions that generally apply to every a'la carte restaurant. Instead, I asked questions about one specific restaurant that kitchen technologist Szabó Tamás worked on, a project which concluded with success. The restaurant in question is called Vintage Garden.

Vintage Garden was opened in 2014 in District 7, Budapest. The owner of the place originally owned a flower shop, and decided that he would like to venture out into a different business segment. The restaurant boasts a chic interior design and a menu that is an exciting mixture of familiar flavors and modern cuisine. Ever since its grand opening, the restaurant has been a huge success, which could be regarded as a miracle considering the design difficulties it had to face. Vintage Garden was established in a pre-existing building in downtown Budapest that was never meant to house a restaurant, and which already had a hostel operating in it. Nevertheless, the idea was executed and the restaurant works, so I decided it would be edifying to find out how they managed to do it, from the point of view of the kitchen technologist who worked with them.

I based my questions to Szabó Tamás on my findings from the previous two interviews. That is, I modified and added questions based on the knowledge I acquired from the other kitchen technologists. Below you can read a short summary of the answers (for a translation of the full interview, see the Appendix).

*Questions regarding the involvement of the owner, and the partnership with the kitchen technologist.*

The owner of Vintage Garden had no catering experience prior to the opening of said restaurant. He decided to put his faith into the expertise of Szabó Tamás, which the kitchen technologist of course encouraged. Szabó Tamás believes that creating a bond of trust and professionalism between the parties is essential in order to successfully accomplish a project. In that regard, the owner acted in a highly professional manner, putting aside his worries about costs and prioritizing the long-term quality of the kitchen and the restaurant.

In fact, this cooperation worked out so well that since the opening of Vintage Garden, the parties worked together twice to establish and open two more restaurants.

*Questions regarding the building, the limitations it posed, and the aspects they could turn into advantages.*

The restaurant was established in a pre-existing building that houses a hostel. This means that there was very little they could architecturally do to the building – there were walls they could not knock down, spaces they were unable to expand, and so on.

One of the limitations they could turn into an advantage was the narrow passageway (see figure 9 in the analysis) leading from the welcoming area to the restaurant area. The reason it had to be narrow was because the kitchen right next to it. The way they dealt with this is that they implemented a glass wall between the passageway and the kitchen, thus showing the guests the reason behind the passage being narrow. The open kitchen proved to be a success that produced many positive feedbacks.

The largest issue about the back office was the fact that the majority of the kitchen operations (storage, preparation, pastry kitchen) had to take place on the basement level, and the open kitchen was not even right above these. A staircase and a staff corridor had to be implemented – while it is not an ideal solution, it works.

The third and probably most important issue to be solved was an issue of cross-contamination. The food coming from the basement level into the open kitchen crossed the route of the people coming through the main entrance of the hostel. The way they solved this problem was that they vacuum seal every food item coming from the basement, or else they put them in sealed containers, thus avoiding cross-contamination.

*Questions regarding the planning and execution process*

When the planning process was started, the restaurant had no staff at all. As mentioned in previous chapters, this is usually regarded as a disadvantage, because having a chef around for feedback is generally helpful. However, not having a chef

around in the Vintage Garden meant that they could plan the kitchen without dealing with the personal preferences of one given chef.

After the presentation ceremony of the kitchen, the restaurant remained closed for another two months. During this time all the staff was hired and trained, suppliers were chosen, and the menu was finalized. This way the restaurant was tested multiple times and the employees were well prepared by the time of the grand opening.

*His opinion on my research question and hypothesis.*

Szabó Tamás believes that creating an ergonomically ideal kitchen is only easy in theory, because in reality money cannot help us much when the available space is not sufficient. He also states that in his experience, ideal kitchen ergonomics and good working conditions are not even a preference when it comes to planning a new kitchen. Owners will want the guest areas to look as good and be as large as possible, while neglecting the back office areas. They do not consider connections between the state and workings of the kitchen, and the profit increase and guest satisfaction it might or might not produce.

## **7. Analysing results from the third interview**

This interview provided me with a positive example of cooperation between owner and technologist. It proved to me that this kind of proceedings can and do exist, and not everything is as bleak and negative as I deduced from the previous two interviews.

### **7.1. The owner's role**

The most important thing I deduced is an elevated importance of the owner. In the interviews with Aczél-Pál Tamás and Gauland András, they put more emphasis on the role of the chef, what the chef can help with, what kinds of challenges do the views and wishes of the chef pose, and how important the chef's opinion really is. Here, there was no chef to begin with, and nobody played a similar role to the chef either – that is, nobody else in the business had cooking expertise or gave voice to suggestions a chef would normally make, not even the owner. This proves that once the kitchen technologist has all the necessary information, he can successfully complete a project from start to finish, without the involvement of anyone in the restaurant.

That might raise the question: how important is the owner then? The answer to that is that he is of the same importance as the technologist. Without the right attitude from the owner, the technologist would never be able to accomplish any success with the kitchen he is working on. The case of the Vintage Garden proves this. The owner acted in a professional manner by letting the kitchen technologist have his way. It might also have stemmed from his inexperience as a restaurant owner, of course, but the fact that two other restaurants were later born from the same cooperation proves that he was always ready to put the needs of the business in front of his short-term gains.

