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ENHANCING OCCUPATIONAL AND CONSUMER SAFETY AS A GUIDELINE FOR PRODUCT QUALITY MANAGEMENT IN THE CONTEXT OF CORPORATE SOCIAL RESPONSIBILITY

Abstract: *This research presents an empirical study, which aims to develop a scientific and methodological approach to ensuring occupational and consumer safety in product quality management across Eurasia. To this end, the research synthesizes official international statistics on occupational and consumer safety for 12 Central Asian countries and five EAEU countries in 2024–2025. A Eurasian model for ensuring occupational and consumer safety in product quality management is mathematically formalized. A multicriteria classification of occupational and consumer safety measures is proposed, distinguishing between general and specific measures, quality standardization measures and corporate social responsibility measures, and clarifying the effects of their application across different market segments of the Eurasian market economy. The overarching conclusion is that, across the digital and non-digital market segments of the Eurasian economy, general measures of occupational and consumer safety management implemented within the framework of corporate social responsibility yield the greatest benefits for product quality. These measures constitute the core of the author's approach: in the non-digital segment, they focus on improving the health-related outcomes of labor and product consumption for employees and consumers, while in the digital segment, they emphasize the provision of safe Internet services. The new approach is supported by practical solutions aimed at improving occupational safety management and consumption in Central Asia and the EAEU. Their implementation will enhance product quality, which in turn will contribute to increasing the market capitalization of Eurasian companies and expanding the share of online processes and e-commerce in the production and distribution activities of these companies.*

Keywords: *occupational safety, consumer safety, quality management, product quality, corporate social responsibility, Central Asia, EAEU*

1. Introduction

Product quality is one of the key areas of corporate governance. Although quality is a fundamental postulate of economic science, this theoretical category is constantly being expanded and, as a significant body of additions accumulates, periodically

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reinterpreted. One of the defining features of the current stage of development of economic systems is their heightened volatility. Like all open and dynamic systems, they are subject to change; however, in today's realities, changes in economic systems are occurring on a critical scale.

These changes shift economic systems into fundamentally different countries. For the most part, they are unpredictable and often hazardous. Consequently, ongoing economic transformations require serious, carefully calibrated, yet timely responses, which place peak pressure on the management apparatus of these systems at all levels, including the corporate level. As a result, demand for stability, elevated to the status of a priority for all participants in market relations, has increased.

In this context, safety has gained particular value in today's economy, becoming an integral and significant component of product quality. Stakeholders interacting with a company, across all categories of market actors, inevitably assess its activities from the standpoint of safety and consistently take the safety of economic cooperation into account when making decisions. Responding to current market demands, modern companies focus closely on the safety of their economic activities and direct their managerial efforts toward ensuring it.

The heightened complexity of managing safety as a component of product quality under current economic conditions stems from the fact that changes occur simultaneously across all domains of economic systems. In the economic sphere, there is an unprecedented acceleration of business cycles, creating extraordinary risks of crisis. Managing safety as a component of product quality in this sphere requires companies to demonstrate a high degree of flexibility.

In the technological domain, under the influence of the Fourth and Fifth Industrial Revolutions, a radical shift in technological paradigms is occurring, the horizons of automation are expanding, and innovation is becoming an integral part of everyday reality. Managing safety as a component of product quality in this domain requires companies to pursue continuous modernization, achieve and strengthen technological sovereignty, and enhance digital competitiveness.

In the environmental domain, climate anomalies and natural disasters are emerging, reducing the availability of natural resources and making the environment less favorable for economic activity. Managing safety as a component of product quality in this area involves combating climate change, rationalizing the use of natural resources, and minimizing associated risks, as well as preventing environmental disasters through the exercise of corporate environmental responsibility.

These changes overlap and reinforce transformations in the social domain, where communication and interaction are increasingly structured around safety considerations. Employees demand safely equipped workplaces, while consumers prefer the safest possible products. Managing safety as a component of product quality in this domain entails tightening and strictly complying with requirements for occupational safety and consumer product safety.

The social dimension of product safety, which directly affects product quality, warrants in-depth and independent examination, since quality management in this area determines not only a company's ability to attract human resources (its reputation as an employer) and market its products (its reputation as a supplier), but also the very continuation of its economic activity (its business reputation, which shapes its attractiveness to partners and influences state attitudes and regulation).

The challenge lies in the fact that cultural differences between economic systems are most clearly manifested in the social domain, necessitating the development of tailored methodologies for managing product quality

through the assurance of occupational and consumer safety for each economic and geographic region of the world. The experience of such management in the Eurasian economy remains insufficiently studied; as a result, no relevant methodology has yet been developed for this context, which reduces the effectiveness of Eurasian practices in ensuring occupational and consumer safety within product quality management.

In an effort to contribute to addressing this issue, the present article sets a research objective aimed at developing a scientific and methodological approach to ensuring occupational and consumer safety in product quality management in Eurasia. This objective determines the logic and structure of the study, within which three interrelated tasks are consistently addressed.

The first task is to identify trends in changes in occupational and consumer safety in relation to product quality management in the activities of Eurasian organizations. The second task is to construct a Eurasian model for ensuring occupational and consumer safety in product quality management. The third task is to forecast prospects for changes in product quality in Eurasia depending on the management of occupational and consumer safety, and to propose recommendations for improving this management.

2. Literature Review

2.1. Occupational and Consumer Safety as an Object of Product Quality Management: A Theoretical Review through the Lens of Specific Cases

The research is conducted in accordance with the scientific provisions of the concept of occupational safety in relation to labor quality (Sergi et al., 2025) and the concept of consumer safety in relation to product quality (Bazinyan & Mayilyan, 2024), within the framework of the microeconomic theory of quality management (Yalmaev et al., 2020).

In the existing literature, occupational and consumer safety as an object of product quality management is mainly examined in relation to specific sectors of the economy, with attention given to particular cases of such safety, including, but not limited to, the following examples:

- In agriculture: food safety as an element of food security, encompassing compliance with storage conditions, shelf life, the absence of harmful components (e.g., GMOs), and the health benefits of food products for consumers (Borisova et al., 2015);
- In the service sector: the safety of healthcare products (pharmaceuticals, medical equipment, and medical services) in terms of preventing threats to patients' life and health (Popkova et al., 2024);
- In the industrial sector: occupational safety at industrial and production facilities, with regard to proper workplace equipment and compliance with relevant sanitary and epidemiological standards (Li et al., 2024).

