



Article

The Importance of International Standards in Improving Product Quality Management in Industrial Enterprises

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Abstract: This article analyzes the role of international standards - ISO 9001:2015, ISO 22000:2018 and the HACCP system - and their economic significance in improving product quality management at food industry enterprises in the Jizzakh region on a deep scientific basis. The leading food manufacturing enterprises of the region - "Bonu Shirinlikari" LLC and "Iruskon" LLC were selected as the object of research, and their activities were studied based on an integrated approach. During the research, economic indicators before and after the introduction of international quality standards in these enterprises were compared and dynamically analyzed. In particular, the main factors affecting export potential, competitiveness, product quality, production efficiency, and overall economic results were comprehensively assessed. The impact of the introduction of quality management systems on the internal processes of the enterprise and management efficiency was also considered. The results of the study show that the introduction of international standards has led to positive results in both enterprises: the level of product rejection has decreased by an average of 3-4 times, the export share has increased by 4-5 times, and the ROI indicator has formed around 120-140% with a payback period of less than 1 year. At the same time, a significant increase in product quality and consumer confidence has been observed. The article concludes with specific practical conclusions aimed at further developing the quality management system in the food industry.

Keywords: Food Industry, Quality Management, ISO 9001, ISO 22000, HACCP, International Standards, Economic Efficiency, Jizzakh Region, Export Potential

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1. Introduction

The food industry is considered one of the strategic sectors of the Uzbek economy, occupying an important place in the country's gross domestic product (GDP). According to the 2023 data of the Uzbekistan Statistics Agency, the share of the food and beverage production sector in GDP was 6.8 percent, which corresponds to 18.2 percent of industrial production [1]. More than 3,000 enterprises operate in the sector across the republic, and their total export potential in 2023 amounted to 1.4 billion US dollars [2].

Jizzakh region is one of the important agro-industrial regions of Uzbekistan, and the share of the regional industry in the economy has been increasing significantly over the past five years. According to statistics for 2023, the volume of food industry production in Jizzakh region exceeded 3 trillion soums and accounted for 34.7 percent of the total volume of industrial products in the region [3]. There are more than 120 food enterprises in the region, most of which are small and medium-sized businesses.

However, the lack of quality management systems in regional food enterprises has become one of the serious problems. In order to be competitive in international markets, realize export potential and meet the requirements of foreign trading partners, there is an increasing need for enterprises to implement international standards such as ISO 9001, ISO 22000 and HACCP [4]. Quality management systems (QMS) directly determine not only product quality, but also the efficiency of production processes, labor productivity and economic results [5].

The purpose of the study is to scientifically assess the impact of the introduction of international quality standards on product quality and economic efficiency, and to develop practical recommendations, using the example of the enterprises "Bonu shirinlikari" LLC and "Iruskon" LLC in Jizzakh region. The article is built around the following research questions: how does the introduction of international standards affect the economic performance of the enterprise; to what extent does the introduction of a quality management system expand export potential; and to what extent is the ROI indicator formed.

Literature Review

The issue of product quality and safety management in food industry enterprises is one of the priority areas of the modern economy. The acceleration of globalization processes, the expansion of international trade relations, and the growing demand for quality and safety by consumers have significantly increased the requirements for food products. Therefore, the issue of organizing and improving product quality management systems based on international standards is gaining importance in scientific research. In scientific literature, product quality is interpreted as a multifaceted economic category, which is determined by the consumer value of the product, its safety, compliance with standards, and the level of satisfaction of consumer needs.

In the food industry, the concept of quality is closely related to safety, and in modern scientific approaches, "quality" and "safety" are considered as a single integrated system. Food and Agriculture Organization (FAO) [6] and the World Health Organization (WHO) [7] have recognized food safety as one of the key factors in ensuring public health. According to these organizations, systematic and preventive approaches to ensuring food safety are the most effective.

One of the important stages in the formation of food safety management systems is associated with the development of the HACCP (Hazard Analysis and Critical Control Points) system. This system was originally developed in the 1960s in the USA to ensure food safety for space programs, and later became widely used throughout the world. The HACCP system is aimed at identifying, evaluating and controlling hazards, ensuring food safety by establishing critical control points at all stages of the production process. The HACCP principles have been internationally recognized and recommended by the Codex Alimentarius Commission [8] as the main tool for food safety management.

