

## Research Article

# Evaluation of the Readiness of Small and Medium Enterprises on the Indonesian National Standard

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**Abstract.**

Indonesia's economic condition, which is experiencing a weakening due to the pandemic, has created a competitive climate among businesses. Jago Jaya Shuttlecock is one of the SMEs in the city of Surakarta that has been producing shuttlecocks since 1971. Jago Jaya Shuttlecock wants its products to be SNI certified for the expansion of the marketing network and to increase the class of the products it produces. Therefore, this research was conducted to assess the readiness of SMEs to obtain SNI certificates. This was done by examining quality control using a control chart and the process capability in accordance with the quality requirements in SNI 0036-2014. This research also examined the readiness of SMEs in the SNI certification process from the aspects of administration, technical quality assurance, and economic capability. The problem was analyzed using the Failure Modes and Effect Analysis (FMEA) and obtained suggestions for improvements according to the priority of action if the specification is out of control and the Cpk indicator  $<1.5$ . In the preparation of SMEs in the SNI certification process, it was found that the readiness in the administrative, technical aspects of quality assurance and economic aspects were 100%, 17%, and 100% respectively. Based on the results, recommendations were given to improve the quality assurance system.

**Keywords:** Readiness, SMEs, SNI, Indonesian National Standard

## 1. INTRODUCTION

Indonesia's economy, which is currently experiencing an economic downturn, has built a competitive climate among business actors. Many business actors are competing to be the best in their respective fields. Thus, every business actor is required to be able to compete strongly and have the ability to withstand. This competition occurs from business actors with a large market cap to the small and medium industry (SMEs) level. This competition also occurs in the shuttlecock industry. This industry is one that has potential because badminton is a popular sport in Indonesia which has a long history and has succeeded in making the nation proud through its many achievements at the international level. Many shuttlecock products have been circulating in Indonesia for a long time at various prices. Quality is an indicator that the shuttlecock has a competitive

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edge. If the price offered is getting more expensive, the quality will also be better. A quality product reflects that the product has met the minimum standards set. Standards are technical specifications or something that is standardized including procedures and methods that are prepared based on the consensus of all parties concerned with regard to the requirements of safety, security, health, the environment, developments in science and technology, as well as experiences, current and future developments will come to get the maximum benefit. The standard regarding shuttlecocks that applies in Indonesia is SNI 0036-2014.

One of the shuttlecock producing areas is Surakarta. According to data contained in the Department of Industry and Commerce, in 2020, the number of business units for shuttlecock production in Surakarta is 20 business units, scattered in Jebres and Serengan Districts. Jago Jaya Shuttlecock is one of the SME that produces shuttlecock in Surakarta. Located in Jebres district and has been running its production since 1974. The products produced have been marketed around Central Java to West Java. This SME has decreased its sales turnover from year to year. This happens

because the marketing coverage is still relatively small and there are more competitors with better quality. The quality is proven by the existence of SNI certificates. Owned by competitors. The Jago Jaya management wants to expand the marketing network and increase the class of the products produced so that they can be used at a more professional level of competition. However, Jago Jaya does not yet have an SNI certificate as an indicator of quality assurance of the products produced so that it has not received the trust of the public. Therefore, this research was conducted to evaluate the quality control at Jago Jaya Shuttlecock in accordance with the quality requirements contained in SNI 0036- 2014 and the readiness of SME in meeting the requirements in SNI certification.

## 2. RESEARCH METHODS

This research began with a literature study of the related theory to be used. Furthermore, direct observation was carried out in June-July 2020 to examine the specifications on the results of the Jago Jaya shuttlecock production. The specifications studied were weight, height of cork, centreline length of cork, main material of cork, number of feathers, length of feathers, colour of feathers, colour of yarn, centreline of feathers, shuttlecock kite, and distance travelled by the shuttlecock. The samples taken were 25 samples with 4 subgroups in each sample.

