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IMPACT OF TECHNOLOGICAL DEVELOPMENT ON BUSINESS EFFICIENCY IN THE FOOD AND BEVERAGE DEPARTMENT

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Abstract

Technological development has a great significance in the hospitality industry, specifically in the food and beverage department, and particularly in the differentiation of supply and price leadership. Technological development through the 20th century and the beginning of the 21st century led to a revolution in many fields, like communication, computer sciences to the monitoring of operations and better organization. The use of modern technological solutions affects the workforce, but it must be taken into account that the devices and equipment cannot compensate for the skills, knowledge, expertise and creativity of employees, so use of such devices and equipment decreases the need for unskilled and semiskilled workers. Innovations in the food and beverage department are important for competitive differentiation, but also innovations in the hospitality industry are always at risk as they can easily be copied and imitated, which leads the company to further innovation and improvement of services. Standardization of the working procedures, handling the groceries, binds the usage of technological solutions that allow standardization during the work, which regulates the number of employees needed, energy consumption, lower waste, with increased hygiene and cleanliness of the working process and greater effectiveness and cost efficiency for the company itself.

Keywords: technology, innovations, hospitality, cost efficiency, standardization.

Jel Classification: M21; L83

INTRODUCTION

Technological improvement surely has a big impact in hospitality, especially in food and beverage department, with a big emphasis on offer differentiation and price leadership. Hospitality industry doesn't use laboratories for research and development, and currently

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under technological improvements construction and performance of appliances and equipment could be considered, and the techniques of preparation and serving the meals which provide better preparation processes, better heating, energy and temperature control, but also working power, with at least as possible waist, better hygiene of the working process, but also with more flexible and faster service in the end. According to Statistical Yearbook of Croatia 2014, with over 12.5 billion (and continuing to grow) Croatian kunas of income, the sector of providing the accommodation, preparation and servicing of the food makes one of the key elements of tourism product, the one which is differentiated when comparing to competence.

Table 1. Accommodation provident and food services income

	2010	2011	2012
Income in thousands of Croatian kuna	11.677.653	12.181.401	12.521.640

As the Front office and Hotel Reception part of any hotel can be analyzed through the kindness of the staff, room appearance and the atmosphere, in the same way Food and Beverage department can be analyzed through the creativity in meal preparation, esthetic experience of the meal, but also with total experience after the service consumption. In fact, it can be said that exactly when it comes satisfaction analysis in tourism and hospitality the biggest part goes to food and beverage department, as stated by Perman and Mikinac (2014).

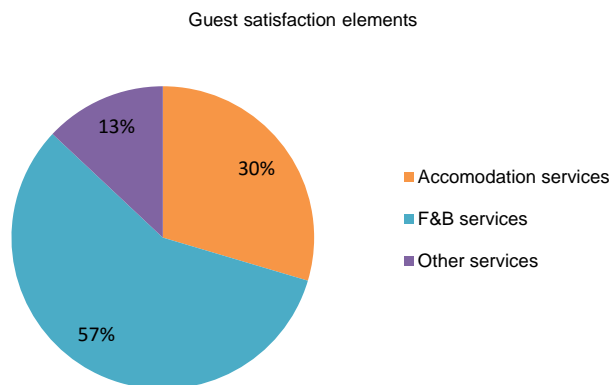


Figure 1. Guest satisfaction elements in tourism and hospitality

According to above showed, it is obvious that more than 50 % of service satisfaction goes to food and beverage services, which is significant especially as it is known that most of the hotel guests use half board services, following with bad and breakfast service, and only a small percentage of the hotels even offer full board service mainly because of the poor demand for those services. Restaurants, as independent hospitality service providers offer extra services expenditure for the tourists, but they only offer food and beverage services, with which they become the only satisfaction element in certain destination, and regarding that restaurants don't offer accompanying elements such as accommodation or other services which can lower the dissatisfaction.

1. THE SIGNIFICANCE OF TECHNOLOGICAL DEVELOPMENT IN CONTEMPORARY FOOD AND BEVARAGE DEPARTMENT

Technological improvement, through the 20th century, and also in the very beginning of 21st century, has brought to revolution on many fields, from communication, computer sciences and all up to business monitoring and better organization, but very often only the computer sciences developments are considered by the technological improvement, and other fields very often stay in the shadows, but technology actually represents the application of the science to achieving the industrialized or commercial goals, and under technologies, in case they are seen broader, devices, equipment and tools, together with organization and techniques which are required to manage them, were considered.

