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FOR SILK INDUSTRY ENTERPRISES: DEVELOPMENT OF AN IMPROVED MODEL OF PDCA CYCLE

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Abstract: While modern techniques and technologies play an important role in the development of silk industry enterprises, the introduction of internationally recognized standards and management systems is an urgent issue. The PDCA (Plan, Do, Check, Action) cycle is a quality management system widely used in the industry as a continuous improvement tool, and the possibilities of introducing this improved model to silk enterprises are highlighted. Therefore, the process approach PDCA cycle, which is available in the quality management system that is internationally recognized and meets international requirements, is currently necessary in the silk industry enterprises. In this article, we recommend the development of a PDCA cycle based on the requirements of the quality management system for silk industry enterprises and the introduction of modern requirements for the quality system. As a first step, the scientific work carried out in the direction of the quality management system was reviewed, and the changes that occurred after the introduction of the PDCA cycle in silk enterprises were carefully analyzed. All documents of silk enterprises have been subjected to regulatory expertise and approved by the department's management. Conclusions, scientific proposals and practical recommendations were presented on the formation of healthy competition in the enterprises of the silk industry by improving the PDCA cycle of the quality management system.

Keywords: PDCA, quality, system, management, control, silk industry, improvement, requirements, cycle.

Introduction. The production of silk is crucial for countries that are developing. It is an industry with a high labor force. Due to globalization and the adoption of cutting-edge technologies by national and multinational corporations, SMEs are up against fierce competition. However, they are also falling short in terms of product performance and quality requirements. To date, in ensuring the quality of textile (silk) products, the introduction of the requirements of international standards, the production of improved models remains one of the most important issues. therefore, in this article, we decided to develop an improved system of the PDCA cycle, called the process approach of the ISO 9001: 2015 standard, introduced by the international standardization organization ISO. The PDCA cycle was developed by Professor Walter Shewhart at the Bell Telephone Laboratory in 1920 to facilitate the implementation of this international standard and was first used in this laboratory. Dr. Walter A. Shewhart and Dr. W. Edward Deming advocated PDCA concept for productivity management, and continuous quality improvement of process and products. PDCA is the “golden cycle for improvement”. It is a methodical approach for problem solving and continuous improvement. PDCA wheel should be considered a never-ending cycle for improvement towards an ideal condition[1]. This cycle begins with the planning phase and ends with the verification process. The planning cycle consists of setting a goal, identifying the problem, formulating a theory, determining success indicators, and implementing the intended plan. These activities are included in the Do step, where components of the plan, such as

product production, are implemented. Second comes the verification (learning) phase, in which the results are monitored to verify the plan's progress and success or problems and areas for improvement. The Law step closes the loop by integrating the learning generated by the entire process, which can be used to achieve goals, change methods, or even reformulate theory entirely. All four of these stages are repeated over and over again as part of an endless cycle of continuous improvement[2]. The 7 quality management principles adopted by the ISO 9001:2015 standard are evidence based decision making, customer focus, leadership, employee engagement, process approach, improvement, and relationship management. One technique utilized in the process approach quality management principle is the Plan-Do-Check-Act (PDCA) cycle. Dr. William followed Walter Shewhart's lead in popularizing this technique. Deming, Edward [3]. Companies frequently employ the Plan-Do-Check-Act (PDCA) approach to enhance customer happiness, reduce errors, and improve service quality. The plan-do-check-action (PDCA) cycle management model was developed by scholar Deming in 1954. It is a scientific concept that the general public has acknowledged as a solution to the problem of work quality. The primary function of the PDCA cycle management model is to implement quality management in accordance with the sequence of plan (P), do (D), check (C), and action (A), so that the management objectives are gradually developed to reach the end goal[4]. A smooth and effective quality improvement process depends on allocating enough time to each PDCA cycle phase. The components presented here constitute a methodical approach grounded in the scientific method and serve to guarantee that enhanced endeavors are carried out in a manner that optimizes the level of achievement attained. Process enhancements need to be recorded and given top importance. The processes to accomplish the above matter are shown in Figure 1 and involve the use of SPC through the PDCA cycle, followed by CED and NGT to identify the root cause, and finally 5W1H methodologies for determining improvements. Steps or cyclePlan of Action gathering of data, selection of research focus, and interview. D0 Making a plan and using the 5W1H technique to implement an improvement. Examine the process capability (Cpk) and stability process ({ – R Chart).Take Action establishing uniformity[9]. The study's goal is to offer recommendations for using the PDCA technique to address production-related issues. The study aims to address two primary concerns. To enhance packaging quality, the first step is to create a more straightforward version of the PDCA cycle using quality tools. The second is using the PDCA cycle to address packaging design multi-objective difficulties[10].