A limitation of the existing publications on this topic is their narrow perspective on managing occupational and consumer safety to enhance quality, which is confined to improving individual working conditions and specific product characteristics, without providing a holistic view of this managerial practice. The synthesis of individual cases and accumulated knowledge found in prior academic literature makes it possible to formulate the author's definitions of key concepts that delineate the scope of the research field addressed in this research:

- Drawing on the works of Bogoviz et al. (2018), occupational safety is interpreted as ensuring employee comfort in the workplace and protecting workers' life and health by employers, in the interests of fully unlocking human potential, increasing labor productivity, attracting and retaining top talent in the labor market, and maintaining a reputation as a responsible employer;

- Consumer safety, with reference to the publications of Atoyan et al. (2022), is defined in this article as the suitability of products for consumption and the favorability of consumption outcomes for consumers' life and health (absence of harm and, where possible, the presence of health benefits);
- Quality management of products through ensuring occupational and consumer safety, in line with the works of Mkrtchyan and Navasardyan (2024), is understood in this article as a managerial practice implemented by companies within the overall quality management framework, aimed at improving working conditions and product properties (goods and/or services) in the interests of employees and consumers.

2.2. A Systemic View of Occupational and Consumer Safety as an Object of Product Quality Management and an Analysis of Gaps in the Literature

In today's era of digital threats, a new dimension of security (i.e., the cyber dimension) has emerged and gained significant importance, extending to production and consumption in the economy. Accordingly, this research distinguishes two market segments in the contemporary economy based on a technological criterion: non-digital and digital segments, within which the analysis is conducted.

In the non-digital market segment of the modern economy, the most important marker of product quality is corporate capitalization (Glavina, 2024): the higher the quality of products, the greater the competitiveness of firms and, consequently, the better their financial performance. In this segment, companies apply the following key measures of product quality management through ensuring occupational and consumer safety:

- Guaranteeing the employer's compliance with basic labor rights as a specific measure of occupational safety (Isayan & Mayilyan, 2022);
- Preventing workplace injuries as another specific measure of occupational safety (Moreno et al., 2024);
- Improving the health outcomes of labor and product consumption for employees and consumers as a general measure of occupational and consumer safety (Tovmasyan et al., 2022).

In the digital market segment of the economy, the dominant marker of product quality is the share of online processes and e-commerce in companies' production and sales activities (Vasilikhina, 2025).

A large body of literature is devoted to cybersecurity, including works by Petrenko et al. (2019) and Żywiołek (2025). However, these studies are conducted largely independently of considerations of product quality. In the digital market segment, companies apply the following key measures of product quality management through ensuring occupational and consumer safety:

- Provision of secure Internet services as a general measure of occupational and consumer safety in the digital economy (Galoyan et al., 2023);
- Development of ICT skills among consumers as a specific measure of consumer safety in the digital economy (Mukhomorova et al., 2020);
- Creation of ICT-based workplaces as a specific measure of occupational safety in the digital economy (Bannikova et al., 2019).

The listed measures of product quality management through ensuring occupational and consumer safety fall within the domain of corporate social responsibility, which is contrasted with quality standardization under ISO 9001 (Mijatovic et al., 2025). Eurasian empirical experience in ensuring occupational and consumer safety is addressed in a limited number of sources (Yuan, 2023), primarily with reference to groups of Central Asian countries and the Eurasian Economic Union (EAEU), but remains insufficiently explored overall.

The literature review conducted reveals a gap related to the lack of clarity as to which occupational and consumer safety measures are decisive for product quality in Eurasia. Therefore, the research formulates a research question regarding which measures (quality standardization, specific corporate social responsibility measures, or general corporate social responsibility measures) deliver the greatest benefits for product quality across the digital and non-digital market segments of the Eurasian economy.

3. Materials and Methods

3.1. Statistical Basis of Research

To examine the experience of the Eurasian economy, the research sample includes 12 Central Asian countries (Afghanistan, China, India, Iran, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, and Uzbekistan) and 5 EAEU countries (Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia).

Considering the overlap of several countries in these two groups, the total sample comprises 14 countries. The analysis is based on combined statistical data for 2024–2025 aggregated into a single dataset; therefore, the number of observations is 28 (Table 1, see appendix).

The outcome variables include the market capitalization of national companies (Qnd) (WIPO, 2025) for the non-digital segment and the share of online processes and e-commerce in companies' production and sales activities (Qdt) (UNDP & MBRF, 2024) for the digital segment. The control variable is the monetary value of products certified under the ISO 9001 quality standard (QS) (WIPO, 2025).

The explanatory variables for the non-digital segment include the strength of guarantees ensuring employers' compliance with basic labor rights (Sc_1), the frequency of occupational injuries (Sc_2) (UNDP, 2025), and healthy life expectancy (for employees and consumers) (Sc_3) (UNDP & MBRF, 2024) For the digital segment, the explanatory variables include the number of secure Internet services (Sd_1), the share of consumers with basic ICT skills (Sd_2) and the share of ICT employment (Sd_3) (UNDP and MBRF, 2024).

3.2. Research Sequence and Methods

As the method for addressing the first task (i.e., to identify trends in changes in occupational and consumer safety in relation to product quality management in the activities of Eurasian organizations), the authors employed a horizontal analysis. Using this method, the annual growth rates of all variables presented in Table 1 for 2025 compared to 2024 are calculated separately for Central Asia and the EAEU.

The second task (i.e., to construct a Eurasian model for ensuring occupational and consumer safety in product quality management) is addressed through regression analysis. This method is used to assess the dependence of quality indicators (Q) on the set of explanatory variables (S) and the control variable (QS), separately for the digital and non-digital segments of the Eurasian economy. The research model takes the following functional form: Q=F(S,QS).