When looking through computer terminology, hardware, as stated by Muller (2010) is very often identified as the technology, but the technology is being started with the software – the system which is inevitable and without which hardware can't work.

Table 2. The nature of technology

Technologies	
Hardware	Software
Devices	Systems
Equipment	Organization
Tools	Techniques

What can be seen as hardware in the hospitality industry are devices and equipment which organization or company disposes, and the application of which ensures the business efficiency through energy and groceries savings, and ultimately workforce, with overall business standardization. The software in this case, certainly is intangible element of the organization of work, working environment, and precisely that hardware is controlled by the software, a human, one which devices will never be able to completely replace.

A number of devices and equipment in contemporary food and beverage department help that through the use of the same organization cost savings are achieved through fewer required devices - apropos, savings primarily refers to the physical (space) conditions, which may be less with the use of multifunctional devices. The cost savings are also noticed with the equipment, where it is no longer needed a larger number of devices whose functionality cannot be maximally exploited, what also, in a way, represents the opportunity cost for the procured equipment and devices which are no longer being used. The use of modern technological solutions affects the workforce as well, where a number of employees can be replaced with devices and equipment, but we must take into account that the devices and equipment cannot compensate for the skills, knowledge, expertise and creativity of employees, so use of such devices and equipment decreases the need for unskilled and semi-skilled employees, especially in the segment of additional (or extra) work, because most appliances and equipment supports systems of self-preservation and hygiene, and devices like the combi ovens can be cleaned themselves, especially dishwashers of Granuldisk type which also wash burnt remains of the containers, and similar, and with what savings of water, detergents are achieved, but also an important element as well - employees no longer spend useful time that they could spend in the manufacturing process to clean, or are exposed to very often unhealthy and volatile detergents and chemicals.

Standardization is becoming one of the important elements for the company and with the respect of ISO standards and a HACCP system, technological advances in hospitality has never been closer.

Of course, as every medal has two sides, so it is also with implementation of technology in the hospitality industry. The big problem is, with a high purchase price, the refusal of employees to work on modern devices and equipment, especially because the purchase of these technologically advanced elements is performed without previously thoughtful ways of implementation, introduction of employees in the use and necessity for such sophisticated devices and very often education of employees is missing. Employees who are not motivated and do not know how they can have the benefits of the use of devices and equipment, very often, moreover, intimidated with the interchangeability of workforce with devices and equipment, don't use the devices, with what the investment in technologically sophisticated equipment is not cost effective, and using conventional principles in the production process the company does not reduce the cost of energy, food, nor can it fully meet the HACCP procedures.

The key to successful implementation of sophisticated equipment and modern technological solutions is the education of employees, regarding that the equipment and technology is here to help them in their work, and they should be explained the advantages that innovation itself brings.

Table 3. Strategic advantages of innovation in food preparation

Differentiation	Cost leadership
Superior food quality	Centralised production
Improved nutritional value	Greater usability
The unique ways of cooking	Smaller losses of food
The unique ways of serving the food	Lower costs of food
Maintaining freshness of foods	Lower energy costs
The speed and accuracy of service	Lower capital costs
Cooking and serving as a method of attracting	Shorter preparation and serving
	Lower labor costs
	Simplified workflows

Surely, by using the strategic advantages in the preparation of food, better market segmentation can also be accessed, and also differentiation, with which one individual hospitality company with its offer stands out from the competition. Catering companies and hotels can be an ideal example of a market that can have the benefits of the implementation of modern technologies and precisely they can face the greatest challenge in designing a differentiated product or service, because a large number of hotels is too similar in its offer, so proactive changes and with thinking targeted needs and wishes of guests can be reached, maintaining high, recognizable quality and standards. As noted by Victorino and Verma (2005), after the hotel company recognizes and understands the wishes of guests, their challenge should be to give the priority to the wishes of guests that give the highest value to the offer of that hotel services.

Hospitality industry does not have reputation to greater innovation, nor its culture of learning organization, and the whole area of technology in the food and beverage department is much wider than the above stated, because as Rodgers (2007) stated, the scope of food and beverage includes equipment, construction solutions, as well as the overall system of food and beverage department, and also there is striving towards achieving technological development of other sciences such as medicine and similar. The

big problem is the lack of understanding, or, as stated Rodgers (2008) researches, surveys, case studies and multivariate techniques do not lead to the formulation of new theories, while the scientific models of hospitality science, in addition to the existing theoretical and research models of natural and physical sciences are often overlooked.