Methodology. Prior to performing the research, a research protocol was designed that included the main questions for the interviews. In this instance, semi-structured interviews were conducted. Professionals in project management, quality assurance, and design and engineering responded to interview questions aimed at comprehending the use of the PDCA cycle. Because the study's participating company is dedicated to the PDCA cycle, the investigations focused on installation, performance, and problems associated with using this methodology. Direct observations, casual chats, attending meetings and events, and reviewing archive sources were used to further investigate the

instances and guarantee the accuracy of the data obtained from the interviews. The case study's findings demonstrate that the PDCA cycle—which is the officially stated quality assurance procedure in the organization—is not always adhered to exactly. They have developed an in-house process of their own that they claim takes less time and is adequate to produce the required results. This is the primary justification for why the PDCA approach is not used today. The businesses have not really given the PDCA method a try and have less experience with it[7]. Tested and demonstrated throughout time, the PDCA cycle is a potent instrument for continual improvement. It allows problem-solving an organized approach, empowering firms to make data-driven decisions [8].

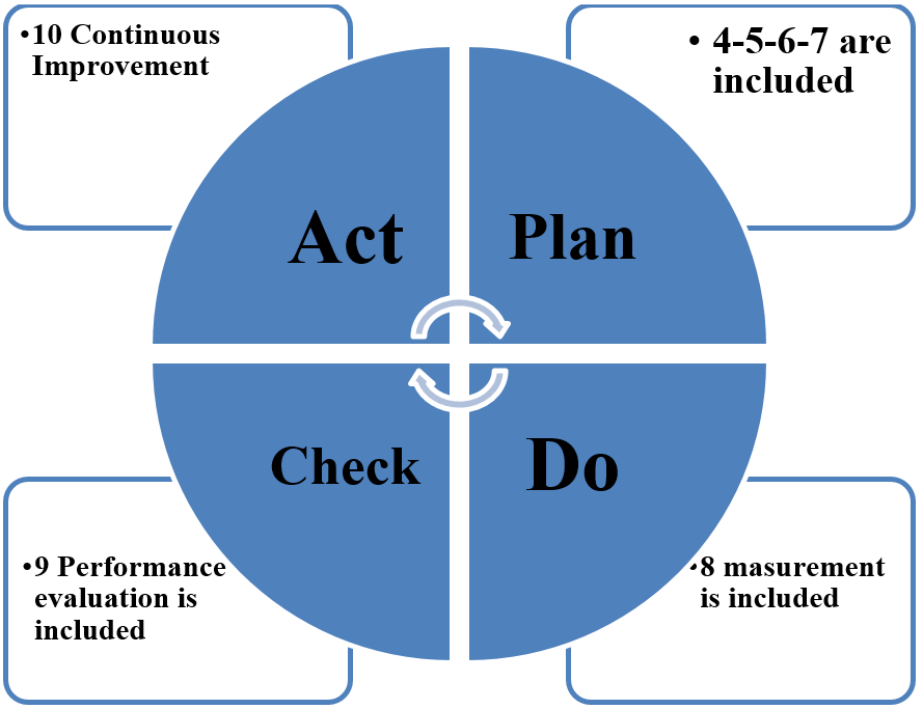

Figure 1. PDCA modeling depended on ISO 9001:2015 standard.