A positive relationship is indicated by positive values of the regression coefficients for variables Sc_1, Sc_3, $Sd_{1\text{-}3}$, and QS, and by a negative value of the regression coefficient for variable Sc_2. The reliability of the regression relationships is tested using correlation analysis, Fisher's F-test, and Student's t-test. As a result, statistically significant explanatory variables that exert a positive influence on Q are selected.

To address the third task (i.e., to forecast prospects for changes in product quality in Eurasia depending on the management of occupational and consumer safety and propose recommendations for improving this management), the authors applied scenario analysis. Using this method, two alternative

scenarios are constructed.

The first, a passive management scenario, is associated with maintaining in 2026 the given growth rates of all explanatory and control variables from the research model as observed in 2025. The second, an active management scenario, assumes selective maximization (i.e., achieving the maximum values observed in Central Asia and the EAEU, respectively) of the selected explanatory variables.

4. Results

4.1. Trends in Changes in Occupational and Consumer Safety in Relation to Product Quality Management in Central Asia and the EAEU

In addressing the first task (i.e., to identify trends in changes in occupational and consumer safety in relation to product quality management in the activities of Eurasian organizations), the authors conducted a horizontal analysis of the statistics from Table 1. The results of this analysis are illustrated in Figure 1.

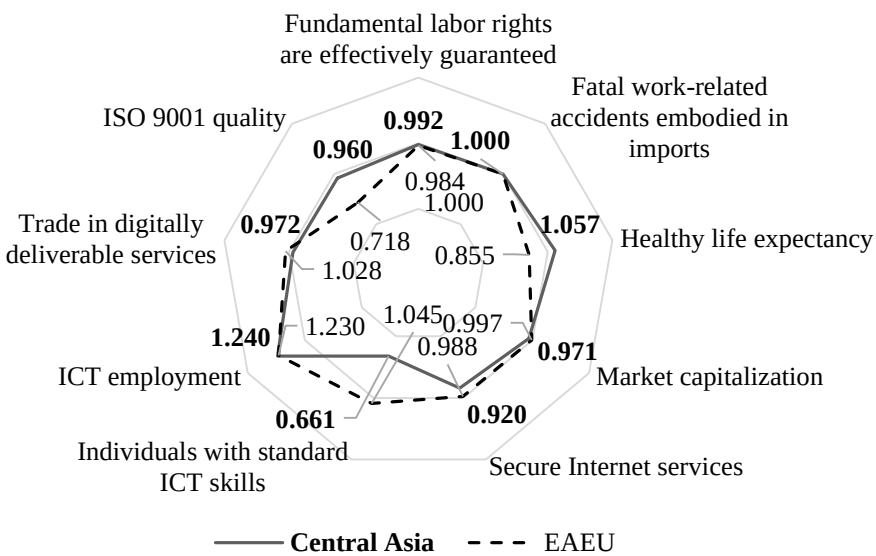

Figure 1. Annual change in occupational safety and consumption indicators in Central Asia and the EAEU in 2025 compared to 2024, times

Source: Developed by the authors.

As shown in Figure 1, the market capitalization of national companies in Central Asia declined by a factor of 0.971 (from 62.525% of GDP in 2024 to 60.733% of GDP in 2025), while in the EAEU it decreased by a factor of 0.997 (from 13.660% of GDP in 2024 to 13.620% of GDP in 2025). The share of online processes and e-commerce in companies' production and sales activities in Central Asia fell by a factor of 0.972 (from 23.283% in 2024 to 22.625% in 2025), whereas in the EAEU it increased by a factor of 1.028 (from 24.120% in 2024 to 24.800% in 2025).

The strength of guarantees ensuring employers' compliance with basic labor rights in Central Asia declined by a factor of 0.992 (from 0.374 points in 2024 to 0.371 points in 2025), and in the EAEU by a factor of 0.984 (from 0.415 points in 2024 to 0.408 points in 2025). The frequency of

occupational injuries (per 1,000 population) remained unchanged in Central Asia at 0.317 cases and in the EAEU at 1.088 cases.

Healthy life expectancy (for employees and consumers) in Central Asia increased by a factor of 1.057 (from 42.500 years in 2024 to 44.933 years in 2025), while in the EAEU it decreased by a factor of 0.855 (from 72.920 years in 2024 to 62.340 years in 2025). The number of secure Internet services in Central Asia (per 1 million population) declined by a factor of 0.920 (from 44.300 in 2024 to 40.775 in 2025), and in the EAEU by a factor of 0.988 (from 62.260 in 2024 to 61.520 in 2025).

The share of consumers with basic ICT skills in Central Asia dropped by a factor of 0.661 (from 11.617% in 2024 to 7.683% in 2025), whereas in the EAEU it increased by a factor of 1.045 (from 14.320% in 2024 to 14.960% in 2025). The share of ICT employment in Central Asia rose by a factor of 1.240 (from 6.067% in 2024 to 7.525% in 2025), and in the EAEU by a factor of 1.230 (from 15.840% in 2024 to 19.480% in 2025).

Simultaneously, the monetary value of products certified under the ISO 9001 quality standard in Central Asia decreased by a factor of 0.960 (from 3.325 bn PPP$ GDP in 2024 to 3.192 bn PPP$ GDP in 2025), while in the EAEU it declined by a factor of 0.718 (from 7.580 bn PPP$ GDP in 2024 to 5.440 bn PPP$ GDP in 2025).

Therefore, in the non-digital segment, product quality deteriorated in both groups of Eurasian economies. In the digital segment, quality declined in Central Asia but improved in the EAEU. For most indicators considered, 2025 saw a reduction in occupational and employment safety compared to 2024 in terms of the application of standardization measures and corporate social responsibility in Central Asia and the EAEU.

4.2. A Eurasian Model for Ensuring Occupational and Consumer Safety in Product Quality Management

In addressing the second task (i.e., to construct a Eurasian model for ensuring occupational and consumer safety in product quality management), the authors conducted a regression analysis of the data presented in Table 1. As a result of this analysis, the Eurasian model for ensuring occupational and consumer safety in product quality management took the following form:

$$\begin{cases} Qnd=43.7521-165.4721Sc_1-61.4310Sc_2+1.8447Sc_3+2.6820QS, \\ Qdt=2.8758+0.5069Sd_1-0.3692Sd_2-0.1553Sd_3+0.5827QS. \end{cases} \quad (1)$$

Based on model (1), the factor variables Sc_2, Sc_3, Sd_1, and QS exert a positive effect on Q. To assess the reliability of model (1), the regression equations are examined separately for the non-digital segment (Table 2) and for the digital segment (Table 3).

