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APPLICATION OF THE METHOD «FMEA» IN FOOD SAFETY MANAGEMENT SYSTEMS

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Abstract
At food industry enterprises, it is important to prevent or reduce risks in the production process, to prevent their recurrence. In this regard, the analysis method FMEA (Potential Failure Mode and Effects Analysis) provides the necessary results in the analysis of the root causes of each possible or occurring defect and taking measures to prevent recurrence. This article presents an analysis of FMEA in the implementation of management systems in food industry enterprises, the practice of its application.

Keywords: Food safety, risk, system, standard, analysis, FMEA, method, assessment, ISO 22000, corrective action, product, process, nonconformity, priority, effectiveness, importance, occurrence, risk priority number.

Introduction
As a result of measures taken in recent years in our country, the export of Agriculture and food has increased by 2 times, the production of more than 10 million tons of vegetables, more than 17 million tons of other agricultural products and 2.5 million tons of meat per year. In 2019-2021, their exports increased by 1.5 times (from $ 590 million to $ 920 million), thanks to the fact that 2,000 exporters received international certificates. [1]
At the same time, factors such as insufficient compliance of cultivated agriculture and food with international standards and safety requirements, improper interaction among food producers and exporters are hindering the country's export potential as well as opening new markets. In this regard, a number of regulatory documents have been adopted in order to increase the volumes of processing of food, fruits and

vegetables, meat, milk and other agricultural products on the basis of international quality standards, to introduce a system of state support for the production of domestic types of food, which are competitive in domestic and foreign markets, and to further improve the provision of

On March 11 of this year, at a video director meeting on issues of further expansion of industrial cooperation and localization, held under the chairmanship of the head of state, the agency "Uzstandart" and a number of ministries were tasked with introducing international standards during 2022. Including:

- 150 in the textile industry;
- 50 in electrotechnics;
- in the food industry, the task was set to introduce international certificates in 200 enterprises.[2]

From the figures, it can be understood that the international certification system in food production enterprises is not effectively established. As you know, for food enterprises "ISO 22000: 2018-Food Safety Management Systems. The international standard" requirements for organizations participating in the food creation chain " is recommended.

Practical experience suggests that most businesses have difficulty meeting the requirements of their O‘zDst ISO 22000:2019 standard regarding quality (non-quantitative) data analysis. To such requirements, first of all, paragraph 8.5.2" risk analysis " is applied. [3]

In fact, once all possible risks have been identified, they must be analyzed to determine which risks should be directed to control measures. Usually, such analysis work is carried out within the framework of the seminars of the food safety group, in particular, in these seminars everyone expresses their opinion and it is considered by all other group members.[4]

FMEA Method

To reduce risks by making unbiased decisions based on the results of the analysis, the FMEA (Potential Failure Mode and Effects Analysis - Analysis of types and consequences of defects) – analysis method can be used. Despite the fact that FMEA analysis has been developed and is mainly used in mechanical engineering, it has a universal character and can also be used in other areas. FMEA analysis is based on the following principles:

➢ collective approach – FMEA is carried out by a group of specialists (up to 4-8 people), whose specially selected interactions are associated with each other;

- hierarchy – for complex products, both the object of analysis and its individual components are analyzed;
- iteration-the analysis is repeated many times and updated with any changes in the object or requirements for it;
- data registration-FMEA data analysis results are registered to further evaluate management activities, increase the speed of data storage and analysis;
- universal – FMEA analysis can be used to evaluate products, processes and even control systems.

In the food safety management system (OMXMT), FMEA analysis is carried out by the food safety team, which assesses the risk in the following sequence of actions:

- determination of all possible risks by the group of the person (for this it is advisable to use the "mental attack" method);
- estimate the possible consequences of each Risk (s) on a ten-point scale, i.e., estimate the potential risk to the health and life of the end consumer;
- to determine the cause for each risk and evaluate the frequency(periodicity) (O) of these causes on a ten-point scale;
- assessment of risk detection capabilities (d)on a ten-point scale, in particular risk detection, is somewhat difficult;
- quantitative risk assessment – the priority number of risks (xus)=determined by the Xoxd, and if the xus exceeds the established value (set separately), the food safety group begins to develop appropriate management measures
- planning management activities
- evaluation of the management measures taken

Gost R 51.814.2-2001 " quality systems in the automotive industry for FMEA analysis. The method of types and consequences of possible defects" can adjust the requirements of the standard. In the same standard, we can take a score scale for each of the three components of the priority number of risks (xus). However, the food safety team must adapt these scales to the Omxt.

