

## Industry 4.0 IT: Solutions in the Romanian Food Industry

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### Abstract

The study presents the advantages using IT solutions for the Romanian restaurant industry in the context of industry 4.0. The Romanian government is also concerned about the chances and prospects offered by the industry 4.0 since a few years ago. Secondary research has shown that businesses worldwide plan to invest approximately 5% of their online turnover in IT solutions. Much of the investment will be directed to the acquisition of software, various applications and their deployment within the organizations. The Romanian restaurant industry, like other branches of the economy, faces a special competitive situation. Competition in the food sector does not only refer to the mere competition between the traditional players in this market, but also to the rest of the organizational forms in this field of activity. Players like Metro and Selgros have already resorted to modern solutions and to various forms of IT solutions. The main objective of the study is to determine the main factors that influence the evolution in this field and to choose the solutions for its sustainable development based on the obtained results. One of the main results of the research is concerned with the need to adapt to new market demands, especially in terms of IT solutions. By comparing the success of other countries as a result of IT implementation, the necessary measure is to identify and implement digital management and control tools, ranging from quality assurance, hygiene, to employee relationship and customer satisfaction. Problems identified as follow-up to the research concern the implementation of digital solutions due to the lack of a management vision, the lack of culture in the area or the lack of IT skills of the staff involved. The research is limited to the restaurant sector, and it is necessary to extend it to the next stage of the entire tourism and services industry in Romania.

**Keywords:** IT solutions, food industry, industry research, Romania, marketing strategy.

**JEL classification:** O12, O33.

### 1. Introduction

Until now, humankind has experienced three industrial revolutions, the first being at the beginning of the 17th century, triggered by the discovery of the steam engine. At the beginning of the 20th century, electricity, through its mass production and exploitation triggered the second industrial revolution. Not long afterwards, after World War II, the computer appeared which triggered the third industrial revolution. In 2011 Dr. Henning Kagermann, president of the Academy of Technical Sciences in Germany, used for the first time the term "Industry 4.0" in a project proposal submitted to the German government (GEISSBAUER, et al., 2016). Industry 4.0 is the initial designation of the global industrial digitization project for better general endowment. Fundamentally, this represents the basis for smart interconnected digital systems. With their help, production is largely self-organized, so that direct communication between people, machinery, equipment, logistics activities and products can be made possible. The interconnection of all flows should ensure the optimization not only of a single stage of the production process, but of a whole value chain. This network of interconnectors should also cover all phases of the product life cycle - from the idea of creating a product to development, manufacture, use, service and recycling (SOMMER, 2015).

Meanwhile, the term "Industry 4.0" is more than just a project; it is the combination of several major innovations in digital technology. All of these combinations have matured and are ready to transform the economy, starting with the energy and production sectors. These technologies include advanced robotics and artificial intelligence, sophisticated sensors, cloud computing, Internet of Things, capturing and analyzing data, digital printing (including 3D printing),

software as-a-service, smartphones and other mobile devices, platforms that use algorithms to drive vehicles (including navigation tools, track sharing applications, ride and autonomous vehicles), etc. The goal of "Industry 4.0" is to incorporate all these elements into an interoperable global value chain shared by many companies across multiple countries (GEISSBAUER, et al., 2016).

To all this, there is an increase in the number and complexity of new technologies, which are constantly appearing to meet the challenges of the 21st century. They require the creation of well-documented and structured methodologies. Thus, research must develop real technological maps, both at an industrial level and at a national and international level. Industry 4.0 is expected to have a major impact on six key areas of an economy, namely transport, energy, services, health, industry and infrastructure (SANTOSA, et al., 2017).

The opportunities for implementing the solutions offered by "Industry 4.0" are primarily about increasing national and international competitiveness, achieving a higher level of flexibility in production and workflows in general, adapting to customer needs, and last but not least, safer and easier transaction reporting and reporting obligations within each economic entity and / or institution (Bundesverband Informationswirtschaft, 2015).