This is further proved by the fact that he did not want to open the restaurant until he was sure it could serve customers with high standards. This attitude is rare today in Hungary, seeing one's business as something to take pride in instead of just a source of profit. Obviously the former view will likely produce profit as well, but the difference between the two views lies within the owner's ability to distinct between short-term and long-term goals.

## **7.2. Turning limitations into advantages**

The other important point to make is that not every limitation in the planning process will hinder the workings of the restaurant. The case of the narrow passageway (see figure 9) is a good example to this. This solution required resourcefulness from the technologist, and open-mindedness from the owner to try something that was not part of the original vision.



Source: ASSUR Kft.

Figure 9: the kitchen and guest area of the Vintage Garden. The bottom and rightmost areas are the guest area, the room in the center of the blueprint is the kitchen. The passageway on the bottom side of the kitchen is too narrow, so they decided to open up the space by implementing a glass wall between the guest area and the kitchen.

Of course it can be said that an open kitchen could have been implemented even if the passageway was wide and there was no need to open up the space. While this is true, it can be argued that in this case, the immediate need for a solution was the source of inspiration. By that I mean that if there was no need to open up the space, they might not have thought of creating an open kitchen. Large restaurants with less limitations do have the resources to re-create lots of different ideas, but small restaurants with more limitations also have the option to implement some bigger ideas, if creative people are working on them.

## **7.3. Health risks and authorization**

The Vintage Garden had every opportunity to fail in regards to legal authorization. The reason it did not go that way was a mixture of cooperation with the hostel, common sense, and possibly some luck with the authorities.

Monitoring the danger of cross-contamination is one of the highest priorities when it comes to authorizing a new restaurant – rightly so. In case of Vintage Garden, there was a high risk in that regard, but they managed to solve the problem. Usually when two ingredient routes of different cleanliness level cross each other physically, the best way to go around this is to separate the two routes in time. This was not possible here, as the ingredients had to be constantly delivered from one level to the other. They tried a third solution with vacuum sealing.

While that is an obvious choice to make, there was still a possibility for the authorities to deny giving the restaurant a permit to operate. As I learned from the previous interviews, authorities will sometimes do their job based on personal preferences. It is true, however, that that issue is more relevant on the countryside.



## **8. Conclusions**

When you dwell into one specific topic deep enough, you will be surprised how many layers it has, how much more there is to it than you initially thought. When I came up with the idea to write my thesis on this topic, I felt like I had a solid foundation to start from. Now I realize that back then I had been flying, and now I came back to earth, so to speak.

The topic of kitchen ergonomics in a la carte restaurants goes way beyond the boundaries of what one learns in class. While it is indeed an interdisciplinary science that creates an ideal working environment for the kitchen staff (the literary overview in this thesis confirms this) that is only the theoretical background to a multi-dimensional practice, and ultimately, a tool for financial gain.

Kitchen ergonomics is a business, one that deals with machines just as much as – or arguably even more than – humans. As such, it concerns not only the kitchen staff, but the owner, the technologists, the financiers and also the manufacturers of these machines. They also have, directly or indirectly, a say in the matter of making one specific kitchen successful.

While on the topic of whom kitchen ergonomics benefits, I have come to the realization that the closer kitchen ergonomics gets to an ideal state, the less it is concerned with the people who work in the kitchen. In an ideal situation, machines are so efficient that human resources are only scarcely needed. In the highest quality kitchens today, there are not many employees working, and as we move forward and more and more kitchens raise their technological standards, the average employment of commercial kitchens will go down drastically.

I have also come to the conclusion that in kitchen technology – just like in many other aspects of life – perfection is unattainable. Limitations will always exist to some regard, and if they are not physical limitations, the people working there will become the limitations themselves. As we are all different, our needs are going to be different as well. That is why kitchen ergonomics creates standards for the average user, and not for the individual user. Otherwise there would be no point of the science to exist.

Of course there are aspects of the reality of kitchen ergonomics that this thesis was not concerned with. I have not talked about the deeper political

background of the decisions made by catering businesses or authorities. Also, my thesis might be considered somewhat biased, since I only interviewed kitchen technologists, and was not concerned with what the other side would say. I did so with the belief that the kitchen technologist always wants what is best for the contractor. However, further studies might show examples that clash with this view. That is a research topic for another thesis.

Even so, I believe that I have given a fair overview of what commercial kitchen ergonomics looks like at this point in time. I conclude this thesis in the hopes that my research is going to be as illuminating to any future readers as it was for me.

## **9. Appendix**

### **9.1. Interview with Aczél Pál Tamás**

*Describing the process of planning a kitchen from the ground up.*

When we plan a new kitchen, that is a comparatively more simple situation, because then the kitchen technologist defines the parameters by which the kitchen can be built. In the first steps, these are spacial parameters that concern the ground plan. The reason I made a differentiation between already existing and new kitchens is because an already existing kitchen has pre-determined features that we need to take into account. In a new kitchen, which is called a "green field project" (*in Hungarian: 'zöldmező beruházás'*) the only really important premise is the size of the building plot and how much of it can be used for buildings. Within this we have to determine what function the kitchen will serve. This function is in connection with certain operations, to these operations we connect certain rooms, and these have a connection system that are regulated by standards, different directives. Based on this we have to plan a scheme of function, this function will eventually become some sort of ground plan, and from this point on the task is to determine what equipments are needed, how many, where to install them, and how they can be inserted into the correct order of work processes.

