
Professional competences of the personnel working on quality control and food safety in the food industry

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Abstract

The consumers’ health is an important problem which calls for better training strategies of the personnel implied in quality control and food safety. The multitude of changes encountered in raw material quality and processing technologies also impose a permanent readjusting of the professional formation. The paper presents the research results within the project FooDrinks viewing the satisfaction degree of the employers regarding the competences of the personnel from this domain, identifying also new abilities and competences requested by the labour market. The results obtained in Romania and in three other countries were compared, highlighting the demanded modern competences.

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1. Introduction

The importance of professional formation of the personnel responsible with the quality and safety of food products is well known by both consumers and manufacturers. Numerous organisms activating in the field have already stated the importance of this objective. It is the case of the European Technology Platform (ETP), Food for Life which has been established in 2001 under the management of the Confederation of Food and Drink Industries of the European Union (CIAA). In June 2011 it has changed its name into FoodDrink Europe and, since then, it has

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represented the interest of food and drink manufacturers at the European Union level.

European Technology Platform (ETP) launched in July 2007 the first Strategic Research Agenda and then newly revised “Strategic Research and Innovation Agenda (SRIA) 2013-2020 and Beyond”, following the principles of the Lisbon Strategy. In the Strategic Research and Innovation Agenda there are pinpointed the main strategies for the food industry development in the upcoming years. Qualification and training of the professionals was identified as a main driver for “acceptance and application of innovation” and “a key component in increasing competitiveness”.

The importance of ensuring the quality and security of food products in what public health is concerned, has generated a complete set of Regulations and Directives of the CE viewing the food products hygiene, in order to institute a global and integrated politics applicable to all food products (from production to selling points and consumers). The legislation proposes to ensure the hygiene of the food products in all stages of production up to the consumer, readjusting the problems concerning nutrition, the composition and the quality of the food products.

Verifying whether these standards are respected and put into practice becomes the duty of the personnel implied in control security sector. The professional quality of this personnel category has a great impact on the quality and security of production, a fact which had been emphasized by the first Codex Alimentarius Commission in 1963 and up to the 2014th edition of the Encyclopaedia of Food Safety (Editor-in-Chief Yasmine Motarjemi), passing through a long series of articles of speciality (Ehiri and Morris, 1996, Holleran et al. 1999, Egan et al., 2006, Trienekens and Zuurbier, 2008, etc.).

On the other hand, changing the fabrication's technology, the quality of the raw materials, of the recipes, the automation of the processes, the concern for the environmental protection are just some of the new requirements which ask for a modern personnel formation and a better readjusting to the actual requirements of the labour market.

Starting from these premises, the present paper shows the results of the research done within the project FooDrinks- Quality Food&drink European Training Plan, (LLP-LdV/PAR/2011/RO/100) concerning the actual and other necessary competences for a better training of the specialists in the field of quality and food safety.

2. The assessment of the competences and skills needed by the personnel working in quality and safety control in Food Industry

The first interested part in the quality of the professional training of the personnel, are the employers. Accordingly, a survey throughout the firms in the food industry area has been done in order to identify the degree of satisfaction of these firms in relation to the present capacity of the personnel working in the field of control of food quality and safety, together with the necessary new competences and abilities.

For this purpose, a series of interviews had been realised on the basis of a questionnaire containing the same set of questions used by all 7 countries participant in the project (Romania, Bulgaria, France, Spain, Greece, Turkey, Hungary) on an pattern of 30 companies in the Food Domain. At the end, we have collected 224 answers.

The questionnaire presented to all the firms had been structured as it follows:

- Identifying the respondent;
- Asking information about the team involved in food quality and safety;
- Evaluating a set of 11 professional competences for two categories of personnel:
  - Employees involved in food quality and safety;
  - Employees involved in the production;
- New professional competences required by the labour market;
- Identifying the additional professional qualities and skills;
- Comments.

2.1. The identification of the respondent

This identification asked: the name of the company, the number of employees, the branch and the main products.

In Romania, the survey included: 12 large firms, having over 250 employees; 8 medium firms with a number of employees between 100 to 250; 8 small firms having between 25 to 100 employees and 2 micro firms having up to 25 employees. The firms are active in different sectors of food and drinks industry such as: meat production and distribution, beer production, milk processing, milling, bakery and pasta, oil industry, sugar confectionery, chocolate and cocoa products, animal husbandry, etc.
2.2 Information about the team involved in food quality and safety

Here should have been mentioned the following details: the structure of the personnel working in quality control and food safety, the personnel education, the position held and the number of the members working in teams. The answers from the trading companies in Romania were summarized in the table 1.