In 2015, it is estimated that supply chain digitization can bring positive benefits in the current planning of European manufacturers' sales and operations with a positive impact as follows: reducing response time to unforeseen events affecting orders (about 300 %), order delivery (about 120%) and time to market (about 70%) (T.S.P. Forum, 2015). Additionally, the growing importance of digital platform providers, indispensable in the management of complex production systems, is expected to rise, which entails risks to data security and ownership. These represent challenges for companies' management structures. This co-operation implies a number of risks as company boundaries are blurred in interconnected value networks, transformed into "digital ecosystems" (KAGERMANN, et al., 2016). The digitization of value chains has the potential to boost productivity levels, but this requires companies to be integrated both horizontally and vertically to ensure exchange of information and to decentralize decision-making (HERMANN, et al., 2016).

"Central Europe can become a spearhead in the development of an industrial internet. There are three important goals for Romania: security of supply and energy independence, limiting environmental impact and economic sustainability. In Central and Eastern Europe there is a difficult challenge for two reasons: 52% of the region's energy comes from coal and 70% of plants are more than 30 years old. We want to address these challenges with the help of the industrial internet for a significant improvement of their performance, by analyzing the big data and optimizing the plants," says Cristian Colțeanu in a public article by Forbes in November 2017. The strategy proposed in this article focuses on digitizing all business lines (FORBES, 2017). The Government of Romania promises to support digitization in our country by creating a program to be implemented by several ministries, such as the Ministry of Communications, Interior and Development (PLAYTECH, 2018). Unfortunately, Romania ranks last in the European Union, according to the report assessing the degree of digitization of each member country. DESI stands for Digital Economy and Society Index, and Romania has a score of 33,21%. Denmark ranks first with an aggregate score of 70,68% compared to the EU average of 52,25%. The underlying criteria are Connectivity, Human Capital, Internet Usage, Digital Technology Integration, and Digital Public Services. Despite a high-speed internet at a low cost relative to other EU countries, we have the lowest percentage of internet users (56%). Very few are the Romanians who shop online (18%), and fewer who use online banking (8%). The largest percentage of all Romanian internet users, 74%, use social networks. Much worse is the fact that we are also in the last place regarding the integration of digital technology. Only 7% of businesses sell their products online, accounting for only 4,3% of turnover. Regarding the

use of e-government solutions, we are also at low levels, namely 6% of users are using this solution, and of them only 12% use pre-filled forms. On top of that, only 55% of them solve the problem completely. (MIHAIU, 2018).

Opening up to digital solutions is growing for businesses, according to a study by Valoria Business Solutions SRL. More than 50% of businesses have positioned “digital transformation” as a central element of their business strategy for 2018. More than 60% of companies say they have capitalized on digitization to get a competitive edge. A year before, only 37% capitalized on the benefits of digitization. The simplification of the processes due to digitization solutions is appreciated by more than 50% of the private companies, even though some of them see as an obstacle to digitizing the lack of "digital customers" (VALORIA, 2018). The current questions are about the advantages of implementing digitization solutions in the restaurant industry in Romania, the support offered by governmental measures in this respect, the challenges facing this industry at national level, but also international.

## **2. Restaurant industry in the European Union**

Going out and drinking or eating in a restaurant, bar or coffee shop is one of the most popular leisure activities among Europeans. As a result, the restaurant and food service industry is booming. Food services refer to all services for out-of-home consumption of food and drink, including restaurants, cafés, bars, takeaway, food delivery, contract catering, cafeterias and other food vendors. The Western European consumer foodservice market had a value of 427 billion euros in 2016.

The Eastern European market is only at 45,6 billion euros, meaning a little more than 10% of the Western market (STATISTA, 2017). The foodservice industry is a thriving sector everywhere in the world.