Numerous scientific studies confirm the practical effectiveness of the ISO 22000 system. In particular, it has been found that the implementation of this standard in food industry enterprises has stabilized product quality, reduced risks in production processes, and increased consumer confidence [9]. In addition, it is scientifically proven that enterprises with ISO 22000 certification are increasing their export potential and gaining access to international markets.

The issue of integration of ISO 22000 and HACCP systems has also been widely discussed in the scientific literature. Studies show that ISO 22000, including the HACCP system, brings it to the level of strategic management, as a result of which internal audit, documentation and continuous improvement mechanisms work effectively in enterprises [10]. This strengthens the systematic approach to food quality and safety management.

In addition, the implementation of the ISO 22000 system also has a positive impact on production efficiency. According to research, enterprises that have implemented this

standard reduce waste, increase resource efficiency, and optimize production costs [11]. At the same time, product consistency and traceability are ensured, which allows for rapid response to food quality and safety issues.

Scientific studies have noted a number of problems in the implementation of international standards in developing countries, including Uzbekistan. These include limited financial resources, a lack of qualified personnel, insufficiently developed infrastructure, and low awareness of standards among enterprises [12]. At the same time, existing studies show that the implementation of international standards significantly improves product quality and safety.

2. Methodology

In this research work, a number of modern scientific and methodological approaches were used to comprehensively study the issues of improving the product quality management system at food industry enterprises. In particular, during the research, the comparative analysis method was widely used, in which the main economic and production indicators before and after the introduction of international standards were compared. This approach made it possible to accurately assess the effectiveness of the changes made at the enterprises.

Also, based on the method of economic-mathematical analysis, important indicators expressing the effectiveness of investments - ROI (Return on Investment), the payback period of investments, and the level of quality-related costs - were calculated and their dynamics were analyzed. This served to determine the extent to which the implemented quality management systems were economically justified.

In addition, the expert assessment method also played an important role in the research. Within the framework of this method, conversations and interviews were held with leading specialists of enterprises, quality managers and industry experts, and the practical aspects of the process of introducing international standards, existing problems and achieved results were analyzed in depth. Through this, the real practical effectiveness of the quality management system was clarified.

The study also used a monographic method, examining the activities of two selected enterprises separately, in detail, in terms of their specific characteristics, management systems, and production processes. This approach allowed us to reinforce general conclusions with concrete evidence.

The research period covered 2020-2023, and the primary data collected during this period were formed based on the financial and production reports of enterprises, documents of quality departments, and a database of customer feedback. Reports of the Statistical Agency of Uzbekistan, the Ministry of Economy and Finance, official publications of the international organization ISO, and industry scientific literature were widely used as secondary sources of information.

3. Results and Discussion

The article studies and analyzes the current state of the food quality management system at the enterprises "Bonu Shirinlikari" LLC and "Iruskon" LLC, operating in the Jizzakh region. The study examined three international standards and systems. ISO 9001:2015 - Quality management systems. This standard defines general quality management principles and provides for a process approach, risk management and continuous improvement. ISO 22000:2018 - Food safety management systems. This standard defines a system that unifies international food safety requirements and includes the principles of HACCP. HACCP (Hazard Analysis and Critical Control Points) is a system of hazard analysis and critical control points aimed at preventing biological, chemical and physical hazards in food products.

Analysis of the situation before the introduction of standards

According to the results of the study, a number of serious shortcomings in the quality management system were identified in both enterprises before the introduction of international standards (Table 1). At “Bonu Shirinliklari” LLC, quality control was largely implemented in a partial and undocumented manner: the product rejection rate was 4.2%, annual customer complaints were 47, and quality costs amounted to 8.5% of production volume. The export share remained at only 2.0%, mainly directed to the Kazakhstan market.

