

American Journal of Economics and Business Management

Vol. 9 Issue 10 | **pp.** 1177-1185 | **ISSN:** 2576-5973

Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Improving the Implementation Mechanism of an Industry-Adapted Integrated Quality Management System in Small Businesses

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Abstract: This paper develops a conceptual mechanism for implementing an integrated quality management system (QMS) in small businesses according to sector-specific requirements, quality risks and resource capacity. Six activity groups are examined: food and processing, textiles and garments, building materials, trade and logistics, services, and crafts and microbusinesses. A sector-sensitive standards selection framework is proposed with ISO 9001:2026 as its core; the process approach, risk-based thinking and the PDCA cycle form a unified methodological basis. The study introduces a composite readiness index covering organizational maturity, personnel competence, financial capacity and digital monitoring, together with a risk-prioritization measure. A five-stage implementation algorithm links diagnostics, element selection, system deployment, performance monitoring and continuous improvement. The framework is methodological rather than an empirically validated model; future enterprise-level testing is required.

Keywords: small business, international standards, ISO 9001:2026, quality management system, industry specificity, integration, quality risk, resource capacity, composite index, PDCA.

Citation: Ugli, O. B. S. Improving the Implementation Mechanism of an Industry-Adapted Integrated Quality Management System in Small Businesses. American Journal of Economics and Business Management 2026, 9(10), 1177-1185 .

Received:4th Aug 2026
Revised: 10th Sep 2026
Accepted: 15th Oct 2026
Published: 27th Oct 2026

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1. Introduction

The increasing complexity of global supply chains, rising expectations regarding product and service quality, and intensifying competition have created challenges for small businesses that extend beyond final-product inspection. Process consistency, traceability of raw materials and components, employee competence, responsiveness to customer complaints, proactive risk identification, and the availability of documented evidence have become important determinants of business reliability and market confidence [1].

ISO 9001:2026 establishes general requirements for a quality management system (QMS) and is applicable to organizations of different sizes. However, the diversity of industries in which small enterprises operate limits the usefulness of a uniform implementation model. Food producers prioritize food safety and sanitary risks; garment manufacturers focus on defects and conformance to customer specifications; building-material producers require testing and technical conformity; service providers emphasize customer satisfaction; and logistics businesses give priority to delivery performance and supply-chain management.

Consequently, selecting appropriate international standards, prioritizing essential requirements, and aligning implementation with internal resources constitute a distinct economic and managerial challenge for small businesses. The Law of the Republic of Uzbekistan "On Standardization" provides the legal framework for standardization activities [2]. This study distinguishes mandatory national technical and safety requirements from international management-system standards: voluntary adoption of an ISO management standard does not replace compliance with compulsory product-safety obligations.

The purpose of this study is to develop an organizational and methodological mechanism for selecting, assessing, implementing, monitoring, and improving an integrated QMS in small businesses while accounting for sector characteristics, quality risks, resource capacity, and economic performance. The object of the research is quality management in small businesses operating in different industries. Its subject is the set of organizational and economic relationships arising from the integration of international standards and management practices [3].

Research on quality management systems has emphasized the extent to which formal standards become embedded in actual enterprise operations, the motives for obtaining certification, and the effects on process performance. Corbett, Montes-Sancho, and Kirsch comparatively examined the financial performance of manufacturing firms certified to ISO 9000 and explored the potential relationship between certification and favorable business outcomes. Nevertheless, generalizing these findings to all small businesses without considering industry and firm size would be methodologically unjustified [4].

Tarí, Molina-Azorín, and Heras reviewed studies of the benefits of ISO 9001 and ISO 14001 and found that results differ across operational processes, stakeholders, and financial performance. Molina-Azorín and coauthors examined quality and environmental management together and identified research issues concerning the relationships among integration, managerial coordination, and organizational performance [5].

Heras-Saizarbitoria and Boiral investigated the distinction between formal adoption and substantive internalization of ISO 9000 in small and medium-sized enterprises, noting that certification alone does not guarantee a sustainable quality culture. Llonch, Bernardo, and Presas examined implementation and costs in a case study involving simultaneous integration of ISO 9001 and ISO 14001 in an SME. These studies demonstrate the organizational and economic relevance of integration, but do not imply that one universal package of standards is suitable for all sectors.