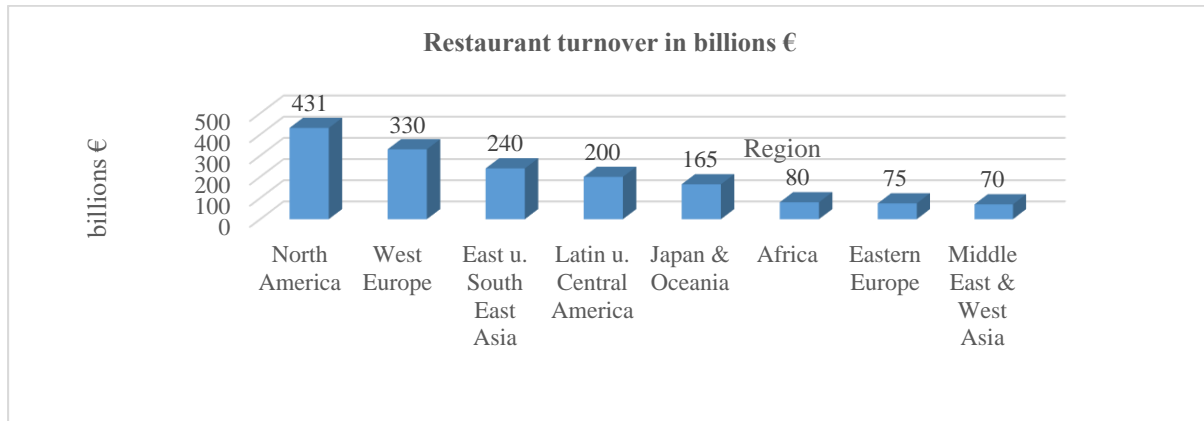
The third largest foodservice market in the world is Europe. The world leader in this market is the Asia Pacific region, accounting for 43% of the market share (GIRA Foodservice, 2018). This position is explained by the rising demand in India and China. The main players on the European foodservice market are: France, Germany, Italy, the UK, and Spain.

Two of the biggest markets in the food and beverage service industry in Europe are the United Kingdom and France, where in 2015 enterprises generated revenues of 87,8 billion euros and respectively 63,2 billion euros. Italy and Spain are also very important, mainly in the number of food service enterprises in the European Union in 2014.

Restaurants are very appreciated by consumers. On the market, we find very different restaurants and eating facilities: from full service 'sit down' restaurants, to limited service and casual dining establishments or company restaurants. The biggest turnover in the restaurant industry is by far in the United States of America, as we can see in the next figure.

The total turnover in the European Union generated by restaurants and mobile vendors was around 237 billion euros in 2015.

The highest number of restaurant enterprises in 2015 were found in France. The number of restaurants has been steadily rising everywhere in Europe. In 2015, the number of restaurants in the UK reached 72,794 (STATISTA, 2017).



**Figure 1. Out-of-home market: Restaurant turnover worldwide by region**

Source: EHI Handelsdaten, 2011 (EHI, 2011)

In the USA, quick service and fast food restaurants are a key segment of the restaurant industry, but this segment developed a lot also in Eastern Europe in the last 20 years. Fast food brands including Subway, McDonalds, Burger King and KFC dominate the landscape for restaurant franchises in USA, Europe and especially Eastern Europe. The U.S. fast food giant McDonalds is present in most European countries. Also often incorporated into big malls, the quick service restaurant market are coffee shops and cafés. In this segment Costa, Starbucks and McCafé are the leading players in Europe. More and more HoReCa suppliers are challenged by Cash & Carry players and Logistics & Transport segments and need to adapt to the new challenges. The foodservice income value worldwide is around € 2,9 trillion in 2017 and shows a good yearly increase (CLAIRFIELD INTERNATIONAL, 2018).

Mintel's expert team of Foodservice analysts have identified four different groups of trends for 2018 in the US Foodservice industry. The trends are related to innovation, customization, and automation onto menus and into restaurant kitchens (MINTEL, 2018).