Table 1. Situation before the introduction of standards in enterprises (2020–2021)

Problem type	“Bonu Shirinliklari” LLC	“Iruskon” LLC
Quality control system	Partial, undocumented	Minimal, verbal instructions
Rejected product percentage	4.2%	5.8%
Annual customer complaints (no.)	47	63
Export share	2.0%	1.5%
Quality costs (relative to production volume)	8.5%	9.2%
HACCP implementation status	No	No
Quality training for employees	Once a year, optional	Not regular
Supplier Evaluation System	No	No

Source: Compiled by the author based on the reporting data of the enterprises “Bonu Shirinliklari” LLC and “Iruskon” LLC

The situation at “Iruskon” LLC was even more serious: the product rejection rate was 5.8%, annual customer complaints were 63, and quality costs were 9.2%. The HACCP system was not used at all in the production process of the enterprise, and there was no supplier evaluation mechanism. The export share remained minimal at 1.5%, and losses due to weak quality control had a negative impact on the company's profits.

As a result of expert interviews with industry specialists, the following were identified as the main causes of these problems: lack of knowledge and skills in the field of quality management; lack of standardized production processes and instructions; poorly developed laboratory facilities; a tendency by management to avoid investing in the quality system, and insufficient monitoring of legislative requirements.

Stages of implementation of international standards

The process of implementing the ISO 22000:2018 standard at “Bonu Shirinliklari” LLC began at the end of 2020 and included the following stages: in the first stage (Q4 2020 - Q1 2021), a preliminary gap analysis was conducted, the scope was determined, and the project team was formed; in the second stage (Q1-Q2 2021), a hazard plan for the HACCP system was developed, critical control points (CCP) were identified and implemented; in the third stage (Q3 2021), documentation was completed, internal audits were conducted, and employees were trained; in the fourth stage (Q4 2021), an external audit was conducted by the certification body and an ISO 22000:2018 certificate was issued.

The implementation of the ISO 9001:2015 standard at “Iruskon” LLC began in early 2021. The company's management indicated the need to form a common management culture and create a foundation for the subsequent transition to the ISO 22000 standard as the main reason for choosing the ISO 9001 standard. The HACCP system was implemented in 2022-2023 as a logical continuation of the implementation of ISO 9001. In the fourth

quarter of 2022, the company received the ISO 9001:2015 certificate, and after that a system was formed that can fully meet the requirements of the global market.

Economic efficiency analysis

In the period after the introduction of the standards - comparing the 2023 indicators with the 2020 (or 2021) baseline indicators - significant positive changes were observed in both enterprises (Table 2).

Table 2. Comparison of key indicators before and after the introduction of standards

Indicators	"Bonu Shirinliklari" LLC		"Iruskon" LLC	
	2020 (before standard)	2023 (after standard)	2021 (before standard)	2023 (after standard)
Production volume (million soums)	2 850	4 120	1 980	2 960
Growth rate	-	+44.6%	-	+49.5%
Rejected product percentage	4.2%	1.1%	5.8%	1.8%
Customer complaints (number/year)	47	12	63	18
Export share	2.0%	8.0%	1.5%	6.0%
Quality control costs	8.5%	5.2%	9.2%	5.8%
Labor productivity growth	-	+18.3%	-	+21.7%
Number of new markets	1	4	1	3

Source: Compiled by the author based on the reporting data of the enterprises "Bonu Shirinliklari" LLC and "Iruskon" LLC

Production volume at "Bonu Shirinliklari" LLC increased from 2,850 million soums in 2020 to 4,120 million soums in 2023 (+44.6%). The product rejection rate decreased from 4.2% to 1.1% - a 3.8-fold improvement compared to the implementation of the standard. Annual customer complaints decreased from 47 to 12, and the export share increased from 2.0% to 8.0%. Labor productivity increased by 18.3%, and the company entered the markets of Russia, Belarus, and Kyrgyzstan in addition to the Kazakh market.

The results at "Iruskon" LLC are even brighter: production volume increased from 1,980 million soums in 2021 to 2,960 million soums in 2023 (+49.5%). The product rejection rate decreased from 5.8% to 1.8%, an improvement of 3.2 times. Customer complaints decreased from 63 to 18, that is, by 3.5 times. The export share increased from 1.5% to 6.0%. Labor productivity increased by 21.7%.