Table 1. The structure of the personnel working in the sector of quality control and food safety

<table>
<thead>
<tr>
<th>Type of firms</th>
<th>&gt; 250 employees</th>
<th>100-250 employees</th>
<th>25 - 100 employees</th>
<th>1 -25 employees</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of firms</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>No. of total employees</td>
<td>6215</td>
<td>1053</td>
<td>136</td>
<td>14</td>
<td>7418</td>
</tr>
<tr>
<td>No. of people working in teams and level of education</td>
<td>396 approx.</td>
<td>151 approx.</td>
<td>30 approx.</td>
<td>5</td>
<td>582</td>
</tr>
<tr>
<td></td>
<td>132 university level</td>
<td>51 university level</td>
<td>10 university level</td>
<td>1 university level</td>
<td>194</td>
</tr>
<tr>
<td></td>
<td>264 secondary level approx.</td>
<td>100 sec. level approx.</td>
<td>20 sec. level approx.</td>
<td>4 sec. level</td>
<td>388</td>
</tr>
<tr>
<td>Percentage of Q&amp;S team</td>
<td>6,3 %</td>
<td>14,33</td>
<td>22 %</td>
<td>35 %</td>
<td>7,8%</td>
</tr>
</tbody>
</table>

As an observation, due to the fluctuations in the number of personnel presented by several firms, some of the values in the table have been approximated.

The following conclusions have been reached from these results:
- The dimension of the equipment implied in quality control and food safety differs from one company to another;
- in the case of small and micro enterprises generally manufacturing traditional products, the quality requirements impose a larger number of people involved in quality control;
- in the case of medium companies, we have identified a poor management in what the staff responsible with the product quality is concerned;
- in the case of large companies, the performance of the technological modern lines allows reducing the number of people involved in product quality, which leads to cutting personnel costs;
- Even the small firms have at least a person with university education leading the sector of control quality and food safety.

The additional information received at this requirement of the questionnaire proved that there is a necessity for the better training of the personnel especially in situations in which possible changes might appear in the technological flow or in the legislation since the training is usually made by vets or biologists. All quality managers should be responsible for training the staff in their units about hygiene, quality and safety requirements.

2.3 The evaluation of a set of 11 professional competences for two categories of personnel

The questionnaire made it possible to assess the importance paid by the Romanian employer to some of the specific professional competences. They have been asked to evaluate 11 competences and to qualify them with one or more of the following: very important; important; moderately important; of little importance; unimportant.

Two categories of personnel have been evaluated in this process:
- Employees involved in food quality and safety;
- Employees involved in production.

The table 2 is synthesising the answers provided by the Romanian firms. Some of the respondents didn’t answer
to all the questions which can be noticed in the percentages obtained.

Table 2 Evaluation of 11 professional competences

<table>
<thead>
<tr>
<th>COMPETENCE</th>
<th>Employees involved in food quality and safety</th>
<th>Employees involved in production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very important [%]</td>
<td>Important [%]</td>
</tr>
<tr>
<td>1 - Observing the healthy and safety working conditions in production</td>
<td>96,6</td>
<td>3,3</td>
</tr>
<tr>
<td>2 - Applying selection criteria and indicators in choosing raw, additional materials and the reliability of those who provide it</td>
<td>86,6</td>
<td>10</td>
</tr>
<tr>
<td>3 - Organizing and controlling the technological process of food and beverages production</td>
<td>86,6</td>
<td>10</td>
</tr>
<tr>
<td>4 - Monitoring the functioning of the technological equipment</td>
<td>70</td>
<td>26,6</td>
</tr>
<tr>
<td>5 - Establishing and controlling the monitoring system of the critical points in implementing the HACCP plan in food and beverages production</td>
<td>93,3</td>
<td>6,6</td>
</tr>
<tr>
<td>6 - Controlling the quality management procedures in food and beverages production</td>
<td>86,6</td>
<td>13,3</td>
</tr>
<tr>
<td>7 - Monitoring the function of control and measurement devices</td>
<td>86,6</td>
<td>10</td>
</tr>
<tr>
<td>8 - Performing control on the sample taking procedures and their delivery for laboratory analysis</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>9 - Supervising the best production practices for food handling implementation and their documentation</td>
<td>90</td>
<td>3,3</td>
</tr>
<tr>
<td>10 - Sorting, generalizing and storing production process information, using ICT</td>
<td>46,6</td>
<td>46,6</td>
</tr>
<tr>
<td>11 - Informing and applying Traceability systems and crisis procedures in management processes</td>
<td>83,3</td>
<td>3,3</td>
</tr>
</tbody>
</table>

The ranking of the competencies can be visualised in Figure 1.