*In case there is a pre-existing kitchen that we would like to modernize?*

That depends on how that pre-existing kitchen can serve its function. If the kitchen functionally works well, then it is the machines that have to be replaced with up-to-date ones. If there are problems with the functioning of the kitchen, then a lot of the times that kitchen has to be re-organized, and that is a whole different story than what one originally expected. So, the kitchen's interior design will become absolutely different from what it was before.

*How long is this process for a new kitchen?*

This absolutely depends on the size of the kitchen. But generally speaking, in the current situation it is one year on average. (*Here, I refer to the article that tells about the restaurant that was re-designed in just two months.*) Well, building technology has limits. When constructing a new building, then a certain structure has to be built first, because this influences the well-being of the building later. So these

two-three months - yes, this exists, and in already existing buildings, like the Buda Castle, they do not close the building for longer than that. (*Here he refers to a work he took part in that was completed within 2 weeks*). But these are not normal. If you make a new kitchen, you have to have it authorized. Until you get a building permit, you cannot execute the plan, because the regulations prohibit it. Making the plan, involving not just me, but the builder, the electrician, etc, if the building is not too big, is done in two months. You hand in the building plans, they are judged and authorized in thirty days. We are at three months and nothing was built yet. The construction plan is another two months, so now it is five months total, and now we can proceed to the execution. If that is done in seven months, then we arrive at the one year that I talked about. But to this day I say that a normal kitchen in a normal building should be built in 1.5-2 years. But nowadays nobody has time for that.

*Is there perfection in kitchen ergonomics?*

Obviously not, but obviously we can aim for it. Why not? Because when you plan a kitchen, you do not know whether the chef using it is left or right-handed, just as a simple example. If he is left-handed, he will not like a kitchen that right-handed people use. Perfect ergonomics could be achieved if you already have the person working there at the start of the planning process, if you are an exceptionally good technologist who knows everything about this field, you know the entire list of available technology and you have the time to look it all up, and you can organize all processes (*he gives examples for these*). Sure, you can do that, but I think it never happened and will never happen.

*How much is this field regulated by law?*

Earlier, it was absolutely over-regulated. Up until 4-5 years ago, it was a highly regulated field, which had many problems, because there were some faulty statements in these regulations. Now it actually loosened up a bit. Now there is ordinance number 62, there is Good Hygienic Practice, HACCP and many other things, but even in these there are wrong statements. Also, and this is the biggest problem in Hungary, the authorities pre-destined to judge, especially those on the countryside, are in an old regulation system, they grew up in it, got used to it, and stick to it. It does not matter if I tell them, 'here is the new ordinance, this says that the black and white dishwashing can be done in the same room', they say, 'alright, I

believe you, but I do not allow this'. And then what can you do? So there is regulation, but a lot of things are still not definite, and also the scope of the regulations is not as clear as it should be. (*I ask whether having all of that in writing is what is needed.*) I think what is needed is that only those technologists should be allowed to make plans who have the authority, which is absolutely not the case, and they should really bear the responsibility as well. In fact, there is no need for a lot of regulations, not even half of what we have now. But the system of responsibility should be defined much better. That is how it works in the West. (*He gives an example regarding waste storage, and how differently it is 'regulated' in Hungary from Western EU countries.*)

*How specific are the ideas of the owner when seeking out help from a kitchen technologist?*

That varies a lot. That depends on whether the owner has or had a restaurant before or not. If they had, then they have experience. There is a chef that works there, who has requests. But if the owner wants to start a hotel that requires a kitchen, then most of the time they do not know what they want. They know that there is going to be a 300-guest-150-room hotel, so there will be 300 people to serve breakfast to, a certain number will require lunch and dinner, and the owner needs a kitchen for this. They more or less leave the rest of it to the kitchen technologist. Maybe later they say that this does not work, there was no need for this much space after all, because maybe only half of the planned guests have lunch in the hotel, and such.

*I ask whether the kitchen employees are ever asked for opinions in case of a pre-existing kitchen.*

Not in any way. It would be difficult to handle. For example, walking up to the employee washing dishes and asking them what kind of dishwasher they would like, this does not work. The chef is the leader of the kitchen, who is responsible for the kitchen professionally, and sometimes even financially. He knows everything, he is aware of the jobs of the kitchen employees, knows which of them to assign to which station. (*Here he gives examples of the different assignments within a kitchen. He also talks about how Hungary has many excellent chefs, and how the technologist has to trust him in the planning process.*) Maybe I am smarter in this

field than the chef, but he is the one who is going to work there, and if he says that he understands what I am saying but this is not what he wants, then I am not going to argue with him about which equipments to use. Somebody likes to work with modern equipments, others will want to work on old equipments because he finds those better. And then when a new chef comes, he will ask who in their right mind would design a kitchen like this.