As shown in Table 2, in the non-digital segment of the Eurasian market economy, occupational and consumer safety management measures explain 43.65% of product quality variation. The regression equation for Qnd successfully passed Fisher's F-test and is statistically significant at the 0.30 significance level (observed F = 1.3532, Significance F = 0.2808).

However, Student's t-test was passed only for the explanatory variables Sc_1 (at the 0.20 significance level: t-statistic = −1.3215, p-value = 0.1993), Sc_2 (at the 0.20 significance level: t-statistic = −1.4194, p-value = 0.1692), and Sc_3 (at the 0.10 significance level: t-statistic = 2.0259, p-value = 0.0545) but not for the control variable QS (t-statistic = 0.6613, p-value = 0.5150).

Therefore, the following regression relationships are considered reliable and confirmed for the non-digital segment: (1) an increase in the strength of guarantees ensuring employers' compliance with basic labor rights by one point leads to a decrease in the market capitalization of Eurasian

companies by 165.4721% of GDP; (2) a reduction in the frequency of occupational injuries (per 1000 population) by one case contributes to an increase in the market capitalization of Eurasian companies by 61.4310% of GDP; (3) an increase in healthy life expectancy (for employees and consumers) by one year results in a rise in the market capitalization of Eurasian companies by 1.8447% of GDP.

Table 2. Regression statistics for Qnd in the non-digital segment

Regression statistics				
Multiple R	0.4365			
R^2	0.1905			
Normalized R^2	0.0497			
Standard error	119.9163			
Observations	28			
Variance analysis				
	df	*SS*	*MS*	*F*
Regression	4	77834.0518	19458.5130	1.3532
Residual	23	330738.2492	14379.9239	*Significance F*
Total	27	408572.3011		0.2808
	Coefficients	*Standard error*	*t-Statistic*	*p-Value*
Y-intercept	43.7521	50.1210	0.8729	0.3917
Sc_1	-165.4721	125.2193	-1.3215	0.1993
Sc_2	-61.4310	43.2807	-1.4194	0.1692
Sc_3	1.8447	0.9106	2.0259	0.0545
QS	2.6820	4.0559	0.6613	0.5150

Source: Developed by the authors.

This makes it possible to conclude that quality standardization under the ISO 9001 standard does not have a statistically significant impact on product quality in the non-digital segment of the Eurasian market economy. By contrast, a general measure of occupational and consumer safety implemented within the framework of corporate social responsibility, namely, improving the health outcomes of labor and product consumption for employees and consumers, is statistically significant and contributes to higher product quality.

Within this segment, the effects of specific corporate social responsibility management measures on product quality are contradictory, although both are statistically significant: guaranteeing employers' compliance with basic labor rights reduces product quality, whereas preventing occupational injuries improves it.

As shown in Table 3, in the non-digital segment of the Eurasian market economy, occupational safety and consumer protection measures account for 63.42% of product quality. The regression equation for Qnd successfully passed the Fisher F-test and is statistically significant at the 0.05 significance level (observed F = 3.8681, significance F = 0.0152).

However, the Student's t-test was passed only for the factor variable Ss_1 (at the 0.05 significance level: t-statistic = 2.5227, p-value = 0.0190) and for the control variable QS (at the 0.20 significance level: t-statistic = 1.3450, p-value = 0.1917). Simultaneously, the Student's t-test was not passed for the remaining factor variables: Ss_2 (t-statistic = −1.0351, p-value = 0.3114) and Ss_3 (t-statistic = −0.4046, p-value = 0.6895).

Table 3. Regression statistics for Qdt in the digital segment

Regression statistics				
Multiple R	0.6342			
R^2	0.4022			
Normalized R^2	0.2982			
Standard error	16.6279			
Observations	28			
Variance analysis				
	df	*SS*	*MS*	*F*
Regression	4	4277.9202	1069.4801	3.8681
Residual	23	6359.2265	276.4881	*Significance F*
Total	27	10637.1468		0.0152
	Coefficients	*Standard error*	*t-Statistic*	*p-Value*
Y-intercept	2.8758	6.4997	0.4425	0.6623
Sd_1	0.5069	0.2009	2.5227	0.0190
Sd_2	-0.3692	0.3567	-1.0351	0.3114
Sd_3	-0.1553	0.3837	-0.4046	0.6895
QS	0.5827	0.4332	1.3450	0.1917

Source: Developed by the authors

In the digital segment, the following regression relationships proved to be robust and statistically confirmed: (1) an increase of one safe Internet service per 1 million people in Central Asia leads to a 0.5069% increase in the share of online processes and e-commerce in companies' production and distribution activities; (2) an increase in the value of products certified under the ISO 9001 quality standard by 1 bln PPP$ GDP contributes to a 0.5827% increase in the share of online processes and e-commerce in companies' production and distribution activities.

This allows the conclusion that, in the digital segment of the Eurasian market economy, product quality standardization under the ISO 9001 standard, as well as a general measure of ensuring occupational safety and consumer protection as an expression of corporate social responsibility, such as the provision of safe Internet services, are statistically significant and enhance product quality. By contrast, specific managerial measures of corporate social responsibility do not exert a statistically significant impact on product quality in this segment.

4.3. Prospects for Enhancing Product Quality in Central Asia and the EAEU Based on Occupational Safety and Consumer Protection Management

In addressing the third objective, which involved forecasting prospects for changes in product quality in Eurasia depending on the management of occupational safety and consumer protection, a scenario analysis of these prospects was conducted. As a result of the analysis, a distinct passive-management scenario was developed for each group of Eurasian economies, assuming that in 2026 the growth rates of occupational safety and consumption indicators observed in 2025 (as shown in Figure 1) will be maintained. The resulting scenarios are presented for Central Asia in Figure 2 and for the EAEU in Figure 3.