The first positions for personnel working in quality and safety control are:
1. Observing the health and safety working conditions in production (Competence nr.1 in the table 2). 96.6% of the respondents consider this competence the most important for both the production personnel that is directly implied in the technological flow and needs to work in safety and hygienic conditions, and for the team implied in quality control and food safety which needs to notice the deviation from the regulations in the field.
2. Establishing and controlling the monitoring system of the critical points in implementing the HACCP plan in food and beverages production (Position 5 in the table 2). Hazardous Analysis and Critical Control Point system is one of the main responsibilities of the safety and quality team which the answers have shown. Nonetheless, the system implementation presupposes a good co-operation between all the participants in the manufacturing process, so 70% of the respondents considered also this competence also very important for production team.
3. Two competences share this position:
Performing control on the sample taking procedures and their delivery for laboratory analysis (position 8). This competence is primordial in the training process of the personnel responsible with quality control and food safety. Concerning the ability of the personnel implied in manufacturing, opinions highly rely on the organizational structure of the company.

Supervising the best production practices for food handling implementation and their documentation. This competence, as the answers demonstrate it, proves very important for both personnel types. The 3.3 percentage of “moderately important” answers attributed to the personnel implied in quality control refers to a part of specification, which is considered more the task of the team implied in manufacturing products.

4. The fourth position belongs to:
   - Applying selection criteria and indicators in choosing raw, additional materials and the reliability of those who provide it (Competence nr. 2).
   - Organizing and controlling the technological process of food and beverages production (Competence 3)
   - Monitoring the function of control and measurement device (Competence nr. 7). Considering the metrology as part of the quality division, the weighting factor received is highly justified.
   - Controlling the quality management procedures in food and beverages production (Competence nr. 6).

86.6% of the representatives of the firms considered it very important for the personnel implied in quality control and food safety who has to manage the possible crisis that may appear and to avoid contaminating the materials and ensure the traceability of the products quality control. The competence is very important in proportion of 73.3% for production personnel.

![Fig. 1. Ranking the competencies](image)

The last position in the hierarchy of professional competences of the quality and safety team is Sorting, generalizing and storing production process information, using ICT. Only 46% respondents (50% in the case of production team) consider the ICT abilities extremely important. The answer is eloquent for the level of computerization of the companies in food industry and the progress that needs to be made in this area.

2.2 New professional competences required by the labour market to the people employed in assuring manufacturing quality and food and drink safety

The six new competences have been highlighted during the discussions with the representatives of the food sector from the countries participant in the project. The competences proposed for the evaluation are the following:

1. The implementation of new technologies, new software or machines and equipment, including those for sustainable, ecological and energy efficient production;
2. Making changes in the market and consumer’s requirements (healthy eating principles, the impact of new ingredients / substances on the quality of food and beverages and on the human health);
3. The manufacturing of new products, including bio- and eco-products;
4. Making changes in organizing work and the organizational culture within the company;
5. The implementation of new models and management systems;
6. The implementation of new regulation, legal norms and quality standards, etc.

The results obtained in Romania are represented in figure 2.

The capacity of implementing new technologies, new software, machines and equipment, including those for sustainable, ecological and energy efficient production, is considered the most important being appreciated by 70% of the respondents. The second position, with a percentage of 63.3%, is occupied by the Manufacturing of new products, including bio- and eco-products and, on the third position, The changes in the market and consumer’s requirements.

2.2.1 New professional competences required by the labour market identified in other countries.

The results obtained in other three countries, viewing the identification of the new competences that are necessary in training the personnel working in quality control and food safety, are presented below.

In Spain the survey included 30 companies: 13 great companies (more than 250 employees), 3 medium companies (up to 250 employees), 8 small companies (up to 50 employees) and 6 micro-enterprises. The answers received have helped making the following hierarchy containing the new proposed competences:

1. The implementation of new technologies, new software, machines, equipment, including those for sustainable, ecological and energy efficient production;
2. The implementation of new regulation, legal norms and quality standards, etc.
3. Making changes in the market and consumer’s requirements (healthy eating principles, the impact of new ingredients / substances on the quality of food and beverages and on the human health):
4. The manufacturing of new products, including bio- and eco-products;
5. Making changes in work organization and organizational culture within the company;
6. The implementation of new models and management systems.