*I ask my question about cutting costs on the part of the owner. While I ask my question I learn from Aczél Pál Tamás that at the end of the planning process the owner does not get a price, they get a budget instead. Usually they do not go to just one company, they ask for prices from several companies, they analyse the possibilities, and then decide on who to purchase from.*

The owners like to cut costs in every area. But in my opinion, the biggest problem is HVAC. It is catastrophic. In a large percentage of kitchen, if you go there in Summer, there is 40-50 °C in there, it is inhumane. That is because they do not spend enough on HVAC, which is not cheap of course, to have proper cooling, to have a proper ventilation hood that puts an airlock in front of the cook so that the heat from the furnace does not bother him. This is not obvious to a lot, and we are having daily arguments about this issue. What is most beautiful about this is that earlier, for understandable reasons, all of this was done on the level of building engineering. When the building engineers realized that no matter how good their plans are, they will always argue with the owners, they pushed this issue towards the kitchen technologists, so that we can try to make the owners understand that it is in their best interest to buy the 300 thousand Forint hood instead of the 100 thousand Forint one. 1 million instead of 250 thousand. These are the usual price differences. We lose these arguments more times than win them. In such a case, the technologist writes a report saying that the owner is advised that the technology used is insufficient, and so on. My conscience is clear, but I feel bad about it. My goal is never to make you spend a lot of money.

*So what does the kitchen technologist propose, where to cut costs when the owner finds things too expensive?*

The point is to create a good plan for the function that the kitchen wants to serve. From this, you can only cut costs if you lower your standards. I can never tell

the owner to leave this or that machine out, that is not how it goes. You can cut costs by saying that you have some old equipment in storage, you are going to install those. But generally, there are no alternatives to speak of. I can tell you, if you do not have enough money, not to build a confectionery kitchen, go to an already existing confectionery kitchen, buy two hundred pastries and sell them for a higher price. You can do that, and you saved up money on building an entire kitchen and hiring a pastry chef.

*I ask about the short and long-term consequences of improper kitchen ergonomics.*

That is a very complicated question, but the first problem is the question of energy consumption. The kitchens that were built (that is, equipped) 15-20 years ago were designed for a totally different energetic system. This is the same that you can see everywhere else, old buildings whose windows' k-factor does not agree with today's regulations, that is, they are not good from the aspect of insulation. So what happens is that you pay large bills for heating unnecessarily. In the kitchen there are old equipments with obsolete technology, they consume large amounts of heat and water, they generate a lot of sewage, and so you lose a lot of money. If the owner of such an old kitchen would sit down with a professional and start to count, it would be quickly discovered that in a short amount of time, in 3-4 after modernization the payback would be an entire kitchen's worth of value. That is, it would be the same as bulldozing the old kitchen and building a new one. Normally the payback period for a kitchen is around 10 years, disregarding the building itself, that is a different topic, we are only talking about of technology here. But if I buy a machine now, and I compare it to a machine made 15-20 years ago, I will see that the kilowatt consumption of the new one is half, the water consumption is one third of the old one, and it is much faster, which means it requires less human resource, too. Because what I used to cook in five hours now I cook in two, and I can use the employee for something else during that time. Nowadays it is not like in the old times when there were lots of people in the kitchen, now there are only a few. We need mobile people. *(Here he mentions a few examples of these points.)*

*Can the kitchen rectify these issues at a later time?*

Of course, but naturally it comes with the issue that the kitchen has to be partially or fully closed down while you modernize. When you reconstruct, it is advised to do everything at once. You need to close the restaurant while you change the doors, the windows, the floor, you need to work on the insulation or the heating system, it is easier to just make an entirely new kitchen, since it is going to be closed for three months anyway.

*Is there a service where they give you advice on modernizing your kitchen?  
How much is it utilized?*

Of course there is. It is absolutely utilized. Of course it depends on the approach of the owner who is ready to ask for advice from a professional. Smart people find out that the cheapest option is always to listen to professionals. If your leg hurts, you go to the doctor instead of treating yourself at home. If you have bad heating, you go to an engineer to have a plan made on how to solve the issue. You say, I have this much money, let's see what can be done. It is the same here, too. *(Here he gives an example about a hotel owner who wanted to cut down on human resource expenses and asked for his help).*

*I recited my research question and hypothesis to Aczél Pál Tamás. His comments on them are as follows:*

It is obviously not true that customer satisfaction is a consequence of good ergonomics. I can take you to five successful restaurants where ergonomics is less than satisfactory. Ergonomics is in regards to the people working there. Of course, how the waiter does his work is also ergonomics, but that's beside the point.

I still think that it is not possible to create an ideal kitchen for any ground plan. The word 'perfect' is a very restricting term. As I said, what is perfect for you will not be perfect for me. I say that the 'optimal' state is what we can get close to, which entails the optimal arrangements for the people working there. And by the people working there I do not just mean the person stirring the soup, but also the person purchasing the ingredients, the person who deals with storage, who knows what refrigerators they have, where to look for things, knows how the computer system works. The word 'perfect' should be treated with caution. It is possible to



reach a state that is near the optimal state. But the thing is, and this is very important, that it is subjective what we call perfect. It is not objective, perfection is not an axiom. (*Here he talks about the right-hand system as an example to optimal ergonomic kitchen layout.*)

Nobody realises how important these things are. When the majority of people plan a kitchen, they plan for the type and number of equipments, but planning where the employee will put down the potatoes after washing them, they do not think of that. This requires such well thought-out planning that is not typical in Hungary right now. There are maybe two or three Hungarians who can do this today. This is because there are not enough professionals. This type of planning is not taught here. In Germany this is a university subject. In Hungary it is not, a number of people start to call themselves technologist and they plan kitchens, but they do not understand the essence of it.