Innovations in the food and beverages department, or even generally in the hospitality industry, can be easily copied and imitated by the general competition, hence constant innovation helps to maintain a competitive advantage over the competition, according to the Ottenbacher and Harrington (2007), and although many hospitality companies realize the importance of innovation in the food and beverage department, they do not know exactly how they can apply it in creating new, innovative services.

2. THE IMPORTANCE OF STANDARDIZATION FOR FOOD AND BEVERAGE DEPARTMENT BUSINESS

Hotel Corporation as the leading business organization in the hospitality industry are an example of how standardization of business and labor can contribute to the recognition of the quality of each brand. Avelini Holjevac (2002) states that the standards of prescribed quality, just as brands such as Hilton, Ritz Carlton, Kempinski or similar, who through the business and work use their own quality standards find their standardization important, because it makes their signature and their business card.

The standards, among others, may be prescribed by the ISO standards or international standards, where business includes standard ISO 9000, environment ISO 14000, as well as food safety standard ISO 22000, which is in compliance with some elements of the HACCP system.

Implementation of quality system leads to raising the quality of services, and also in further business it is being carried out and improved in constant cycle of quality improvement.

With standardized business it is much easier to compare the costs, since the operating procedures are known and if there are any deviations it is easier to get to the causes of the same, because the standards prescribe how something should be, so it's easier to recognize when something goes in the wrong direction. Cost effectiveness is also closely linked with standardization because setting standards from the start affects business and striving for a goal, or to reducing unnecessary costs, so to increasing the degree of thrift, careful handling of groceries, hoarding, planning, and all the principles of a good master.

By introducing standardization in business, technology that the company has is being perfected - the same is adjusted to high standards prescribed by the company, and when it comes to the hospitality company, then it is a word about the standards of services that are intangible in most cases and which, once consumed, represent experience for guest, as the end user.

According to Gustavsson et al (2006) service that is provided by the standards in hospitality facilities should be viewed as a chain whose links are primarily employees, and then the company as such with associated equipment. Guests, as consumers of services will assess and evaluate whether their expectations are met, whether the consumed services have good value for money, and if one of the link of services is not strong enough it can leave a negative impression on the guests.

Food safety is one of the indispensable elements in the hospitality business because contemporary guests are more than ever sensitive to the issue of food safety and rightly

they expect that the food is suitable and safe for consumption. Before the food safety control were occasional and supervision was directed towards the control of sanitary and hygienic conditions and to the control of raw materials and finished products, but as such an approach was not an adequate insurance of the food harmlessness, there was a need for a proactive approach as HACCP (Hazard Analysis and Critical Control Point).

With the modern technological solutions it is also possible to more easily manage the documentation of the HACCP system. Until a few years ago it was necessary to manually check each cooling device, their temperature, record the deviations and it was necessary to sign everything, but today's technology enables networking of refrigeration and chambers, so there are periodically checks of the temperature and if there is a deviation, there is an alarm through the computer that the work of a certain cooling system is abnormal. Of course, monitoring the temperature of refrigeration is not the only reason for networking catering equipment; the same is also possible with combi ovens and multifunctional combined devices such Frima type, which are also networked to monitor HACCP documentation, but also because of the creation of standardized recipes, which are, according to predefined procedures, being finished in these devices.

3. BUSINESS COST EFFICIENCY IN MODERN FOOD AND BEVERAGE DEPARTMENT

Hospitality industry in the manufacturing processes, but also in the overall work, consumes large amounts of energy, whether it comes to electricity, gas or other energy sources. But as the energy in the accommodation section can be regulated with "smart rooms" that upon exiting the guest switches off air conditioning and lighting, and with the opening of the window regulating the work of the air conditioning, the production department has a tougher task with savings and more efficient operations.