Results. In Figure 3, the PDCA model consists primarily of clauses in the ISO 9001 standard. The "PLAN" stage is the basis and requirements for the enterprise to be established. This step is the most essential main foundation where the seriousness of the silk enterprise to achieve goals is determined by its readiness to carry out this step. The ISO 9001 standard included in the "PLAN" phase is the relevant clauses. The ISO 9001 standard included in the "PLAN" phase is the relevant clauses. 4 System of quality control 5 The duty of management, 6 Resource administration, 7 Realization of the product. Determining the objectives, strategies for achieving them, and assessing their execution are the main aims of the planning stage. Every company uses PDCA in a unique way. Time-limited opportunities should be identified through procedures or activities that are the focus of the planning stage in order to make the most of them. Prior to putting a strategy into action, you might need to perform a root cause analysis if you need to

remedy a process issue. (Discover how to do root cause analysis to find issues and fix them.) You may select the best course of action by using data, whether it be study of past PDCA cycles or current process data. The very first principle is everyone quality management system's goal and knowledge to maintain confidentiality and impartiality at all times. Having an impartial approach entails not having any conflicts of interests. This impartiality serves as the cornerstone for all laboratory management system workers to maintain their neutrality at all times, ensuring that no action made will compromise the validity of calibration or testing results. As stated in clause 4 addressing the structural needs, a number of components are required in the next step of the "PLAN" in order to carry out all activities in the silk industry. elements including the workforce, job descriptions for employees, organizational structure, and efficient communication methods. The clauses pertaining to resource requirements, as indicated in clause 6, provide a solid and genuine basis for laboratory operational activities in the "PLAN" step. From Figure 3, the second step of the PDCA cycle is "DO". From the laboratory basicfoundation which are in the "PLAN" step, it will be an input for "DO" step. "DO"step is all activities carried out related to calibration/testing activities and supporting activities. Most clauses in the ISO 9001 : 2015 standard are implemented at this step. The clauses included in the "DO" stepareamong other: Review of requests, tenders, and contracts 8 Measurement, analysis and improvement, 10 Improvement. At this point, the plan is put into action. Players should follow the plan exactly as it is laid out since there is a reason it was created. "CHECK" is the third phase in the PDCA cycle which is consist of 9 Performance evaluation,. The purpose of this phase is to assess the efficacy of the quality management system operations that were completed in the preceding step. This stage is also performed to verify conformance with the application of ISO 9001 : 2015 standard. The purpose of the "CHECK" stage is to assess quality, sufficiency, and efficacy. Evidence-Based Decision Making is a fundamental tenet of ISO 9001:2015 certification standards. The standard's clause 9 lays the groundwork for it. This sentence emphasizes the importance of measuring and analyzing data. Because of this, the majority of the specifications listed in this section concern methods for producing significant data.

Decision-makers can further assist in interpreting the collected data by consulting the sections on analysis and management reviews. Organizations must follow the guidelines in Clause 9 of ISO 9001:2015 in order to monitor and assess their performance. Organizations can measure, monitor, and analyze data to promote continuous improvement, improve customer satisfaction, and guarantee the efficient operation of the quality management system by putting this clause's requirements into practice. The emphasis on measurement, analysis, and ongoing development highlights how crucial it is to make judgments on accurate information and pursue excellence[5].

"ACT" is the fourth phase in the PDCA cycle. One clause is included in this step: Corrective action 10 Improvement. The standards for continuous improvement in the quality management system are outlined in ISO 9001:2015 Section 10 Continuous Improvement. This involves recognizing nonconformities and taking corrective action to prevent them from happening again by removing the nonconformance's underlying

cause. Choose areas for development that will boost satisfaction among consumers, such as expanding the QMS's performance or implementing changes to goods or services.