## **9.2. Interview with Gauland András**

*I ask about the procedure of planning and building an entirely new a'la carte restaurant's kitchen.*

It depends on who is ordering it. We can make an a'la carte kitchen to a prime contractor, let's say in a mall (although food courts are more relevant there, but you can make an a'la carte kitchen there as well) – they do not give us a lot of information. They say they need an a'la carte kitchen, and we have to create the entire standard. If there is an owner, that is better, because then the owner can tell us what was good, what was not, what they want to achieve.

If there is a contractor and says he wants an a'la carte restaurant, the most he will say is that, let's say, it is for forty-eight people, and the story ends there. If there is an owner, he will say how many people he wants to feed, what food they will serve, and once we know these, we can decide if the kitchen will be a full kitchen or just a finishing kitchen (the latter takes a lot less space). This is what we need to know to start planning, these are the basic inputs. If it is a full kitchen, we start talking about other important circumstances. Let's say the restaurant is in the middle of nowhere (a hunter cabin or castle) then we have to calculate with the fact that it will not get supplies every day, so they need larger storage spaces (cold or normal)

unlike in a city restaurant where you might get supplies twice a day. These are definitely needed to start the planning process.

*What is the usual time for this process? From planning to opening the kitchen.*

Optimal time is as fast as possible, but in practice no matter what deadline we set, it will not be met. When we talk about re-furbishing, people will ask if it is enough to close the restaurant for two weeks, that definitely will not work. I always say that whatever they do, the minimum will be a month. Within that month they will not make any big changes to the restaurant. You will need to knock down walls, change wires and pipes, that takes a month. (*Here he mentions an example about a company where the process takes five years.*) Technologies change, so do people and requests, so it is impossible to tell how long all this can take. Usually you can say if six months pass between the planning and opening of a kitchen, there is something that slowed it down.

*(Here he elaborates a bit on deadlines never being met because of mistakes made in the refurbishing process, and also on a restaurant where in the last two weeks of the planning process they tried out the kitchen's capabilities with invited guests.)*

*I ask whether their is perfection is kitchen ergonomomy.*

There is not. Just recently I saw an initiative for a kitchen where there are no square modules. The counters had an amoeba shape, they said that this is the best. They show this from above in a video, you can see the people moving, but you can also see some dishes partly off the counters because the counters have no corners, or you can see these horroristically expensive equipments with a deep frier on top – why they could not built that into the module, we did not find out. So there is no perfection in this kind of ergonomomy. There are solutions in ergonomomy that you are afraid to draw on paper. When there are seventy centimeters between two lines of equipments and somebody has to work there, this cannot be drawn because it looks silly, but there are kitchens that work like that because that is the available space. I am sure it is possible to create perfect ergonomomy, but it is a question of space. If there is space then you can make this work, but space is always very limited. (*Here he talks about the unimportance of 'correct' ratios between guest space and kitchen space.*) I have never seen a kitchen being ergonomically perfect.

*I ask about the legal background in Hungary.*

It is highly regulated. The regulations in Hungary might be the most strict in the EU, or even in Europe. Here we have to make separate rooms for things that are done in one room in Austria or Germany. Because of this we need more walls, more doors, more tiles, the ventilation system has to be connected to more rooms, so in other words in Austria or Germany it is easier to build a kitchen more cheaply. This is not necessarily good or bad. People in the West do not die of food poisoning either, but all this can be detrimental to food safety. When you put the dirty ingredients in the same room where you cook, those can possibly affect each other. However, abroad most ingredients come to the kitchen prepared. They will not peel potatoes, they buy them peeled, and so the dirt will not get in the kitchen (which could otherwise carry bacteria). In Hungary we do have these unprepared ingredients, and we need to treat them separately. This is why we have stricter regulations. *(After I ask whether this is the reason why regulations are so different in different countries. He tells an example about a small restaurant in Croatia where the toilet was right next to the kitchen.)* This kind of thing works abroad because there you can rent a small place like this office *(the office we were in is roughly 15 square meters)* and you can have your kitchen in it. In Hungary this is enough for a small buffet, nothing else, it is impossible to accomplish because the regulations make it so. So abroad it is easier to do, but it definitely goes against basic hygiene. Our regulations loosened up already, there used to be an MSz standard *(Hungarian Standards Institution)* which is not in effect anymore, that was rather harsh. Since then the standards got smoother, more EU-like, but it still gives a lot of room for authorities to say no to anything they do not like. It is not written anywhere what anything has to be exactly, it just says, let's say, that you have to avoid cross-contamination. That can mean anything. If the authorities see the kitchen plan and see two paths of products crossing each other, they can say no to it and will not care about the rest.

*I ask about the visions of the owner about the kitchen when they approach a kitchen technologist.*

If we are talking about an owner who is already in catering, then he will have ideas. If the owner just owns the building and will find someone to take care of

the business, he will have none. In that case you have to wait for the chef. The worst case possible is when you finish a project with a chef and when the restaurant opens the chef leaves. Then a new chef comes who says that every decision made was wrong. You cannot do anything about it. It is like with interior designers, one will like red walls, the other will not, who will decide if it is good or not? Kitchen design is similar to interior design like that, one chef will want certain equipments in a certain order, but then a left-handed chef arrives and wants everything in the opposite order. There is no concrete vision about this. Only the chefs can tell it, and the problem with them is that they cannot see what is on the plan. I can lay the plan out for them, but they do not have a sense of space, they see the plan but they do not understand it, how big the spaces are, what they can and more importantly cannot do there. You have to explain these things thoroughly. It is not simple.