Among the applicable normative and methodological sources, ISO 22000:2018 specifies food safety management requirements , while ISO 22002-100:2025 addresses general prerequisite programmes (PRPs) across the food, feed, and packaging supply chain . ISO 28000:2022 may be relevant to security management in supply chains . ISO 10002:2018 and ISO 10004:2018 provide guidance on handling complaints and monitoring customer satisfaction. ISO 10013:2021 and ISO 10015:2019 offer guidance on documented information and competence development, respectively [6].

The literature review reveals a methodological gap: a need to assess sector-specific quality risks alongside resource availability and to connect standards selection with performance monitoring through one coherent five-stage mechanism. The present article addresses this gap by developing such an integrated approach for small business entities [7].

2. Materials and Methods

This article is a conceptual and methodological study. Its evidence base comprises official descriptions of international standards , relevant legislation of Uzbekistan, and peer-reviewed research. The methods employed include systems analysis, structural-

functional classification, comparative analysis, risk-based thinking, the process approach, the plan-do-check-act (PDCA) cycle, and economic-logical modelling.

Within the proposed model, standards are organized into three groups: (a) core quality-management requirements applicable across business types-ISO 9001:2026; (b) additional management systems relevant to specific operations, such as food safety, environmental management, occupational health and safety, and supply-chain security; and (c) guidance standards supporting particular practices, including complaints handling, customer satisfaction, documented information, and competence development. The applicability of each standard must be assessed in relation to actual enterprise processes, customer specifications, and mandatory legal requirements. The presence of additional standards does not imply that all of them must be certified simultaneously.

Four components are proposed for evaluating readiness to implement an integrated QMS: O-organizational maturity of management and processes; K-personnel competence; F-availability of financial and material resources; and D-readiness for digital monitoring. Each component is scored on a scale from 0 to 1 using audit evidence and documented criteria. Sector-specific risk is considered separately when selecting implementation priorities.

The following weighted geometric aggregation is proposed to express overall implementation readiness:

$$I_{QMS} = O^{0.30} \times K^{0.25} \times F^{0.25} \times D^{0.20}, \qquad 0 \le I_QMS \le 1. \qquad (1)$$

The weights in Equation are initial methodological assumptions proposed by the author; they sum to one. The geometric specification prevents an extremely low score in one component from being fully offset by high scores in other components. Once enterprise-level observations become available, the weights should be tested through expert assessment, factor analysis, or sensitivity analysis.

To rank the correction of identified nonconformities, the following provisional priority indicator may be applied:

$$P_j = L_j \times S_j \times (1 - C_j)] / (1 + B_j). \qquad (2)$$

Here, L_j denotes the probability that risk j will occur (0-1); S_j is the severity of its consequences (0-1); C_j is the effectiveness of existing controls (0-1); and B_j is the firm-defined, normalized cost of the additional corrective measure (0-1). A higher P_j indicates a higher suggested priority. However, mandatory product-safety and occupational-safety requirements must never be postponed solely because of cost; they are placed in a separate compulsory-compliance category.

The formula does not directly predict economic performance; rather, it supports the ranking of internal interventions. Actual effectiveness must subsequently be evaluated through observable outcomes such as defect rates, rework, customer complaints, on-time order fulfillment, and implementation costs.

3. Results and Discussion

The first step in the proposed mechanism is not merely to assign an enterprise to a sector, but to identify its actual production or service processes and the associated quality risks. Table 1 summarizes priority management areas and appropriate standards for six illustrative business categories.