FMEA analysis should significantly increase the effectiveness of the risk analysis carried out, but it should be borne in mind that the objectivity of FMEA analysis, like any method based on an expert opinion, is highly dependent on the composition of the food safety group. Therefore, FMEA analysis can involve professionals outside the food safety group, as well as representatives of consumers and suppliers, if necessary.

This FMEA (Potential Failure Mode and Effects Analysis) method is an effective means of improving the quality and safety of the technical object being created, which will be aimed at eliminating the problem or reducing its bad consequences.

This method is widely used by leading companies around the world in obtaining problems at the stages of new projects and production processes, as well as in ensuring and analyzing production processes and product quality planning and safety.[5]

The requirement to introduce the FMEA method is the requirement to apply automotive quality management systems in paragraphs 8.3 and 8.5 of the IATF 16949:2016 standard, as well as other standards of the aerospace and aviation industries [6].

The purpose of introducing and analyzing the FMEA method is as follows:

- ensuring the quality execution of the planned business process;
- achieving the required safety, ecology, efficiency and strength(reliability) descriptions-safety, environmental protection;
- design, technology, maintenance and repair to prevent possible defects (risks, failures)and reduce their consequences;
- introduction of statistical techniques in the loss or reduction of the consequences of possible mismatches, especially the detection of high risks;
- documentation of these processes.

The use of FMEA in all processes of production, finding inconsistencies and eliminating them is considered very important in the unobtrusive improvement of the product.

The advantage of introducing the FMEA method is the following:

- avoid them based on the discrepancies that can occur in the consumer in the design and technology processes and the analysis of their consequences;
- making the right decisions in design and technology processes;
- possible: increase the consumer satisfaction level by reducing safety, quality, ecology, function failure (failure), etc.

Also, the development and application of the FMEA method is carried out mainly at the following stages:

- when creating a new product(process).
- when the product(process) is changed.
- when new requirements are applied to the product(process);
- in making decisive decisions on the inappropriate product (raw materials, material, semi-finished and other)in the economic-based state of the clock.
- The FMEA method can be used not only in the process of design and production technology of the clock, in the development and analysis of any processes, which are sales, service performance, marketing, etc.

While the FMEA is headed by a person, it is necessary to organize a team for the collection and analysis of data (team), it is desirable if they consist of a qualified

designer, production technologist, maintenance mechanic, quality engineer and other specialists. Timely implementation of FMEA into design and technology processes will prevent further changes.

The decrease in inconsistencies in FMEA decreases based on the following indicators:

- ❖ accurate assessment of requirements;
- ❖ starting with the design of prevention in the preparation and assembly of the clock;
- ❖ type of mismatch that can occur in design/processes and pre-accounting of the reasons;
- ❖ knowing the results in advance by conducting tests;
- ❖ possible inconsistencies of species identification;
- ❖ create a form of open bidding, tracking and taking action (form) ;
- ❖ ensuring the use of the results of evaluation and Requirements analysis in new designs and modifications of the clock.

Types of identification of possible inconsistencies:

- determination of all types of inconsistencies that can occur for any product and function (tasks) ;

- determination of the impact of environments in which inconsistencies can occur: physical, biological, chemical (temperature, humidity, cleanliness, bad raw materials, etc.);

-type of inconsistencies: determination of shrinkage, ferment, poisoning, oxidation, discoloration, among others;

- consequences of inconsistencies: detection of poisoning, helplessness, death, bad appearance, surface unevenness, variability, etc.

Determination of risk advantage number (RPN):

$$RAN = (S)x(O)x(D)$$

here:

(S) significance is a possible mismatch (central - failure) assessment that is important to the system or consumer. The "importance" is applied only in the consequences that have arisen, and its reduction is achieved by changing the project.

(O) the probability of occurrence is the degree of opportunity to deduce the exact cause/mechanisms.

(D) the probability of finding is to find the cause/mechanisms of possible inconsistency.

(S), (O) and (D) are scored with scores ranging from 1 to 10.

(RPN) reduction of risk dominance:

(S) reducing the degree of relevance is achieved by revising project or technology processes.

(O) reducing the occurrence rate is achieved by revising the processes of the project or technology, eliminating or reducing one or more reasons, studying the variability using a statistical method for the output of the processes:

- ✓ to eliminate the defect-replacement of the nozzle into a defect-resistant project;
- ✓ note-consideration of dimensions and joys in the project;
- ✓ clock for replacing a weak component-revision of the project;
- ✓ add duplicate system;
- ✓ review of the description of materials-materials.