According to the GIRA Foodservice study of 10 European countries, the Europeans eat 18% of all meals outside their home. The tendency of eating more and more outside is related also to the fact that every day less women cook at home. More and more women are working fulltime and have less time for house activities. Because of this, many traditional recipes disappear together with the feeling of traditional home and family. On the other side, this translates into growing opportunities for producers, distributors, restaurant chains, catering establishments, and other foodservice companies.

Even if we do not cook at home, we are concerned about healthy eating, and interested in eating local, fresh, and sustainable foods. Some of the trends are more country-specific reflecting the eating habits every specific region. However, in most of the countries, customers are interested in the international cuisine.

Even though this is an industry where we talk about tradition and culture, the digital economy is necessary and covers more and more of its areas. The digitalization of this industry includes: e-commerce platforms, delivery and automation technologies, and customer and production process tracking systems.

Customers have higher expectations, and in order to satisfy those, the industry needs a better skilled work force. This means increased labor costs. The labor costs and the high employee turnover is a general problem of the industry. "High competition as well as economies of scale are very noticeable in the industry, which is one of the reasons for consolidation in the industry" (CLAIRFIELD INTERNATIONAL, 2018).

### **3. The Restaurant Market in Romania - Analysis and Results**

The restaurant market has experienced an accelerated growth over the last decade. As part of HORECA, restaurant development depends directly on general economic development.

This sector is very sensitive to general economic fluctuations. In times when the economy shows growth, there is also growth in this sector, but generally at a more accelerated pace. In times of crisis, the restaurant market drops more than other sectors, being more sensitive to these economic fluctuations. This market increased and doubled in 2008-2016, reaching 8.5 billion lei in 2016.

This market has increased at the same time with the increase in consumer spending recorded by our country in the last period. The growth in this sector has been determined by several factors: the reduction of the VAT rate, the general growth of the tourism industry and of the consumers' purchasing power. The number of players in this market increased at a smaller pace than the total turnover of the industry over the same period, this showing a significant increase in the average sales per existing restaurants.

The restaurant market is dominated, as turnover, by three major international chains - McDonald's, KFC and Pizza Hut. The development of the restaurant market has been sustained by the expansion of local and international players as well as the emergence of new names. An example of this is the entry into Romania of two big players from the US - Taco Bell and Sbarro (ROSCA, 2017).

Despite the increases, however, we notice that the restaurant market is a difficult one, with strong competition and a strong staff turnover. Continuing professional training and qualification is the only sustainable solution to address the shortage of qualified staff in the restaurant, bar and cafe industry. In addition, through the right training, weak management in this sector can also be tackled.

This sector faces one of the highest bankruptcy rates, according to the data published by the Romanian Employers and Organizations (HORA), namely almost 60% of newly opened units are bankrupt in the first nine months of existence and up to 80% in the first five years of operation.

HORECA companies must take into account the fact that without a well-structured business plan, a well-trained staff and a strategy tailored to changing conditions in this market, especially under Industry 4.0, they will have no real chance of survival, or in the best case, they will experience less development.

Romania ranks last in the European standings in terms of household spending in restaurants, bars and cafes. These expenditures amount to only 1.1% of the monthly income of a household in Romania. At the top of this ranking is Spain with 14.6% of the monthly income. The European Union average stands at 6.8% of monthly household incomes.

The number of job vacancies almost doubled from 2009 to 2016 (Bellu, 2017).

Digitization can solve a part of the labor force problems in this sector, both by replacing the people with robots, or by simplifying the work and leading to an effective and sustainable increase of labor productivity.

Looking at the Romanian economy as a whole, according to the results of the Deloitte study related to industry 4.0, a general level of digitization could reduce the number of jobs, affecting directly or indirectly about 60% of the existing ones (FEINBERG, 2016).