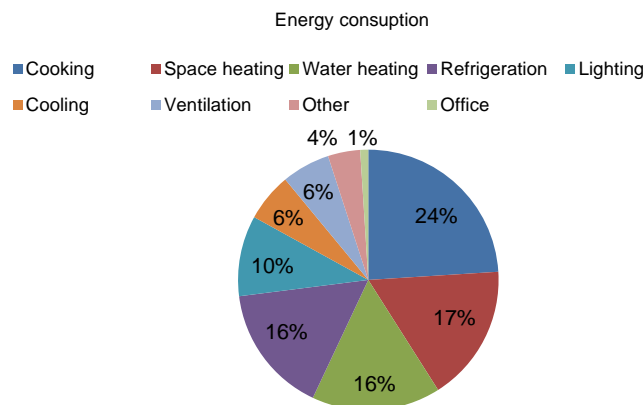


Figure 2. Energy consumption in the hospitality industry

As can be seen from Figure 2, the cooking uses as much as 24% of the energy, and the cooling devices 16% of total energy consumption, which is very high, and if it being looked synthetic, 40% of the total cost goes on cooking and refrigeration. A big influence on this high consumption is the awareness of employees, who should be familiar with

business cost efficiency, and to use energy only when it is needed, and not to leave, for example, burners on stoves on when there is no food preparation or leave the fryer or oven to operate at full power while food preparation.

The kitchens in hospitality businesses are, according to Riley (2005), designed with a focus on productivity and organization of production processes, or becoming more systematic, which ultimately leads to standardized services, which is in the food and beverage department represented by food and drinks and services related to them.

Guaranteed, the use of energy-efficient appliances can certainly contribute to business efficiency, which in any case, modern equipment and devices can satisfy, particularly if they are marked with the Energy Star label, which in the United States and the European Union means energy efficient appliances.

Business cost efficiency can be in this case linked to effectiveness as well, since ineffective production system is also cost efficient, where it saves energy, groceries with moderate consumption of labor. According to Assaf and Matawie (2009) a correlation can be seen between the number of meals and each element (inputs and outputs). So the efficiency and effectiveness is surely affected by the consumption of energy, because as mentioned above in the production department around 40% of total energy consumption goes on cooking and refrigeration, followed by the total number of permanent staff, or the total number of full-time for an indefinite period. This item is very important because too many full-time employees during periods of weaker business for the company means increased costs without justification, and too few full-time employees during periods of stronger business leads to increased stress among employees, increased errors in the production process, and ultimately this way of working is not sustainable for the company. It is necessary to select the optimal number of permanent staff who can by the working hours in a day, week or month work their jobs in an optimal way, while maintaining a high quality of work throughout the default time period.

The system of cooking and serving (Cook-Serve) is, according to the Marzano and Balzaretto (2011) a conventional system that is applied in the hospitality and meals are served with a minimum waiting period from preparation to serving.

Hybrid cooking system builds on conventional cooking system, where, finished dish is immediately served to guests, but also builds on the systems of modern technological systems such as "cook and chill" (Cook-Chill), according to Ceserano and Foskett (2007), where after the preparation the meal is being cooled to a suitable temperature from 0°C to + 3°C, so that, when needed, the same order can be warmed to a temperature for serving and consumption, thereby served each dish has an ideal quality and characteristics.

The system "cooking and holding" (Cook-Hold), keeps prepared dishes at the ideal temperature, which allows finishing of the same dishes before serving. An external preparation is related to the centralized production, where central kitchen prepares meals for satellite kitchens that just completes and serves those same dishes. Furthermore, the level of preparedness of raw materials is paramount for the very effectiveness because, although some groceries are more expensive, such as meat, fish and vegetables, and have passed pre-cleaning, portioning and preparation does not represent a cost effective choice for the company (due to higher prices) but certainly affect greater effectiveness (less work around raw materials, more about preparations), especially in organizations with fewer employees.

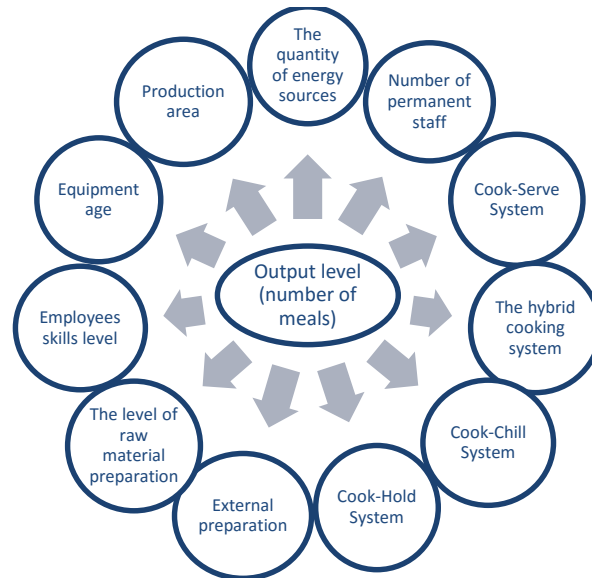


Figure 3. Correlation between the number of meals and each element

The level of skills of employees certainly affects the effectiveness because employees who have the skills, knowledge and competencies for the job, they perform much more efficiently, more effectively, with fewer errors, adverse spaces and idle time.