Then, from the data obtained, an analysis of quality control was carried out using the *X-R* (Variable) control chart and the *P* (Attribute) control chart and the process capability in accordance with the quality requirements contained in

SNI 0036-2014. The problem was obtained by looking at the uncontrolled specifications and has a low value of process capability. Furthermore, the problem was analysed using the Failure Modes and Effect Analysis (FMEA) tools to provide recommendations for improvements in order of priority. After that, an assessment of the readiness for SNI certification was carried out using the assessment model developed by Fahma et al. [1] which was in accordance with the SNI type 3 certification process by LSPro TOEGOE Yogyakarta. The assessment was carried out on administrative aspects (corporate and personal), technical quality assurance systems (document completeness and application), and economic aspect. From the results of the assessment, suggestions are given for improvements to aspects that have not met the requirements for SNI certification.

### 3. RESULTS

This section would discuss about SNI 0036-2014, the results of processing with control charts and capability analysis which the problem findings were analysed using FMEA as well as an assessment of the readiness of the SNI certification process in administrative, technical quality assurance, and economic aspect.

#### 3.1. Indonesian National Standard (SNI)

The Indonesian National Standard (SNI) is the only standard that applies nationally in Indonesia. With the existence of Government Regulation of the Republic of Indonesia Number 102 of 2000 concerning National Standardization, the main target in the implementation of standardization is to increase the availability of the Indonesian National Standard (SNI) which is able to meet the needs of industry and installation work to encourage the competitiveness of domestic products and services.

With the existence of national standardization, there will be a single reference in measuring the quality of products and or services in trade. So, this can improve protection for consumers, business actors, workers, and other communities for safety, security, health and preservation, and environmental function. Provisions regarding national standardization have been regulated in the Republic of Indonesia Government Regulation Number 102 of 2000 contains the National Standardization stipulated by the President of the Republic of Indonesia on 10 November 2000. The

requirements for SNI certification are divided into two, the requirements for the quality of the process to the results of the production and the requirements in the form of an application for SNI certification. SNI certification requirements in the form of characteristics and process quality requirements until the production results are determined based on the applicable SNI. Then, it is adjusted to the type of product or service to be certified, which in this case study is a product from SME Shuttlecock, which uses SNI 0036-2014. Meanwhile, the SNI certification requirements in the form of SNI certification application document requirements are determined based on the certification scheme

determined by the authorized Product Certification Institute (LSPPro), namely LSPPro TOEGOE, Yogyakarta.

### 3.2. SNI 0036-2014 about Shuttlecock

According to SNI 0036-2014, the badminton shuttlecock has a special shape, made of cork or other suitable material and poultry feathers that meet the technical requirements in the sport of badminton. The head is cylindrical with half-spherical strike support, made of cork or other suitable material except for metal, wrapped in thin skin or other suitable material in white. While the tail is made of 16 pieces of feathers. The feathers are arranged in such a way that they are tightly tied, using yarn, in 2 or 3 rows. The yarn ties are given adhesive. Quality requirements for shuttlecocks can be seen in Table 1.

TABLE 1: Quality requirements of the Shuttlecock in SNI 0036-2014.

Specification	Unit	Quality Requirements
Weight	gram	4,68—5,5
Height of Cork	mm	22,5—25
Centreline Length of Cork	mm	25—28
Main Material of Cork	-	Cork
Numbers of Feathers	pcs	16
Length of Feathers	mm	62—70
Colour of Feathers	-	White
Colour of Yarn	-	White
Centreline of Feathers	mm	58—70
Shuttlecock Kite	-	Stable
Distance Travelled by the Shuttlecock	mm	530—990

### 3.3. Control Chart Analysis

The control chart is one of the tools to carry out statistical process control (SPC). A control chart is used to analyse the output of a process. Data that represents defects from the output is plotted on the control chart. If no data is out of the upper control limit (UCL) or lower control limit (LCL), and the data plot shows no symptoms of deviation, then it can be said that the process is under control. Conversely, if there is data that is out of control, then the process is not stable. Data that is out of control is due to a special cause. This study uses the *X-R* control chart for variable data and

P control chart for attribute data. The help of Minitab is used to make a control chart and the results are shown in Figure ?? which is the *X-R* FRcontrol chart on the shuttlecock weight specification and Figure ?? which is the P control chart on the feather and yarn colour specification. A summary of the results of making control charts is shown in Table 2.