However, the companies are optimistic about Industry 4.0, but they are skeptical about the ability of each company to influence it (ANGHELUTA, 2018). After the analysis of four domains: social impact, strategy, talents / labor force and technology, the results show that companies are unsure of how they have to react to change so they can benefit from positive results. Regarding the social impact, 87% of companies believe that Industry 4.0 will improve

social equity and quality of life as well as its stability. In addition, companies are convinced that the workforce needs to be trained to face new challenges.

"The survey highlighted the fact that executives around the world are at an early stage in preparing organizations to make the most of Industry 4.0. They will need to use opportunities to strengthen interaction with customers, employees, organizations, communities and society in a broader sense (ANGHELUTA, 2018).

However, companies are planning to invest about 5% of digital revenue from digitalization worldwide at \$ 907 billion, according to a PwC study, according to Agerpress (AGERPRESS, 2016).

In the restaurant industry, companies digitize essential activities within their own chain of business, but also in their relationship with partners, especially on supply floors. In addition, they improve their product portfolio by introducing digital features and innovative data services (ANGHELUTA, 2018).

The main investments will be directed to the development of digital technologies such as sensors or connection devices, software and applications for data processing systems. As a result of implementing digital solutions, companies also expect to reduce costs and increase their competitiveness (PwC, 2016).

Considering the fact that the vast majority of restaurants in our country are small and very small companies, it is understandable that they do not have departments that can thoroughly analyze all the existing solutions in the market. Thus, over 80% of companies expect data analysis methods to have a significant influence on the improvement of decision-making processes. The general issues faced by companies in implementing Industry 4.0 refer to domestic digital specializations as well as the lack of specialists in this field.

For example, some digital solutions for restaurants are:

- a. Inventory tools integrated into the existing POS system;
- b. Sensors for reducing energy costs (both for lighting and coolers). They can additionally provide information on the required maintenance work, which reduces the cost with the equipment;
- c. Digital applications are an important solution for the paper-based monitoring and reporting system, but also for systems required by law such as Hazard Analysis and Critical Control Points (HACCP);
- d. Digital applications to increase customer satisfaction, etc.

Industry 4.0 delivers a more satisfying and rewarding experience to the customers, including a more streamlined process of delivery and day-to-day management for the supplier. This includes also applications on their mobile devices that control the customer experience, for example, loyalty programs, customer preferences, and even light music preferences. (DARRYL, 2018). By improving customer experience, restaurants can increase their competitiveness.

METRO AG supports the digitization of the Horeca sector, launching internationally the "Digital Club" platform dedicated to restaurants, hotels and catering providers (METRO, 2017).

According to the obtained results, it is known that at present most restaurant owners do not use any digital solutions. Even if the digital solutions available can solve a significant part of the problems they face, even concerning the workforce, the digital solutions are missing.

Digital Club offers restaurants: Free digital tools, advice, support and a space that facilitates dialogue, socialization, knowledge sharing, and building a community dedicated to restaurant owners.

Compared to Romania, the HORECA sector in Germany has a high level of digitization, despite the fact that the size of the companies are also very small.

"METRO AG has set up the company HoReCa.digital, which aims to manage its own digital solutions as well as those developed by start-ups. The company started the digitization process in 2015 through METRO Accelerator, supported by Techstars, which promotes start-ups that develop digital solutions for the Horeca industry" (METRO, 2017).

Two Digital Club solutions ready to be used internationally are: a tool that enables businesses to quickly and easily build a personalized website and an online booking tool. The goal of Digital Club is: To create a digital community for the Horeca sector (METRO, 2017).

SELGROS implemented a digitization tool called "Flowtify" for internal monitoring and reporting, but also for law required monitoring, for example HACCP.

This digital instrument, Flowtify, offers:

1. Easy creation, editing and evaluation of checklists on tablets or PCs
2. Live Feedback across all stores\Access to all relevant data, no matter where you are
3. Intuitive operation on the tablet and in the Web Dashboard.