*I ask how often the other kitchen staff are asked about their opinions.*

The kitchen staff – not at all. Only the chef, who can either tell what he wants clearly or cannot. The problem is when a chef tell you, let's say, to put this equipment from there to here, he might not understand that we cannot do that because it will not fit here for whatever reason. I cannot put a stove under the window sill no matter how much he would like it that way. If we can make each other understand the points we are making, then we can cooperate, but in most cases it simply does not work.

*I ask about where owners like to cut costs.*

They like to cut costs on the entire kitchen. The kitchen is the last thing to be finished in a building. If someone opens a hotel, guesthouse, anything, even just a restaurant, even if you already have the building, you have to break things down, rebuild, place tiles, design, interior architecture and so on. Then the last thing is kitchen technology, and that is when the money runs out. This is where they start talking about where to cut costs, which equipment to buy a cheaper version of, or a more simple version. It is always on the kitchen. You cannot cut costs on anything else. The guest has to see the nice tables, the good interior design, that is what attracts him, but what is behind the kitchen door can fall victim to the low budget.

*I ask him to elaborate on exactly what part of the kitchen they like to cut costs on.*

It is difficult to tell this in detail, but for example there used to be a regulation to place bent plinth where the walls and the floor meet, now it is not compulsory. However, it is obvious that where the wall meets the floor perpendicularly, dirt will accumulate and a black line will appear. These kitchens cannot be cleaned with a scrubbing machine (at least the smaller ones) and the dirt will bring other things with itself like infection, insects, it comes with it unfortunately. One meter of bent plinth is 4 thousand forints, and you need quite a few meters of it, this usually gets cut. Or the quality of the tiles – they buy the cheap tiles, then the pot smashes against it and the tile breaks, and then insects can crawl in and out there. There are countless things like that. Will there be false ceiling or not? Exactly what they cut costs on is difficult to tell. But generally they like to cut costs on the brand of the equipments – to go back from a German to a mid-Italian, or to a cheaper Italian, or to a Chinese. Between two of these there can be a 100% difference. You cannot really cut costs on anything else.

*I ask what the kitchen technologist will suggest if there really is a need to cut costs.*

Nothing, because we are not asked. That is the simple answer here. In Germany, planning has nine phases. First phase is data collection, fourth is the pre-planning, fifth is the authorization plan, sixth is the implementation plan, seventh is the tendering plan, the eighth is very important: participation in the implementation process and project supervision, and the ninth is the realization plan. In Hungary, it all stops at point six. They accept the implementation plan made for them, they either make the tender or not, but it is very rare that the applications that come with the tender get back to me, and that they ask me whether the machines in question are good enough for the standards we set in the beginning. Simply no. At that point it is a choice between company A, B and C, and a question of which is the cheapest. This is especially true for an investment company where they only see that they need one stove or two dishwashers, but they do not care what these equipments can do. There is no insight here at all. Only serious companies go through these points.

*I press on the matter of ventilation, and how people do not seem to put enough funds into it.*

Engineers are not as prepared as they should be. Kitchen ventilation is a whole different calculation, there are very good German standards for it, but Hungarian, none. In Hungary they use the unstable rules in the old standards, for example in the kitchen ventilation needs to be thirty-fold, ten-fold in the preparation area, fifteen-fold in the dishwasher, five-fold in the storage room, and that needs to be accomplished. But it does not work that way. If in a steak restaurant I put a thirty-fold ventilation, that might result in the guests' coats filled with the smell of food. That will not work. Engineers are prepared to this extent at best. But the technique of exchanging the air also matters. In case of water, engineers still calculate with a hundred liters per dishes made. If we think of a restaurant that makes 2 hundred portions and we calculate with 20 thousand liters of water, that is silly. That amount of water is the kitchens normal consumption for three weeks. These bad numbers are still in public consciousness. With air draining the usual problem is when we have a restaurant on the ground floor of a four-storey building, and the pipes have to be conducted to the top of the building. The people living there have to agree on this, and if there is no elevator shaft where it can be done, they usually do not agree. If there is, then it is for sure too small. Then the pipe will be too thin, only small amounts of air can be conducted in it, so it will not be able to conduct the amount of air that it should. So, there is a big stress on correctly calculating these numbers, and also on the right kind of ventilation hood. It is a simple design, a box with filters, but Hungarians will make it for you for 400 thousand forints, while from Germany or Austria you can order it for 2.5 million. And you see no difference between them. But they work differently, one of them can barely do something, while the other can accomplish the air suction that is necessary for the kitchen. A lot depends on the right ventilation system.