Age of equipment is important in so far as the older device, it is also greater energy consumer, therefore there is lower level of energy efficiency, it works less and there is greater likelihood of failure, which in less maintained and amortized device is not a rarity. Newer devices, in addition to being more efficient in their work, they use less energy sources, are easier to handle, but they are also under warranty, which certainly reduces maintenance costs over a longer period.

The production area is very important because, for a given capacity catering facility should meet the space in the production department, so it can be able to make preparations for a sufficient number of dishes, so they may be prepared and served on time.

World-renowned manufacturers assure drastic savings, so modern tools and equipment make it possible that, beside saving energy sources for approximately 40%, they also offer savings on groceries or means for work, where due to "smart" principles of heat treatment there are lower losses from 10 to 20 % or less shrinkage foods through the cooking process, which on a daily basis can save up to several portions of certain dishes, which through the week, month and year accumulates noticeable savings for a specific company. However, modern technological solutions also reduce the costs of water, but also usage of fats in preparing meals for 80 to 90%, making these dishes suitable for even the most stringent nutritional requirements. The working process is reduced by 50%, making it possible to better organize the employees in the production process.

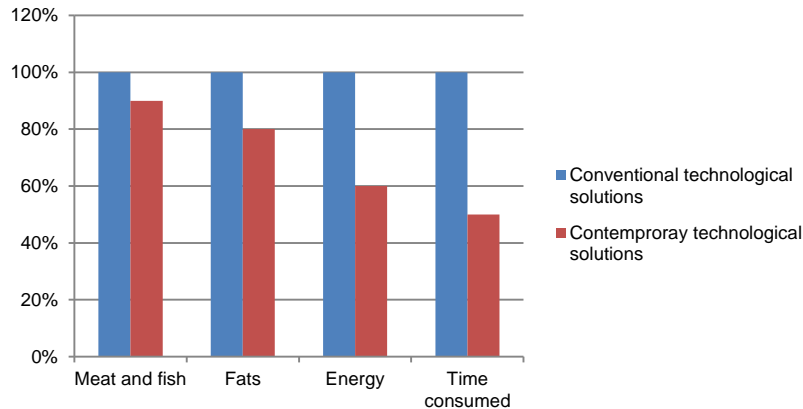


Figure 4. Display of savings comparing conventional and modern technological solutions

As can be seen from Figure 4, where the comparison between consumption of meat and fish, as well as foods most prone to shrinkage, fat used, energy and working time, a standard consumption of conventional devices is marked with 100%, to indicate that cost savings come from the use of modern technological solutions. Of course, one should take into account that the price of food, especially meat and fish from year to year increases significantly, what makes savings of 10 to 20% a significant financial savings for the company, and saving energy to each new generation of devices is being increased, so in couple of years an extremely effective and efficient appliances and equipment can be expected, while shorter work period provides opportunity for better engagement of the workforce, their working time, and finally it can optimize workflow and thus, through the optimization of the labor force and their number, can better organize the workflow without the occasional need for engagement of additional staff, which can also contributes to savings for the company.

CONCLUSION

Technological improvement has brought significant innovations in all fields, including also food and beverage department, as a core hospitality production department. When it comes to significant resistance towards improvements in food and beverage department, then it firstly comes from the employees who are not accepting innovative business models, and keep to fixed conventional methods which are not enough for the company in goal achieving because of which the contemporary technological methods were implemented – and that goal is cost savings.

Together with implementation of contemporary technological solutions, standardization offers a base for enlarging the business efficiency especially with growing brands offer which have already standardized their quality and by which they have reached differentiation on the market which is very homogenous by its nature.

In this paper elements which affect business efficiency, as also elements which significantly affect the violation of business efficiency as careless energy usage or groceries, were presented.

With the work according to rules of good master with the usage of modern technological solutions, beside satisfying HACCP system, the costs of groceries, energy and working power are highly reduced, which in the end leads to business efficiency and bigger work efficiency.

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