The main advantages of flowtify are:

1. elimination of archiving costs
2. unburden executives through automated plausibility checks
3. easy collaboration with auditors through remote access to all relevant data
4. fast onboarding of new employees
5. established processes stay even with high staff turnover
6. early reminders of maintenance prolongs the service life of your equipment.

The flowtify App includes:

1. upcoming checklists are indicated 60 min prior to start
2. checklists are organized by closing time
3. finished checklists are visible up to 12 h in the past
4. sort checklists by departments
5. deactivate checklists or single tasks when needed
6. Result value fields such as: numbers, dates, yes/no, signatures, etc. to mark tasks done
7. multiple Remeasurements
8. mark tasks as not done – employees have to enter the reason why the task could not be completed accordingly
9. include attachments to tasks, (video, pdf, photo, word, excel, etc.) to guide employees
10. instant messaging in case of irregularities (email / web dashboard / HotelKit)
11. employees can send messages & photos related to a specific tasks
12. generating different types of reports
13. localization: English, German (French, Italian, Romanian in Q2/2018) (VOLLMER, 2018)

#### **4.Conclusions and discussions**

The restaurant industry faces a very strong competitive situation. Strong competition is also encountered in other branches of the Romanian economy, but competition in the restaurant industry does not only refer to the mere competition between traditional players, but also to the competition with the new forms of modern gastronomy. Thus, digitization is a simple, safe and unavoidable solution in this industry.

As we have earlier presented, players such as Metro and Selgros have already resorted to modern solutions and to various forms of digitization.

The sustainable development of the restaurant sector depends on a qualified workforce and especially on customer satisfaction. Both aspects can be improved by using the tools offered by digitization, industry 4.0.

This sector does not have to worry about digitization, as it exists and is widely applied in other countries and has proved to be successful. Among the first applications of digitization needed in this sector are: digital management and control tools, quality assurance, and hygiene; those related to collaboration and communication both vertically and horizontally with the workforce and last but not least, those related to the satisfaction of the clients.

A very important aspect is the choice of the most suitable solutions for each company and its departments. Each digitization solution includes the initial acquisition costs and a number of other implementation and use costs. Therefore, the advantages of the chosen solution need to be carefully analyzed and the users need to be well trained to take advantage of everything that the digital solution offers.

Choosing a digital solution without verifying the possibilities of implementation and/or without training users properly, brings with it a number of material or organizational risks.

In order to have new business opportunities, we must embrace automation and digitalization and develop new markets, new production processes and new products. Industry 4.0 has proven to increase productivity and efficiency, and even though it has reduced the job opportunities in some sectors of the industry, it has created more highly skilled and productive jobs in the IT industry. Restaurants and hotels should adapt to the needs of today's consumer, which are tech-savvy and self-sufficient (the great majority of them do not need a travelling agency anymore) and use user-friendly and updated applications to promote their respective businesses (JASONOS & McCORMICK, 2017).

As a general conclusion, we must mention the experience of other countries, where the restaurant sector continues to position human relations first. So the customer will return to a restaurant only if he was treated well and felt good, liking the atmosphere found in that place. Digitization should be carefully chosen according to the specifics of the location and the age of the clients in order not to lose the personal communication that a customer segment is looking for, but also not to neglect or lose the advantages of digitization. As an example, in fast-food restaurants, customers may, better receive digitizing, even in the case of orders or issuing notes, than in more sophisticated restaurants. Berlin's "Byte-Burger" restaurant is a place where the order is made directly at the table on a tablet, and in Cologne's "Grillrestaurant B. Easy", customers receive the digital bill and have to pay for it at the exit of the restaurant (GEHRING, 2017).

The analysis is limited to the restaurant sector, and it is necessary to extend it to the next stage of the entire tourism and services industry in Romania, with the coverage and analysis of the level of appreciation of the different digital solutions from the point of view of the consumer.

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