*I ask about the short and long-term consequences of the failure to modernize.*

It is only a question of money. A technology that is not modern simply means that neither the machine nor the materials in it are modern. It is going to require a lot of service, which is bad both in the short and long-term. I had a deep

frier that we bought from the Italians, a simple manufacturer, but the machine's oil tank broke within six months. The manufacturer offered to exchange it for another – they do not even want to fix the old one. This happens with the poor version of equipments. These machines also consume more energy. Serious Italian manufacturers have a research lab. They test the new deep frier, use it, develop it. Cheaper manufacturers buy the parts of the machine and just put it together, whether it is optimal or not, or easily cleaned, they do not care. That is why it is cheaper, and these are the disadvantages of these machines – they are definitely not going to work as long as the more expensive but better built equipments.

*Is it possible to correct these mistakes after the fact?*

Not really. It costs a lot of money. If you buy a bad equipment, use it and then want to re-sell it, it is extremely difficult at that point. If you buy a new one, you realize that the cheaper the machine the more expensive it actually is, because you bought it twice. But that does not happen, once they buy it, they are going to keep fighting with it. According to bookkeeping, even for these machines, amortization is five years, and they will not exchange them before that. It happens that they will complain about it, but they have to deal with the bad decision they made. They bought it because it was the cheapest, and that is all to say about it. On the other hand, if the kitchen does not work although they bought the more expensive equipment, then it is usually a question of human resources. That people cannot use the good machines, that they are not used to it, because they worked with something more simple before, and they do not understand that they have to operate the new machine differently. *(Here he mentions an example about a pastry making machine that, according to the owners, burnt all the pastries, and during the inspection it turned out that the users refused to accept that the new machine could bake them much quicker, and continued to set the timer to forty minutes instead of twenty-five.)*

*I ask whether there is a service where people can ask for ideas about the modernization of their restaurants, and if so, whether people actually use it.*

It is really up to the chef, how flexible he is, whether he goes to expositions, and then they might ask for this or that machine. This is not really my table *(as a kitchen technologist)* because it is about equipment acquisition. They see something

and buy it – it is not a question of technological planning. They do not ask for our opinions. While these are not consumable products strictly speaking, they kind of are in this sense. The flexibility of the chef will determine whether one wants a more modern machine or not, and then it is up to the owner if he agrees on it or not. The chef will then have to prove himself, because some of these machines cost hundreds of thousands of forints, and after purchasing they will find out whether they can use it well or not. The machine can definitely deliver, but the users have to prepare, have to read up on it, there are serious temperature requirements that they have to keep – they cannot buy it and then start practicing on it, it does not work that way (of course they need to practice, too, but preparation is important). But once again, it is not a question of kitchen technology.

*Lastly, I read my research question and hypothesis to him and ask his opinions about them.*

It sounds half and half to me. The question of funds is not true. There is the Brudern House (*Párizsi Udvar*) in Budapest, planning was about two years ago, now it is at the implementation phase, that is a historical building. You will not be able to knock down walls there no matter how much money you have, because for one it is not allowed, and for another the building itself does not allow it. There you have to work with what you have. That building has a long narrow room in the basement for the kitchen, which can be good from an individual usage point of view, but from a kitchen ergonomics standpoint it is not good. You cannot plan a kitchen in such a narrow room. As for the part about guest satisfaction – guests do not care about any of this, they do not see what happens inside the kitchen. They do not care how crowded it is, or rather not see it, how hot it is in there, how good the ventilation is. For ergonomics you need space, that is for sure. If the kitchen has space, ergonomics is possible to accomplish. When you have to establish the kitchen in an existing room, that gives a limit. If it is a historical building, that is an even bigger limit. If it is on a ship, that gives the third and biggest limit. On a ship you cannot change anything, because you need many permissions to do so. So it is very difficult to solve these problems. (*He elaborates a bit more on the ship example.*) It is possible to create good ergonomics, but the best is a 'green field project'. They tell me that they need a kitchen here, ask for my opinion on how big it should be, I tell them it requires 1,500 square meters, there I can make something that works, but anything less than that



will be worse. As far as ergonomics goes, it is a difficult question. People have to like working there, tools should not be too far or too close to the equipments – it is difficult to prepare for that, you need years of practice to understand the connections between these things. *(He tells an example about empty spaces on the kitchen plan, how they look useless in plan but are actually useful in reality.)*

As I told you before, ergonomics involves a lot of things. In a smaller kitchen, you have a kitchen line where your chef works and everything has to be tailor made to him, it matters a lot whether the chef is right or left-handed. If a new chef comes, he will not like that kitchen. That is what matters. And the kitchen is ergonomically good, but the chef is bad. It is like buying the coat for the button. I often tell the investor that it would be good to have the chef at hand already. A lot of times they tell me not to worry about that, I should plan the kitchen as well as possible and the chef who will come here will get used to it. Then the chef comes, looks around, and if he does not like what he sees, he leaves. If he says he will be able to work there, he stays. Of course during planning you adhere to certain rules of ergonomics, furniture heights, pathways, and so on – if these do not shrink or grow to unreasonable measures, the kitchen will be useable. This is not like the pharmacy where you have to measure everything out to the smallest detail, we have margins to work with. But in spite of this, there is a lot to possibly mess up. In ergonomics, really the most important thing is whether we have the necessary surfaces or not. For example, if there is no place to put things on next to a wardrobe-sized oven, it will be a problem. Or, let's say, the oven is at the right place, but what will happen when you have to work with it? How its door will open, what it will open onto, whether it will be in the way – and that is how you choose equipments, because for example there are ovens where you open its door and then slide the door in next to the equipment. Now it is not a door that is in your way as you put things in and out, which is also hot by the way, if you need it, you pull it back out and close it. A lot depend on this, so what I am saying is that you can make it all well, as long as you have the space for it. *(He says a few more examples regarding heights in the kitchen.)*

### **9.3. Interview with Szabó Tamás**

*How much restaurant experience did the owner of Vintage Garden have? What ideas did he have, and how much did he let you have your way?*

The owner did not have any restaurant experience. They had lots of good ideas, but they were mainly for the guest area, decoration, ambiance and the way of business. They let me have my way completely regarding kitchen technology.