As shown in Figure 2, in Central Asia in 2026, under the passive-management scenario, the following changes in occupational safety and consumption indicators are expected. In the non-digital segment, the strength of the guarantee of employers' compliance with basic labor rights is projected to decrease by 0.85% (from 0.371 points in 2025 to 0.367

points), the frequency of occupational injuries (per 1000 people) is expected to increase by 191.18% (from 0.317 cases in 2025 to 0.924 cases), and the healthy life expectancy of workers and consumers is predicted to rise by 5.73% (from 44.933 years in 2025 to 47.506 years).

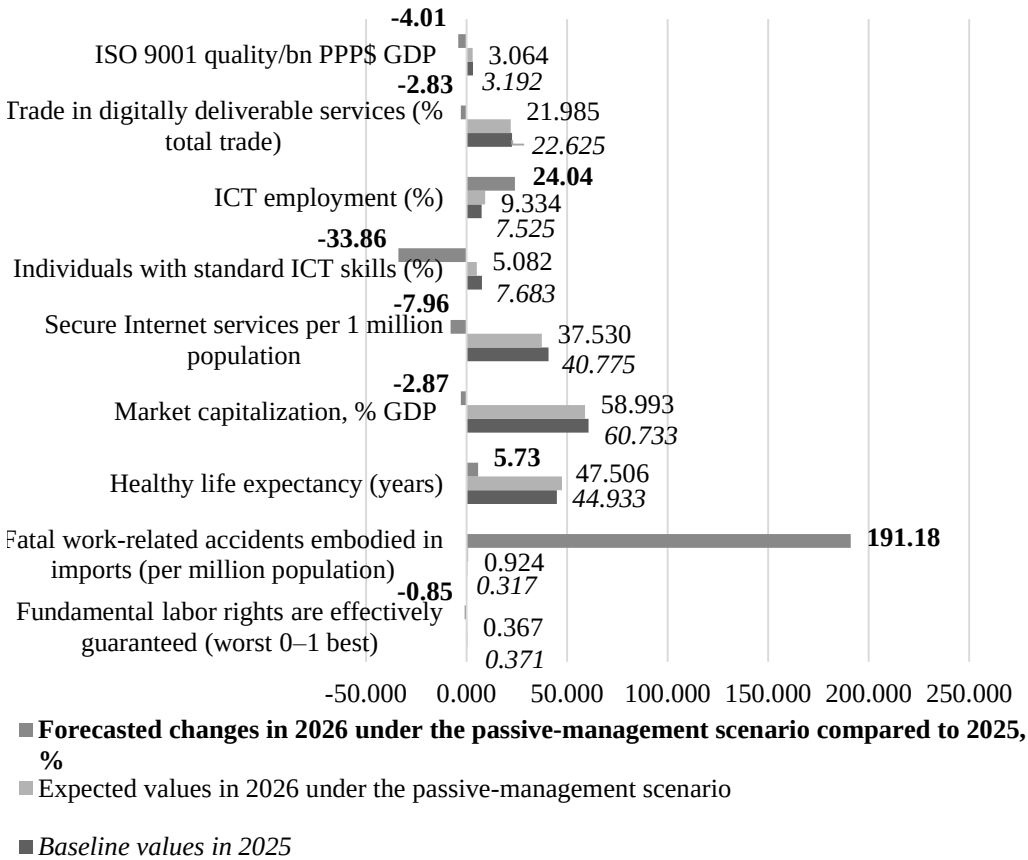

Figure 2. Annual growth rates of occupational safety and consumption indicators in Central Asia in 2026 under the passive-management scenario compared to 2025, %.
Source: Developed by the authors.

In the digital segment, the number of safe Internet services in Central Asia (per 1 million people) is expected to decline by 7.96% (from 40.775 in 2025 to 37.530), the share of consumers with basic ICT skills is projected to decrease by 33.86% (from 7.683% in 2025 to 5.082%), and the share of ICT employment is forecast to increase by 24.04% (from 7.525% in 2025 to 9.334%). Additionally, the value of products certified under the ISO 9001 quality standard is expected to decrease by 4.01% (from 3.192 billion PPP$ GDP in 2025 to 3.064 billion PPP$ GDP). Taken together, these changes will lead to a reduction in the market capitalization of national companies (from 60.733% of GDP in 2025 to 58.993% of GDP, a 2.87% decrease) and a decline in the share of online processes and e-commerce in the production and distribution activities of companies (from 22.625% in 2025 to 21.985%, a 2.83% decrease).