ROI and investment performance analysis

The investments made to introduce international standards in both enterprises and the economic benefits derived from them are presented in Table 3 below.

Table 3. Cost-effectiveness of implementing international standards (ROI analysis)

Indicator	"Bonu Shirinliklari" LLC	"Iruskon" LLC
Standard implementation costs (total, million soums)	185.0	124.0
Including: consulting services	68.0	45.0
Including: education and training	32.0	22.0

Including: equipment and modernization	55.0	38.0
Including: certification costs	30.0	19.0
Additional annual profit (million soums)	412.0	298.0
Quality cost savings (mln soums/year)	96.0	68.0
Loss reduction (million soums/year)	54.0	41.0
Export revenue growth (million soums/year)	262.0	189.0
Net annual profit (million soums)	227.0	174.0
Investment payback period (years)	0.81	0.71
ROI indicator	122.7%	140.3%

Source: Compiled by the author based on the reporting data of the enterprises "Bonu Shirinliklari" LLC and "Iruskon" LLC

A total of 185.0 million soums were spent on the implementation of standards at "Bonu Shirinliklari" LLC. The net annual effect was 227.0 million soums, the payback period was 0.81 years, that is, the investment was fully repaid in less than 10 months. The ROI indicator was 122.7%.

"Iruskon" LLC received a net annual profit of 174.0 million soums for an investment of 124.0 million soums, and the investments were repaid in 0.71 years - that is, approximately 8.5 months. The ROI indicator was 140.3%, which was higher than that of "Bonu Shirinliklari" LLC. The main factor explaining this difference was the relatively large initial share of quality costs in "Iruskon" LLC and their subsequent significant reduction.

The results obtained are fully consistent with the trends noted in the international scientific literature. Studies by Terlaak and Dean [13], Martinez-Costa and Martinez-Lorente [14], Psomas et al. [15] also demonstrate significant improvements in competitiveness and financial performance in food enterprises that have implemented ISO 9001 and ISO 22000 standards. However, such empirical studies are still rare in the Central Asian context, which further increases the practical value of this study.

Compared with existing studies, the ROI indicators achieved by enterprises in the Jizzakh region (122.7–140.3%) are significantly higher than the world average. This is explained by several factors: firstly, the relatively high level of quality costs before the introduction of standards - that is, the possibility of eliminating cheap losses is high; secondly, the geographical location of the Jizzakh region and its transport and logistics potential are favorable for exports; thirdly, the subsidies and privileges of the Uzbek government in the field of export promotion.

It should be noted that during the implementation of standards, enterprises faced a number of obstacles: a shortage of qualified consultants, a limited complete documentation base of standards in the Uzbek language, a long certification period (8-14 months), and a heavy financial burden. The support of government agencies, industry associations, and international cooperation programs (UNIDO, ITC) was an important factor in overcoming these obstacles.

Comparative analysis shows that "Bonu Shirinliklari" LLC, which implemented the ISO 22000 standard, achieved relatively high results in expanding export markets. This is explained by the fact that the ISO 22000 standard, due to its focus on food quality and safety, served as a confidence factor for foreign buyers and distributors. "Iruskon" LLC, which operated on the basis of ISO 9001, showed superior results in increasing domestic

production efficiency. This confirms that both standards are complementary systems that can be implemented together.

4. Conclusions

The results of the study show that the introduction of international quality standards - ISO 9001, ISO 22000 and HACCP systems - is an important factor in the activities of food enterprises in the Jizzakh region, not only in improving product quality and safety, but also in ensuring economic efficiency. In particular, as a result of the implementation of these standards, the level of product rejection decreased by 3-4 times, and quality-related costs were significantly reduced.

At the same time, the export potential of enterprises has increased sharply, the export share has expanded by 4-5 times, and the opportunity to enter new foreign markets has arisen. The relatively short payback period of the investments made is 8-10 months, and the rate of return (ROI) has reached 120-140%, which confirms the high economic efficiency of these systems.

In addition, the introduction of a quality management system has increased the systematization and documentation of production processes, increasing employee productivity by 18-22%. At the same time, the main problems identified during the study - financial burden and lack of qualified specialists - can be eliminated by improving targeted support mechanisms by the state.

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