Table 1. Basis for QMS integration across six small-business sectors

Business sector	Priority management focus	Appropriate combination of standards and approaches
Food processing and related activities	Food safety, hygiene, raw-material traceability, product traceability	ISO 9001:2026; ISO 22000:2018; ISO 22002-100:2025 and applicable PRPs; HACCP principles
Textile and garment manufacturing	Defects, process discipline, order conformity, working conditions	ISO 9001:2026; ISO 14001:2026 and ISO 45001:2018 where applicable
Building-material manufacturing	Laboratory tests, technical conformity, product safety	ISO 9001:2026; ISO 14001:2026 and ISO 45001:2018 where applicable; mandatory technical regulations
Trade and logistics	Delivery reliability, storage, complaints, supply-chain security	ISO 9001:2026; ISO 10002:2018; ISO 28000:2022 where supply-chain security risks warrant
Services	Customer satisfaction, complaint resolution, service delivery time	ISO 9001:2026; ISO 10002:2018; ISO 10004:2018
Crafts and microbusinesses	Consistent product quality, simple records, workforce skills	Principles of ISO 9001:2026; guidance from ISO 10013:2021 and ISO 10015:2019

The proposed classification follows the logic of "core QMS + sector-specific risks + supporting standards." A food processor, for example, may integrate ISO 9001 processes with ISO 22000, but must not simplify or disregard specific mandatory food-safety duties. A microbusiness, by contrast, can begin with a basic process map, a concise checklist, and a complaints register without introducing excessive documentation. In this approach, standards serve the enterprise's practical problems rather than becoming ends in themselves [8].

Based on the submitted conceptual framework, the integrated QMS is organized into five consecutive stages: (1) identifying the sector profile; (2) assessing quality risks and resource capacity; (3) selecting priority QMS elements; (4) establishing the system and its supporting infrastructure; and (5) monitoring, evaluation, and preparation for certification where appropriate. Figure 1 illustrates the relationship among these stages. The cross-cutting methodological principles-process orientation, risk-based thinking, PDCA, and continuous improvement-apply throughout the mechanism [9].

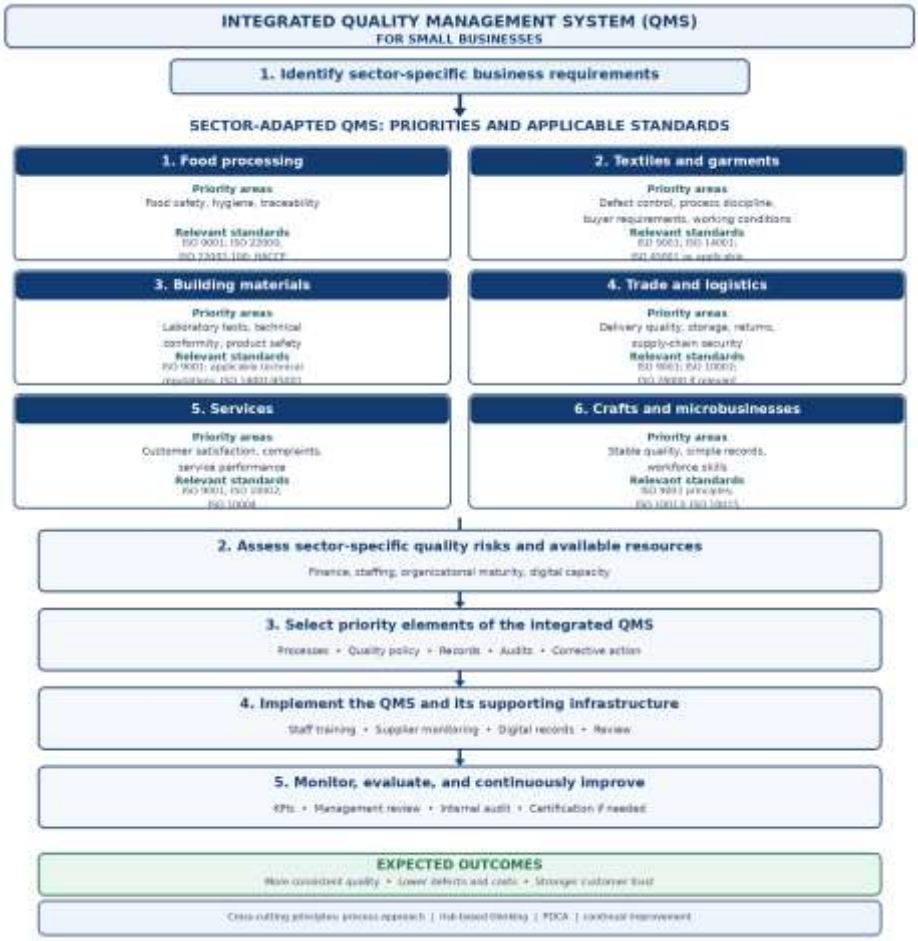


Figure 1. Sector-adapted mechanism for implementing an integrated QMS in small businesses