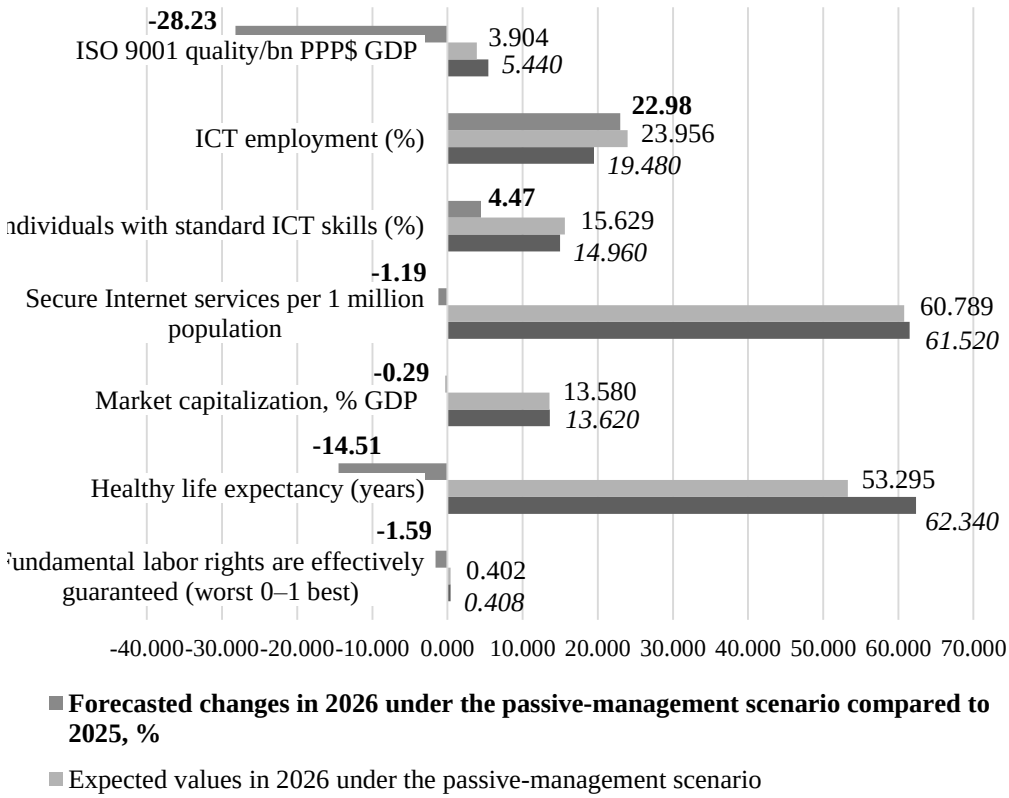

Figure 3. Annual growth rates of occupational safety and consumption indicators in the EAEU in 2026 under the passive-management scenario compared to 2025, %.
Source: Developed by the authors.

As can be seen from Figure 3, following the passive-management scenario in the EAEU in 2026 will also lead to adverse changes in occupational safety indicators. In the non-digital segment, the strength of the guarantee of employers' compliance with workers' basic labor rights is projected to decline by 1.59% (from 0.408 points in 2025 to 0.402 points), while the healthy life expectancy of workers and consumers is expected to decrease by 14.51% (from 62.340 years in 2025 to 53.295 years).

In the digital segment, the number of safe Internet services in Central Asia (per 1 million people) is expected to decrease by 1.19% (from 61.520 in 2025 to 60.789), the share of consumers with basic ICT skills is projected to increase by 4.47% (from 14.960% in 2025 to 15.629%), and the share of ICT employment is forecast to rise by 22.98% (from 19.480% in 2025 to 23.956%). This will lead to a decrease in the value of products certified under the ISO 9001 quality standard by 28.23% (from 5.440 bn PPP$ GDP in 2025 to 3.904 bn PPP$ GDP). Taken together, this will cause the market capitalization of national companies to decline by 0.29% (from 13.620% of GDP in 2025 to 13.580% of GDP). This means that in 2026, unless occupational safety and consumption management practices are adjusted, a product quality crisis will occur in Central Asia and the EAEU.

4.4. Practical solutions for improving occupational safety and consumption management in Central Asia and the EAEU to enhance product quality

To prevent the identified undesirable changes in the field of occupational safety and consumption that would occur under the passive-management scenario, and to achieve growth in the level of this safety in 2026 instead of decline, an alternative active-management scenario has been developed and proposed for implementation. Practical solutions for improving occupational safety and consumption management in Central Asia to enhance product quality, which make it possible to implement in practice the developed active-management scenario (the most preferable and recommended for adoption) are illustrated in Figure 4.

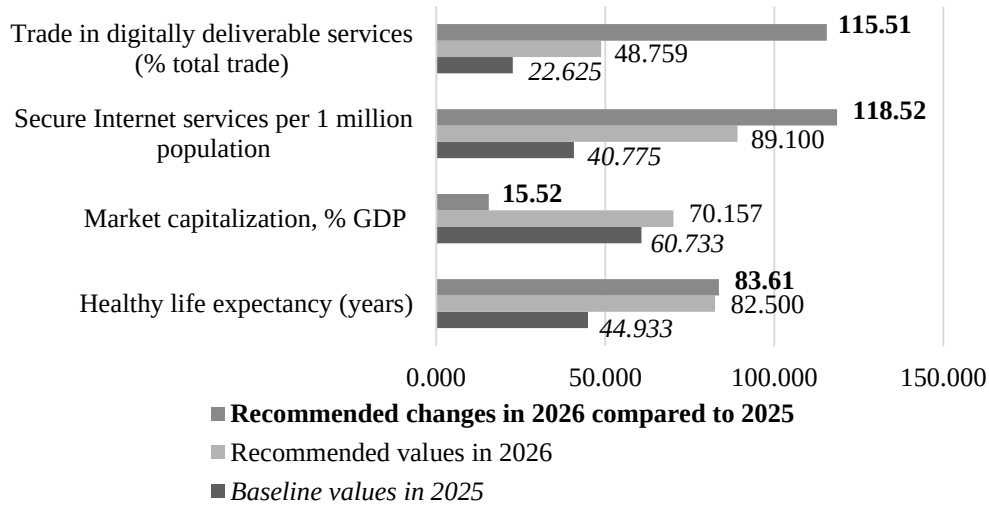

Figure 4. Practical solutions for improving occupational safety and consumption management in Central Asia to enhance product quality.
Source: Developed by the authors.

According to Figure 4, to improve occupational safety and consumption management in Central Asia, it is recommended that in the non-digital segment the healthy life expectancy of workers and consumers be increased (from 44.933 years in 2025) by 83.61% (to 82.500 years), and in the digital segment the number of safe Internet services (per 1 million people) be increased (from 40.775 in 2025) by 118.52% (to 89.100). Implementing these recommendations will prevent a decline in the value of products certified under the ISO 9001 quality standard, maintaining it in 2026 at the 2025 level (3.192 bn PPP$ GDP).

This will avert a decline and achieve growth in the market capitalization of national companies by 15.52% (from 60.733% of GDP in 2025 to 58.993% of GDP in 2026). Additionally, the implementation of these practical solutions will prevent a reduction and ensure an increase in the share of online processes and e-commerce in the production and distribution activities of companies by 115.51% (from 22.625% in 2025 to 21.985%).

Practical solutions for improving occupational safety and consumption management in the EAEU to enhance product quality, enabling the implementation of the most preferred and recommended active-management scenario, are illustrated in Figure 5.