Important prerequisites:

- Identify and pick areas that could want improvement
- Respond to deviations and take steps to resolve the underlying issue
- When necessary, carry out corrective measures and assess their efficacy.
- Maintain documentation of nonconformities and remedial measures
- Maintain and enhance your QMS.
- Enhance your ISO 9001 QMS by Applying the Seven Quality Management Principles [6].

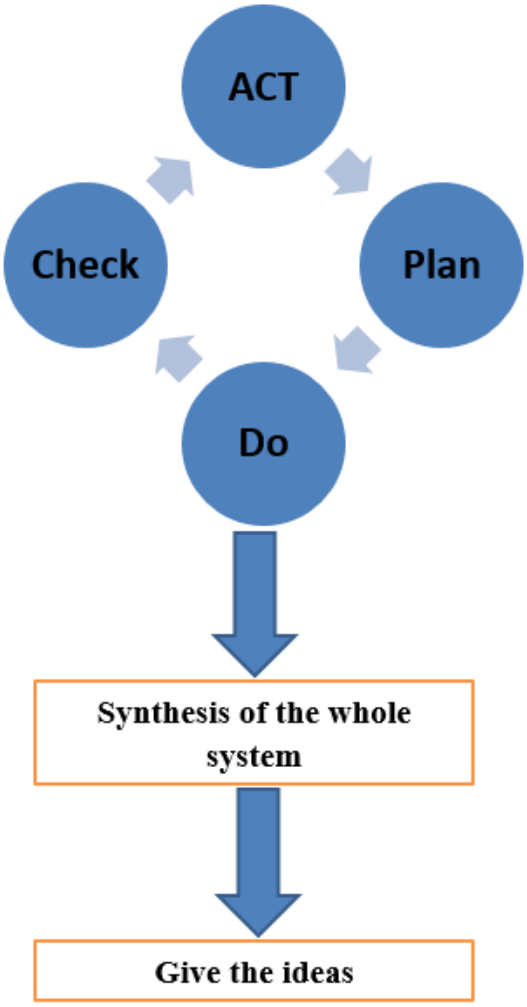

Figure 2. PDCA improved modeling.

By introducing this PDCA + SG improved model to a silk factory, it allows to identify and eliminate defects that remain even after the introduction of a quality management system with PDCA skills in the company. In this process, initially entering the planning stage 4 – 5- 6-7 the conditions of the requirements apply and then proceed

to the Bajar stage. After the completion of all four stages, the whole system is synthesized from which and the conclusion is made by mutahasis that it is good and bad.

Conclusion. Plan-Do-Check-Act, or PDCA, is a cycle in which the process approach standard ISO 9000:2015 is applied. This tries to give an overview to make it easier to comprehend how each clause of the ISO: 2015 standard is implemented so that its application can be consistent. Generally speaking, a PDCA cycle consists of four steps: "PLAN," "DO," "CHECK," and "ACT." A PDCA model based on the ISO: 2015 standard will be developed from this research by combining all of these processes into a single cycle. The "PLAN" stage serves as the fundamental framework and moral guideline for carrying out high-quality operations that yield reliable outcomes. The primary task in the laboratory is the "DO" step. This tries to give an overview to make it easier to comprehend how each clause of the ISO: 2015 standard is implemented so that its application can be consistent. Generally speaking, a PDCA cycle consists of four steps: "PLAN," "DO," "CHECK," and "ACT." A PDCA model based on the ISO: 2015 standard will be developed from this research by combining all of these processes into a single cycle. The "PLAN" stage serves as the fundamental framework and moral guideline for carrying out high-quality operations that yield reliable outcomes. The "DO" step is the primary laboratory activity that occurs from the upstream (e.g., quality request review) to the downstream. The purpose of the "CHECK" phase is to assess the effectiveness, suitability, and sufficiency of the quality management system. In contrast, the "ACT" stage entails taking steps to reduce or remove risk, get rid of non-products, and seize opportunities in order to improve the performance of the silk industry. The research's PDCA ISO 9001:2015 methodology is anticipated to be applied in Namangan's silk industry.

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