*What advantages and disadvantages did the location (the building) pose?*

When creating the restaurant, and mainly the kitchen, we had to make a lot of compromises due to the geometry of the building. The biggest challenges were the central location of the water connection, and the employee entrance (which is also the entrance to the hostel that operates in the building). The disadvantage that we could turn into an advantage was the narrow corridor leading from the welcoming area into the restaurant. We did not want the guests to feel that they have to pass a narrow passage into the restaurant, so we decided to show them the reason behind it being narrow, which was the kitchen. So we „opened” the kitchen area with a rustic glass wall, which produced very positive feedbacks until this day.

*What engineering and technological limitations did you face when planning the kitchen? What solutions did you suggest, and how ideal do you think the solutions were?*

The changing rooms, preparation rooms, storage rooms, preparation kitchen and the pastry kitchen were in the basement, which caused difficulties, because this way the open kitchen has to work very strongly together with the employees in charge of preparation. Because the upper level of the kitchen is not right above the basement level, we had to implement a staircase and a service passage to connect those two. It is very far from the ideal state, but it works.

*What problems did you face with the authorization of the kitchen?*

The people coming through the entrance of the hostel that operates in the building cross the route of the prepared ingredients coming from the basement area to the open kitchen. The way we solved this is that every ingredient, product or dish that has to be taken to the open kitchen will be vacuum sealed, or is carried in a sealed storage/carrier dish or box.

*What were the wishes of the chef? How much of these wishes could be fulfilled? How much was he open to new, modern technology (as opposed to older methods)?*

During the course of planning and execution there were still no employees, so we did not have to deal with personal preferences. Generally, we determined the basic directives with the owner, which we harmonized with the architectural and engineering capabilities, the legal directives and the menu plans. As the owner was preparing for a long-term operation, it was easy to convince him to buy the most modern technology available.

*What is the technological quality of the kitchen of the Vintage Garden? Was there any area where the owner chose the cheaper option instead of the ideal one?*

At the time of the opening of the restaurant, the equipments and tools implemented in the kitchen were rather modern and of good quality. By now they have obviously amortized, and new technologies also appeared on the market, but generally the kitchen technology there is still considered an upper-middle category. In the preparation areas we had to implement cheaper, but more cost-efficient, painted steel coated refrigerators instead of the stainless steel coated ones, but this did not cause a decrease in the quality of cold storage, this was merely an aesthetic choice.

*Did you take part in the entire process of the execution (ergo from planning to the supervision of the implementation)?*

During a kitchen investment I find it very important to create a bond of professionalism and trust with the contracting party, which makes him lean on me throughout the entire execution of the project, which enables me to supervise the project from the initial brainstorming, throughout the test cookings, until the grand opening. It is a great honor – and responsibility – to start a novice caterer on his career. Since the relationship was so good, there was no need to create a tendering plan, because the owner only wanted to work with us. The Vintage Garden was the first project we accomplished together, since then we created and opened two other places together.

*How long did the process of creating the restaurant last, from planning to opening? Was it possible to keep to the original deadline? Was there time to test the kitchen before the grand opening?*

The project was accomplished in roughly half a year. There were no deadlines, only a rough estimate, which we could keep to. A few days after implementing the kitchen technology there was an unofficial presentation ceremony, and afterwards the place was closed for two more months, while the staff was hired and trained, suppliers were chosen, menu was created and the guest area was „fine-tuned“. As there was no date set for the grand opening, the owner only wanted to open the restaurant when he felt like the place was professionally well-prepared. These two months were worth it in the end, because even the very first guest was welcomed by a professional, well-prepared staff, and a restaurant which was tested multiple times.

*Did you successfully create an ergonomically ideal kitchen for the Vintage Garden?*

Unfortunately the kitchen is far from ergonomically ideal. As we had to adhere very strictly to a pre-existing building structure (load-bearing walls, etc) the open kitchen has very little and very tight working areas.

*I ask for his opinion on my research question and hypothesis.*

The hypothesis is only partly true. Creating an ergonomically ideal kitchen is fairly easy in theory. It is 80% available space and 20% available funds. However, the great difficulty is that when we plan and create a kitchen, ergonomics is not high on the list of things taken into account. And creating a good working environment is an aspect that is not even discussed in a project. We can state that the areas that the guests see are always planned with great care and receive a lot of funds, but the areas that are hidden from the guests are highly neglected. The connection between extra profit, guest satisfaction, and the perfect kitchen/perfect working environment is something that the contracting parties do not consider important. Most of the time the contracting party will try to make the guest area as large as possible, in order to be able to welcome as many guests as possible at once, and will try to cramp the back office functions into a space as small as possible.

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