TABLE 2: The result of the analysis using control chart.

Specification	Result
Weight	Under Control
Height of Cork	Under Control
Centreline Length of Cork	Under Control
Length of Feathers	Under Control
Colour of Feathers and Yarn	Under Control
Centreline of Feathers	Under Control
Shuttlecock Kite	Under Control
Distance Travelled by the Shuttlecock	Under Control

### 3.4. Process Capability Analysis

Process capability is an analysis of variability relative to product requirements or specifications and to assist production development in eliminating or reducing a lot of variabilities that occurs. This process capability is a critical performance measure that shows the process can produce according to product specifications applied by management based on customer needs and expectations [2].

According to Breyfogle [3], the standard sigma values for Cp can be grouped into 3 categories:

1. CP = 2, then the process is as expected
2. CP < 2, then the process is outside the specification limit

3.  $CP > 2$ , then the process is according to specifications The standard sigma values for Cpk are as follows:
4.  $Cpk < 0$ , indicates the process average is outside the specification limit, meaning low accuracy.
5.  $0 < Cpk < 1.5$ , indicating that the accuracy and precision is still low if the Cpk value is  $<1.5$ , but if the Cpk value  $> 1.5$ , then the precision is high but the accuracy is low.
6.  $Cpk > 1.5$ , if followed by a value of  $Cp > 1$ , then the process is capable and high accuracy and precision. But if the value of  $Cp < 1$ , it means high accuracy and low precision.

In this study, the Cpk indicator and if the Cpk value in a specification  $< 1.5$  then the analysis is carried out at a later stage. The summary of the results from process capability analysis is shown in Table 3.

TABLE 3: The result of the process capability.

Specification	Cpk
Weight	0.03
Height of Cork	3.61
Centreline Length of Cork	5.09
Length of Feathers	4.35
Colour of Feathers and Yarn	1.7
Centreline of Feathers	5.46
Shuttlecock Kite	0.48
Distance Travelled by the Shuttlecock	0.62

### 3.5. Failure Modes and Effect Analysis (FMEA)

FMEA is a quality improvement and control program that can prevent failure in a product or process. The purpose of implementing FMEA is to prevent problems from occurring in processes and products. When used in design and manufacturing processes, FMEA can reduce costs by rapidly identifying and improving products and processes during development. This method is relatively easy and does not require a lot of money. The result is a better process because corrective actions have been taken, reduce and eliminate failures [4]. The results of the analysis using FMEA are shown in Table 4.

TABLE 4: Failure Modes and Effect Analysis (FMEA).

Specification	Potential Failure Mode	Potential Effect(s) of Failure	S	Potential Cause(s)	O	Detection	D	RPN	Recommended Actions
Weight	Does Not Meet the Standard	The Shuttlecock is Unstable	7	The Weight of feathers and Cork are too light	7	Visual	7	343	Selecting Suppliers that are meet the standards
The Colour of Feathers and Yarn	Does Not Meet the Standard	Does Not Meet Consumer Expectations	6	The Selection of the materials does not meet the standard	8	Visual	7	336	Selecting Suppliers that are meet the standards
Shuttlecock kite	Does not meet the standard	The shuttlecock is unstable	7	Bad Feather Straightening	8	Visual	5	280	Purchasing a feather straightener so that the shuttlecock kite is stable
				The sewing and gluing process are bad	9	Visual	7	441	Purchasing of sewing and gluing machines as well as training employees to use the machine
				There is no hoit tools to test the shuttlecock kite	9	Visual	8	504	Purchasing of a hit test tool to inspect the shuttlecock kite