Comparing the results obtained with the ones in Romania we notice the passing on the second level of the necessity to know and implement the new regulation and standards emitted at the level of European Union.

In Bulgaria 36 companies were surveyed: 1 great company, 17 medium companies and 18 small companies. The competences proposed have been ranked as follows:

1. The implementation of new technologies, new software or machines and equipment, including those for sustainable, ecological and energy efficient production;
2. The manufacturing of new products, including bio- and eco-products;
3. Making changes in the market and consumer’s requirements (healthy eating principles, the impact of new ingredients / substances on the quality of food and beverages and on the human health); 
4. Making changes in work organization and organizational culture within the company; 
5. The implementation of new models and management systems; 
6. The implementation of new regulation, legal norms and quality standards, etc.

In Turkey 32 companies were questioned: 13 great companies, 9 medium companies, 7 small companies, 3 micro-enterprises. On behalf of the questionnaire, the results obtained are similar to the ones in Romania:
1. New technologies, including sustainable, ecological production; 
2. The manufacturing of new types of products: bio and eco; 
3. Making changes in the market and consumer’s requirements; 
4. The implementation of new regulation, legal norms, etc. 
5. The implementation of new models and management systems; 
6. Making changes in work organization /organizational culture.

2.2.2 Analysing the results according to the new competences
Analysing the results we have reached to the following conclusions:
1. All employers from all countries require a good knowledge of new technologies, machines and equipments, including those for environment protection. Unfortunately, our conclusion is that the professional training offered is behind the progress of science and technique. 
2. The majority of employers ask for new products, including bio- and eco-products knowledge, skills which increase the competitiveness of the companies; 
3. The information about the changes in the market and consumer’s requirements (healthy eating principles, the impact of new ingredients / substances on the quality of food and beverages and also on the human health) is the 3th competence. Therefore, updating the training programs is required in order to satisfy new consumers’ demands. 
4. The less important concerns the knowledge of rules, legal norms and system management.

2.3 Identifying the additional professional qualities and skills.
In order to obtain the most complete prototype of the ideal employee, the respondents have been asked to identify supplementary competences and abilities, apart from those which have already been mentioned in the questionnaire.

In Romania, according to the percentage obtained, the hierarchy is the following:
1. Ability to work in a team; 
2. Communication skills; 
3. Coping skills to deal with a crisis; 
4. Personality traits: coordination, observation, precision, accuracy, independence, responsibility, etc. 
5. Innovation

Bulgarian companies identified the following additional professional qualities and skills:
• 1. Loyalty; 
• 2. Discipline and initiative; 
• 3. Administrative skills; 
• 4. Planning and organization skills.

From Turkey the following responses came:
1. Ability to work in a team; 
2. Communication skills; 
3. Coping skills to deal with a crisis; 
4. Personality; 
5. Innovation.

Concerning the Spain survey, the greatest part of the new skills states that the companies’ requests are closer to production processes and entrepreneurial management than to the quality and security for food and drinks sector.

2.4. Comments - Other competencies
The last part of the questionnaire has given the respondents the liberty to express their personal opinions,
commentaries viewing other qualities which would be necessary to a new desired employer in the field of quality and food safety. The following answers have been emphasised:

- Good practice, more practical skills; the professional training programs are desired to develop the practical abilities of the workers and the necessity for more practical hours;
- more than that it is desired that the professional training programs to develop more the personnel’s abilities, more practical hours being necessary;
- Largely known in the countries participant in the project, the European legislation would require more attention within the training programs. It is desired that students should be trained to constantly inform about the changes in the international, European and national rules and regulations. This would reduce the losses mainly in the manufacturing industry.
- Visual and chromatic acuity and other senses such as smell and taste should be well developed and better trained in the applicative part of the professional education. The personnel working in quality food safety should have the necessary competences in order to analyse the organoleptic characteristics of the products and materials.

3. Conclusions

- This investigation has led to the ranking of the competences which the actual programs in Romania provide to the personnel working in the sector of quality control and food safety.
- An interesting result highlights the fact that beyond the borders of the countries, the employers' requirements are similar.
- The actual training program offers basic knowledge but must be improved to be in accordance with the actual labour market needs. The new required competences were identified as capacity to adapt at:
  - New technologies, new software or machines and equipment, including those for sustainable, ecological and energy efficient production;
  - Manufacturing new products, including bio- and eco-products;
  - Changes in the market and consumer’s requirements (healthy eating principles, the impact of new ingredients / substances on the quality of food and beverages and on the human health).
- All the employers require people of character, able to work in teams, communicative and capable to cope with stressful situations.

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