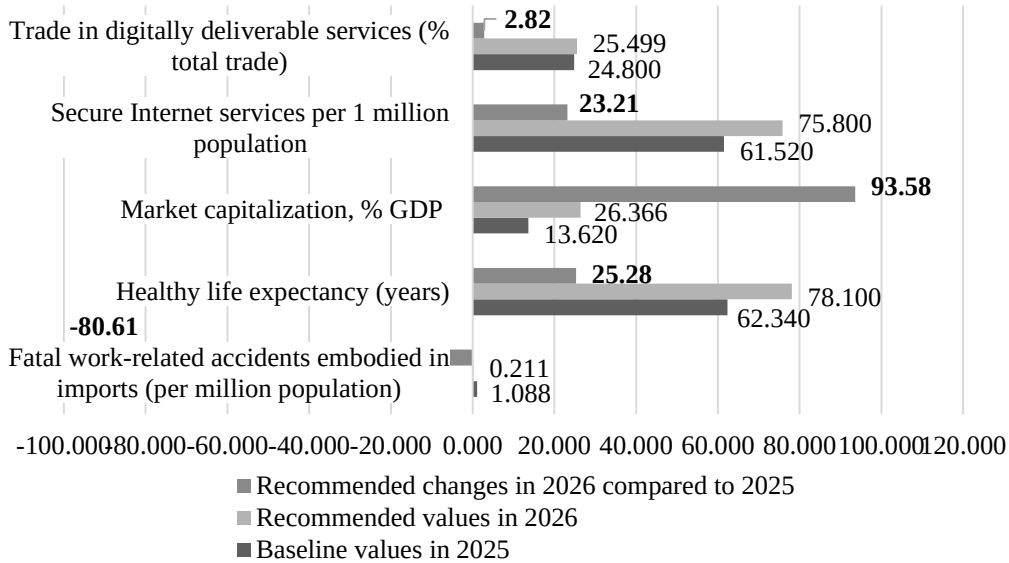

Figure 5. Practical solutions for improving occupational safety and consumption management in the EAEU to enhance product quality.
Source: Developed by the authors

According to Figure 5, to improve occupational safety and consumption management in the EAEU, it is recommended that in the non-digital segment the frequency of occupational injuries (per 1,000 people) be reduced (from 1.088 cases in 2025) by 80.61% (to 0.211 cases) and the healthy life expectancy of workers and consumers increased (from 62.340 years in 2025) by 25.28% (to 78.100 years). In the digital segment, it is recommended to increase the number of safe Internet services (per 1 million people) (from 61.520 in 2025) by 23.21% (to 75.800).

Implementing these recommendations will prevent a decline in the value of products certified under the ISO 9001 quality standard, maintaining it in 2026 at the 2025 level (3.192 bn PPP$ GDP). This will not only avert a decline but also achieve growth in the market capitalization of national companies by 93.58% (from 13.620% of GDP in 2025 to 26.366% of GDP in 2026). Additionally, the implementation of these practical solutions will increase the share of online processes and e-commerce in companies' production and distribution activities by 2.82% (from 24.800% in 2025 to 25.499% in 2026).

Specifically, improving occupational safety and consumption management through the implementation of these solutions is expected to result in the following.

In Armenia, market capitalization of national companies will rise from 0.60% of GDP in 2025 to 1.16% in 2026, and the share of online processes and e-commerce will increase from 18.80% in 2025 to 18.71% in 2026.

In Belarus, market capitalization will grow from 3.70% of GDP in 2025 to 7.16% in 2026, and the share of online processes and e-commerce will rise from 35.70% in 2025 to 36.71% in 2026.

In China, market capitalization will increase from 76.20% of GDP in 2025 to 88.02% in 2026, and the share of online processes and e-commerce from 43.50% in 2025 to 93.75% in 2026.

In India, following the proposed measures will raise market capitalization from 106.00% of GDP in 2025 to 122.45% in 2026, and the share of online processes and e-commerce from 73.00% in 2025 to 100.00% in 2026.

In Iran, compliance with the recommendations will increase market capitalization from 463.20% of GDP in 2025 to 535.07% in 2026, and the share of online processes and e-commerce from 14.70% in 2025 to 31.68% in 2026.

In Kazakhstan, implementation of the proposed solutions will raise market capitalization from 25.30% of GDP in 2025 to 29.23% in 2026, and the share of online processes and e-commerce from 31.90% in 2025 to 68.75% in 2026.

In Kyrgyzstan, the share of online processes and e-commerce will grow from 16.30% in 2025 to 35.13% in 2026, and in Mongolia from 24.20% in 2025 to 52.15% in 2026.

In Pakistan, market capitalization will increase from 12.30% of GDP in 2025 to 14.21% in 2026, and the share of online processes and e-commerce from 37.40% in 2025 to 80.60% in 2026.

In Russia, implementation of these practical solutions will raise market capitalization from 38.50% of GDP in 2025 to 44.47% in 2026, and the share of online processes and e-commerce from 21.90% in 2025 to 47.20% in 2026.

In Uzbekistan, market capitalization will increase from 7.30% of GDP in 2025 to 8.43% in 2026, and the share of online processes and e-commerce from 8.60% in 2025 to 18.53% in 2026.

5. Discussion

The results of this research clarified the occupational safety and consumer protection measures that are decisive for product quality in Eurasia (Table 4), thereby extending the scientific foundations of the concept of occupational safety in relation to the quality of labor (Sergi et al., 2025) and the concept of consumer safety in relation to product quality (Bazinyan & Mayilyan, 2024), and thus supporting the further development of microeconomic quality management theory (Yalmaev et al., 2020).

Table 4. The role of occupational safety and employment in quality management: Eurasian experience studied in this research compared with previous literature

Quality control measures		**Existing literature describing measures**	**Role in the market economy of Eurasia (regression)**	
			non-digital segment	**digital segment**
Measures of corporate social responsibility	Specific	Bannikova et al. (2019), Isayan and Mayilyan (2022) Moreno et al. (2024), Mukhomorova et al. (2020)	Contradictory: significant for all measures, but positive only for the reduction of occupational injuries (−61.4310)	Not significant
	General	Galoyan et al. (2023), Tovmasyan et al. (2022)	Significant (1.8447)	Significant (0.5069)
Quality standardization under ISO 9001		Mijatovic et al. (2025)	Not significant	Significant (0.5827)

Source: Developed by the authors.

As shown in Table 4, in the non-digital segment of the Eurasian market economy, a contradictory role of firm-level corporate social responsibility measures is identified: in contrast to Isayan and Mayilyan (2022), a negative effect of employers' guarantees of compliance with basic labor rights is substantiated, while in line with Moreno et al. (2024), a positive role of preventing occupational injuries is demonstrated.