### 3.6. Assessment of the Readiness for SNI Certification

After examining the readiness of the resulting product with the quality requirements in SNI 0036- 2014, then the readiness of Jago Jaya Shuttlecock was assessed using the assessment model developed by Fahma et al. [1], to assess administrative, technical quality assurance, and economic aspects. Administrative aspects consist of KTP, brand rights, Certificate of Business Domicile, Legalization of Deeds, NPWP for individuals and Business Entities, City Plan Information (KRK), Environmental Permits, Disturbance Permits, Trading Business Permits (SIUP), Company Registration Certificates (TDP), and Industrial Business Permit (IUI). The technical aspects of quality assurance consist of application and documentation of the quality policy, organizational structure, production process flow, quality objectives, quality procedures, person in charge of quality, list of materials, list of tools, and product inspection. The economic aspect consists of the ability and willingness to pay the costs incurred during the SNI certification process. The data were collected using a questionnaire with a Gutman scale of 0-1. A score of 0 is given for conditions that have not been met and 1 is given for points that have been met. The results obtained were that the administrative aspect had a readiness value

of 100%, the technical aspect of quality assurance was 17%, the economic aspect was 100%.

Then a recommendation is given to technical quality assurance in accordance with 4 levels of quality management stem documentation, which consists of:

1. *Level 1: quality manual.* The quality manual is a document that contains the management system in general and is prepared to direct the company in implementing the quality management system;
2. *Level 2: quality procedure.* The quality procedure is a document that contains steps and responsibilities of executing the management process;
3. *Level 3: work instructions.* The work instructions describe in detail how activities in quality procedures are carried out, where these activities are in a department;
4. *Level 4: quality record.* Quality records are objective evidence that a quality management system has been implemented and demonstrated to prove its effectiveness.

## 4. DISCUSSIONS

From the data processing that has been done, it shows in the analysis using the X-R control chart and the P control chart, all data on each specification are still within control limits. This indicates that the production process is in good condition. In the process capability analysis, it shows that the weight, feather and yarn colour, and shuttlecock flying specifications have a value of  $Cpk < 1.5$ . This shows that the accuracy and precision of the quality requirements contained in SNI 0036-2014 are still low. The specifications that have a low Cpk value are then analyzed using FMEA tools and recommendations for improvements are obtained according to the order of priority, namely the purchase of a hit test tool to inspect the shuttlecock kite, purchase of sewing and gluing machines as well as training employees to use the machine, selecting suppliers that are following the standards on weight cork and feathers, colour of feathers and string, as well as purchasing a feather straightener so that the shuttlecock kite is stable. The proposed improvement is to improve the production process contained in Jago Jaya Shuttlecock. So that the resulting shuttlecock is under the quality requirements in SNI 0036-2014.

In the assessment of the readiness of SME in the SNI certification process, it was found that the efficiency of personal and company administration was 100%, the



implementation aspect and technical documentation of quality assurance was 17% and the economic capability aspect was 100%. This shows that SME Jago Jaya already has the administrative requirements required in the SNI certification process and can make payments during the SNI certification process. However, this SME is not yet ready in the aspects of implementation and technical documentation of quality assurance, so it is recommended for improvement under 4 levels of quality assurance system documentation consisting of quality manuals, quality procedures, work instructions, and quality records. The proposed improvement is expected to improve the implementation of the quality assurance system as a requirement in the SNI certification process.

## 5. CONCLUSION

In this study, with the case study of SME Jago Jaya Surakarta, it was found that all specifications were at the control limit, but the specifications for the weight of the shuttlecock, colour of feathers and yarn, and shuttlecock kite still did not meet the quality requirements contained in SNI 0036-2014. Suggestions were made to use FMEA tools to

improve the shuttlecock production process. Readiness in the certification process in administrative aspects was 100%, the technical guarantee was 17% and the economy was 100%. Suggestions are given to improve the application of the appropriate quality assurance system with 4 document-level quality assurance systems.

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