(D) reducing the finding rate can be achieved by increasing the steps for design verification/validation:

- ✓ ya and R-error protection;
- ✓ planning experiments on the production of processes-clock;
- ✓ technological flow processing, revision of work instructions or maintenance plans;
- ✓ Test / Test Plan Review;
- ✓ S. X. X. X.- experience / test results;
- ✓ project analysis and results;
- ✓ picture, schematic images or models confirming the change in physical characteristics;
- ✓ consistency test results.

$$RPN = (S) \times (O) \times (D)$$

The wear of the RPN from 1 to 1000. As the first risk, 100 thousand 125gr is required rating $RPN_{кр}$ critic".

It will be advisable to set a value limit of less than 100 to Marketing and other departments of the enterprise.

If RPN>is greater than Rpnkr, the whole group should focus on reducing it. For implementation, in fact, it is not recommended to set a limit on the RPN value, since if the consumer sets a limit of 100, the transmitter will be forced to take a value of 112.

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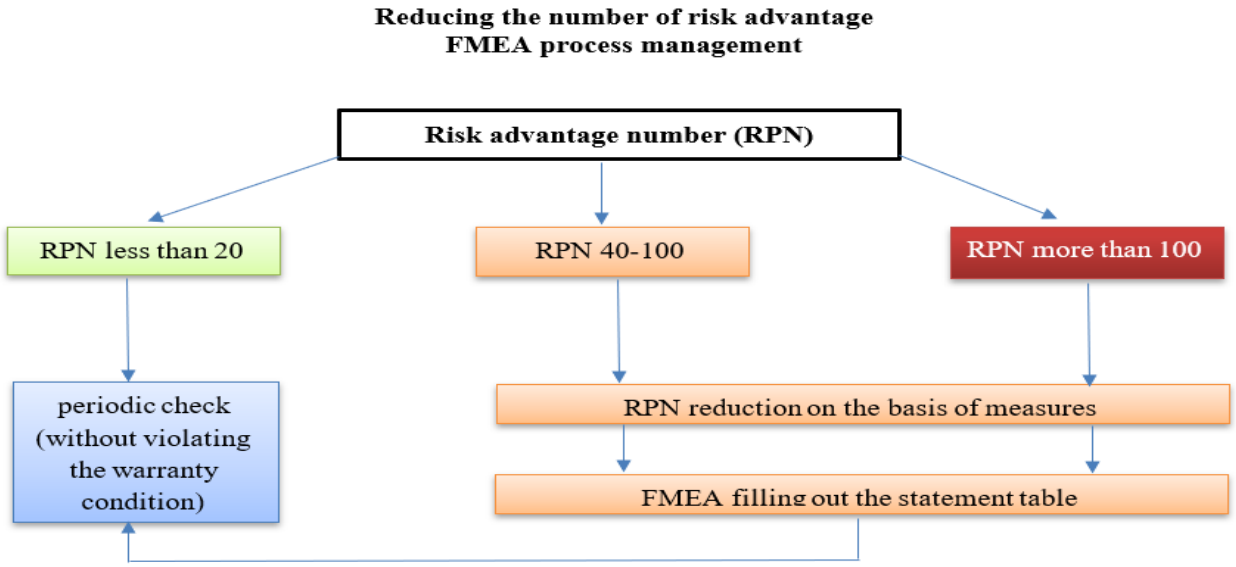

CONCLUSION

As can be seen in the table, the value of RPN is 135, indicating that the value of RPN after the measure is taken is 36. This shows the effectiveness of FMEA analysis. To increase efficiency, this method can be used as one of the best.

References

1. Decree of the president of the Republic of Uzbekistan dated September 9, 2020 PQ-4821 "on measures for the rapid development of the food industry of the Republic and full-fledged provision of the population with quality food products
2. Speech of the president of the Republic of Uzbekistan on March 11, 2022 at the videocenter meeting on issues of industrial cooperation and further expansion of localization.
3. O‘zDSt ISO 22000: 2019 food safety management systems. Requirements for organizations participating in the food product creation chain
4. Khamdamov Bakhrom Raimdjanovich, & Fattaev Mukhammadjon Avazbek Ugli (2021). PRIMENENIE METODA 5W PRI VNEDRENII SYSTEM MENEDJMENTA BEZOPASNOSTI PITSHEVIX PRODUKTOV. Universum: technicheskie nauki, (6-1 (87)), 72-74.
5. B.R.Khamdamov, A.A.Mamajonov "ISO 22000: 2018 Food Safety Management Systems. Requirements for any organization involved in the food creation chain. (Recommendations for introduction)". Monograph. AndMI 2021.
6. A.A.Mamajonov, B.R.Khamdamov, Z.B.Jo ' raev "agreement on the production of products in auto industry" monograph. Khayat publishing – 2020.