In the digital segment, firm-level occupational safety and consumer protection

measures associated with corporate social responsibility, namely, the development of consumers' ICT skills (contrary to the findings of Mukhomorova et al. (2020)) and the creation of ICT jobs (contrary to the conclusions of Bannikova et al. (2019)), proved to be insignificant for ensuring product quality.

In contrast to Mijatovic et al. (2025), the role of quality standardization in the Eurasian market economy was found to be significant only in the digital segment. Notably, general measures play a significant positive role in ensuring the quality of labor and consumption in both the non-digital segment (improving the health outcomes of labor and product consumption for workers and consumers, in line with the findings of Tovmasyan et al. (2022)), and the digital segment (the provision of safe Internet services, in line with Galoyan et al. (2023)) of the Eurasian market economy.

6. Conclusion

Thus, trends in changes in occupational safety and consumer protection in relation to product quality management in Central Asia and the EAEU have been identified, largely associated with a decline in the level of such safety. A Eurasian model of ensuring occupational safety and consumer protection in product quality management has been developed. On this basis, a multicriteria classification of occupational safety and consumer protection measures has been carried out, distinguishing between general and firm-level measures, quality standardization measures and corporate social responsibility measures, and clarifying the effects of applying these measures across different market segments of the Eurasian market economy.

The research concludes that across the digital, non-digital, and market segments of the Eurasian economy, the greatest benefits for product quality are delivered by general measures of occupational safety and consumer protection implemented as part of corporate social responsibility. A scientific and methodological approach to ensuring occupational safety and consumer protection in product quality management in Eurasia has been developed, with an emphasis on the most effective selected measures: in the non-digital segment, improving the health outcomes of labor and product consumption for workers and consumers, and in the digital segment, the provision of safe Internet services.

In line with this new approach, applied solutions are proposed to improve occupational safety and consumer protection management practices in support of maximizing product quality in Central Asia and the EAEU in 2026. The implementation of the authors' approach will help to fully unlock the potential for product quality growth in Central Asia and the EAEU through enhanced management of occupational safety and consumer protection.

Author Contributions

1st author formulated the goal, collected and organized official international statistics on occupational and consumer safety for 12 Central Asian countries and five EAEU countries in 2024-2025.
2nd author conducted a review of literature sources on theoretical and practical aspects of the occupational and consumer safety as an object of product quality management.
3rd author mathematically formalized the Eurasian model for ensuring occupational and consumer safety in product quality management.
4th author carried out multicriteria classification of occupational and consumer safety measures.
5th author summarized the results of the research and compared the Eurasian experience reflecting the role of occupational safety and employment in quality management with previous literature.
All authors approved the paper's contents and its final version.

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Appendix

Table 1. Product quality from the perspective of occupational and employment safety in Central Asia and the EAEU in 2024–2025

Year	Country	Non-digital segment				Digital segment				-
		Fundamental labor rights are effectively guaranteed (worst 0–1 best)	Fatal work-related accidents embodied in imports (pcs. per million population)	Healthy life expectancy (years)	Market capitalization (% GDP)	Secure Internet services per 1 million population (pcs.)	Individuals with standard ICT skills (%)	ICT employment (%)	Trade in digitally deliverable services (% total trade)	ISO 9001 quality (bn PPP$ GDP)
		Sc_1	Sc_2	Sc_3	Qnd	Sd_1	Sd_2	Sd_3	Qdt	QS
2025	Afghanistan	0.365	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Armenia	0.000	0.678	66.80	0.60	50.40	0.00	31.50	18.20	0.30
	Belarus	0.416	3.290	65.70	3.70	70.70	24.10	30.20	35.70	25.90
	China	0.317	0.224	82.50	76.20	53.80	0.00	0.00	43.50	18.30
	India	0.505	0.067	46.60	106.00	48.20	0.00	18.90	73.00	4.00
	Iran	0.230	0.208	66.70	463.20	61.20	4.20	11.00	14.70	1.20
	Kazakhstan	0.528	0.924	58.30	25.30	64.00	30.40	0.00	31.90	0.50
	Kyrgyzstan	0.521	0.211	64.70	0.00	47.20	0.00	10.80	16.30	0.20
	Mongolia	0.553	0.852	57.50	0.00	58.70	24.80	19.20	24.20	6.10
	Pakistan	0.316	0.059	42.20	12.30	32.80	0.40	5.50	37.40	2.20
	Russia	0.577	0.337	56.20	38.50	75.30	20.30	24.90	21.90	0.30
	Tajikistan	0.000	0.142	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Turkmenistan	0.000	0.630	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Uzbekistan	0.535	0.104	64.50	7.30	48.10	12.10	0.00	8.60	5.50
2024	Afghanistan	0.372	0.050	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Armenia	0.000	0.678	78.10	0.60	51.30	0.00	22.20	18.20	0.70
	Belarus	0.436	3.290	74.10	3.70	71.30	23.00	28.00	34.70	35.20
	China	0.317	0.224	0.00	76.20	89.10	51.10	0.00	51.50	18.60
	India	0.505	0.067	54.90	105.60	49.20	0.00	14.30	64.70	5.40
	Iran	0.230	0.208	75.10	484.10	61.90	4.40	9.80	12.10	1.30
	Kazakhstan	0.537	0.924	70.80	25.30	64.70	29.50	0.00	27.20	0.90
	Kyrgyzstan	0.522	0.211	73.50	0.00	48.20	0.00	8.70	3.00	0.30
	Mongolia	0.552	0.852	54.80	0.00	59.50	25.90	14.90	23.80	6.20
	Pakistan	0.335	0.059	43.10	12.30	34.10	0.40	4.80	39.90	2.20
	Russia	0.580	0.337	68.10	38.70	75.80	19.10	20.30	37.50	0.80
	Tajikistan	0.000	0.142	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Turkmenistan	0.000	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Uzbekistan	0.535	0.104	69.70	8.10	49.10	9.00	0.00	19.70	4.20

Source: Developed by the authors based on the materials from UNDP (2025), UNDP and MBRF (2024), and WIPO (2025).