As Figure 1 shows, the mechanism begins with an enterprise-specific sector profile and leads to measurable organizational and economic outcomes. For practical implementation, each stage should produce a verifiable deliverable with an assigned person responsible and at least one monitoring indicator. This turns the conceptual framework into an operational implementation roadmap.

Table 2. Five-stage organizational algorithm for implementing an integrated QMS

Stage	Activities	Output and verification
1. Define sector profile	Document products/services, customer requirements, process maps, and applicable mandatory rules	Sector profile; register of standards and requirements
2. Assess risks and resources	Score quality risks, personnel, finance, and digital capabilities	I_QMS index; risk matrix; identified weaknesses
3. Select priority QMS elements	Identify quality policy, process mapping, records, internal controls, and corrective actions	List of minimum sufficient QMS elements
4. Implement system and infrastructure	Train employees; schedule audits; introduce electronic records and supplier controls	Evidence of implemented processes and assigned responsibilities
5. Monitor and improve	Review KPIs and management results; conduct internal audits; arrange external assessment if appropriate	Performance report and improvement plan

For small businesses, this algorithm is not a one-off certification project. Instead, it is a recurring management cycle involving data collection, review, and revised decisions. ISO 19011:2026 guidance may be used when organizing the internal audit programme [10].

A fundamental condition for sector-sensitive implementation is to distinguish quality risks from organizational readiness. A high level of risk does not necessarily mean that a firm lacks readiness; similarly, access to financial resources does not demonstrate that safety controls are adequate. Accordingly, the proposed methodology calculates the readiness index I_QMS and the risk-priority indicator P_j independently.

Table 3. Criteria for assessing readiness to implement an integrated QMS

Component	Evidence for assessment	Scoring basis (0-1)
O - organizational maturity	Process map, process owners, quality objectives, audits, documented records	Share of predefined criteria satisfied
K - personnel competence	Required skills, training outcomes, competence of process owners	Share of required competence demonstrated
F - resource capacity	QMS budget allocation, equipment, and essential materials	Share of resource needs adequately covered
D - digital readiness	KPI register, electronic records, data collection and review	Share of processes monitored digitally

Consider a hypothetical small garment producer with O = 0.80, K = 0.70, F = 0.55, and D = 0.60. Equation yields I_QMS = 0.665. In the illustrative classification, this falls within the "stable readiness, but with resource and digitalization weaknesses" category (0.50-0.74). The figures are hypothetical and are provided solely to demonstrate the calculation; they do not represent observed enterprise data [11].

For initial diagnostic purposes, the following provisional groups are proposed: I_QMS < 0.25-initial readiness; 0.25 ≤ I_QMS < 0.50-moderate readiness; 0.50 ≤ I_QMS < 0.75-stable readiness; and 0.75 ≤ I_QMS ≤ 1-high readiness. These thresholds are not specified by an ISO standard and must not be treated as normative before empirical validation.

In prioritizing quality risks, internal improvement projects with higher P_j values are advanced in the work programme. Mandatory controls concerning food safety, technical regulations, and occupational health and safety do not follow a rule that compliance is conditional on low costs. This safeguard is essential for the responsible application of the proposed index [12].

The number of certificates alone is an insufficient measure of QMS effectiveness. Firms should monitor actual changes in product defects, rework and returns costs, complaint frequency, on-time order completion, and repeat purchases. An integration-performance report based on a set of industry-relevant key performance indicators (KPIs), rather than one generic measure, will support more meaningful conclusions.

Table 4. Sector-specific KPIs for monitoring integrated QMS outcomes

Sector	Primary KPI	Expected favorable direction
Food processing	Critical nonconformities; share of recalled batches	Decrease
Textile manufacturing	Defective-product rate; rework cost	Decrease
Building materials	Share of batches failing tests; repeated inspections	Decrease
Trade and logistics	Share of orders delivered on time	Increase
Services	Rate of substantiated complaints; customer satisfaction score	Fewer complaints; higher satisfaction
Crafts and microbusinesses	Returned-product rate; repeat-purchase rate	Fewer returns; more repeat purchases

The net additional economic effect during period t may be expressed as follows:

$$E_t = (C_{0,t} - C_{1,t}) + \Delta M_t - J_t. \qquad (3)$$

In Equation (3), C_0,t represents the cost of poor quality in the comparable period before QMS implementation; $C_{1,t}$ represents the corresponding cost in the post-implementation period; ΔM_t is any additional contribution margin attributable to quality improvement, provided that such a contribution can be substantiated; and J_t is the cost of QMS implementation and operation for the relevant period. Costs should be normalized for output, with appropriate adjustments for inflation and changes in product mix [13].

A positive E_t does not by itself establish that the QMS caused the observed improvement. Other influences include changes in prices, production volume, technology, and market conditions. Future empirical research should therefore compare similar firms that have and have not implemented the system, observe at least two time periods, and apply a difference-in-differences approach where appropriate.

The first methodological contribution is to define an integrated QMS for small businesses not as an attempt to combine every standard under one certificate, but as a flexible configuration of core quality requirements, sector-specific risks, and supporting management tools. The second contribution is a five-stage algorithm extending from sector profiling to KPI monitoring. The third is a four-component geometric readiness index, complemented by an independent risk-prioritization measure. The fourth is the proposal to assess implementation outcomes using operational and economic KPIs that are meaningful to each industry rather than relying on certification status alone [14].

For practical application, regional business support organizations, consultancy providers, and small enterprises could jointly adopt a concise diagnostic questionnaire. Based on its results, a firm-specific implementation roadmap could assign process owners, specify employee training, introduce records of quality-related costs, and digitize essential KPIs. For microbusinesses with limited resources, a spreadsheet or simple register may be sufficient at the initial stage; sophisticated information platforms are not universally necessary [15].

The study has several limitations. The proposed component weights, four readiness categories, and risk formula remain conceptual; their predictive accuracy has not been evaluated using an enterprise-level dataset. Consequently, the indicators cannot replace a formal external assessment of certification readiness. Further research should develop sufficiently large samples by industry and firm size, test the reliability of the proposed measures, and assess their association with actual economic outcomes.

4. Conclusion

Effective implementation of international quality standards in small businesses depends on a flexible approach reflecting sector-specific risks and resource constraints. Instead of prescribing an identical package of additional standards to all firms, requirements should be selected according to each enterprise's profile, with ISO 9001:2026 providing the core quality-management framework. The appropriate combination of standards may differ across food processing, textiles, building materials, trade and logistics, services, and microbusinesses. Mandatory safety requirements and technical regulations must be clearly distinguished from voluntary certification arrangements. A five-stage implementation algorithm has been developed: sector profiling, risk and resource assessment, selection of priority elements, system and infrastructure deployment, and monitoring with continuous improvement. A roadmap specifying responsibilities, deadlines, documentary evidence, and KPIs is recommended for each stage. The proposed I_QMS index combines organizational maturity, staff competence, financial and material capacity, and digital readiness. Before it is applied in sectoral or regional programmes, the weights and classification thresholds must be tested empirically using enterprise-level data. The P_j indicator is proposed to prioritize corrective actions by accounting for risk probability, severity, control effectiveness, and implementation cost. Compliance with mandatory safety requirements remains a priority regardless of this ranking. QMS performance should be evaluated using sector-relevant KPIs and trends in the cost of poor quality. The existence of certification does not in itself establish growth in competitiveness, exports, or profitability. Support programmes for small businesses should initially emphasize relatively low-cost measures, including process mapping, internal audits, employee competence, and simple digital records. Integration may then be expanded according to the specific needs of the industry. Future research should assess the economic impact of the proposed mechanism using at least two periods of observations for production and service firms, comparison groups, and suitable controls for external factors.

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