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Analysis of Statistical Quality Control For Textile Industries Production Processes With A Special Reference To Rabkavi-Banhatti

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Abstract:

The global economy has changed dramatically over the last two decades as a result of global competition, to the point that practically every organisation, major or small, has been affected in some manner. Quality is the most effective factor a company or organization can use in the battle for customer/client.Statistical quality control is a set of problem-solving techniques that can assist you in achieving process stability and increasing capability by minimising variability. The main purpose of this research is to employ SQC in the textile sector, analyse control charts, and compare the performance of different control charts for production data. In the production context, it improves quality, dependability, productivity, and customer happiness. In manufacturing, quality assurance necessitates the adoption of quality control procedures. The level of quality control in 12 randomly selected textile industries in Rabkavvi-Banhatti is investigated in this study.The result of the study reveals that in all the textile industries the production process is within the control limit.

Introduction:

The global economy has changed dramatically in the last two decades as a result of global competition, to the point that practically every organisation (big or small) is affected in some manner. Creativity and innovation are required to bring about the necessary change to gain a competitive advantage (Hotelling, 1947). In the struggle for customers/clients, quality is the most effective component a company or organisation can use. Maintaining a good standard of quality for sarees, like any other product, is critical. In this scenario, the quality issue is much more delicate. No one wants to buy shabby clothing that isn't fashionable. The clothing she wears displays her human dignity and way of life.

Customers must be satisfied in order to be competitive, and in order to fulfil customers, we must focus on quality. Quality control is the attitude and driving force behind creating high-quality products and services that please customers by emphasising the best value of an industry's products and services. Quality control's major goal is to verify that the products, services, or procedures given are dependable, fulfilling, affordable, and physically sound, as well as that they match certain requirements.They place a higher importance on quality and delivery time in today's highly competitive global industry. Similarly, manufacturers have begun to place a higher emphasis on quality and delivery time, and businesses are attempting to gain a competitive advantage and increase profitability by improving quality. Continuous quality improvement will differentiate a company from its competitors in competitive industries, resulting in increased revenue. One of the most important competitive elements for businesses is ensuring quality. The ability to develop high-quality items has an impact on export, sales, and revenue.

It is a long-standing business strategy for any company to provide high-quality products to its clients. This quality control program's goal is to help manufacturers meet the industry's high standards. Furthermore, the supplier might benefit from the company's quality control programme. Quality control programmes not only assist in identifying and rejecting defective items, but they also identify production procedures that require extra attention, minimising the number of defects in future production. In the manufacturing facility, this sort of quality control serves as a foundation for management decisions.

For the purposes of this article, a defect is defined as a condition that causes merchandise to be of poor quality or undesirable due to one or more of the following factors:

1. It is noticeable
2. It will have an impact on the product's desirability
3. It will have an impact on the product's serviceability.

Quality control management is the part of the overall management function that sets and implements the quality policy. Quality assurance covers all processes within a company that contribute to the production of high-quality items. The inspection is carried out by representatives from the current production, and the results are recorded on a control chart. The goal of garment inspection is to visually assess items from a random delivery to confirm that they are in general conformance and appearance with the instruction/description and/or sample received (Rahman, 2018).

Background history of Rabakavi Banhatti textile industry

Rabakavi Banhatti located 18 kilometres west of the Jamkhandi sub division. Rabakavi, Banhatti, Hosur, and Rampur are the four areas that make up the town. Rabakavi and Banhatti municipalities merged in 1952 to become a single municipality. The textile industry, both power-loomed and hand-loomed, is well-known in the area. Rabakavi-Banhatti has around 22000 power looms, making it one of the most densely populated areas in Karnataka.

The Rabakavi–Banhatti textile industry started from 12th century by Jedar Dasimaiya. It had history of 300 years, in 1951 German businessmen improved the management system and also introduced new technology. They started this through handloom later on the technology changes automatic textile loom used then Power loom came and using now days. At 12th century 1st saree rate is Rs. 9 it included all the cost of production and profit.At 1942 Chanamalappa machakanur started handloom. Continued till now his son from 1978 by ashok machakanur that time saree rate Rs. 26 and now saree rate is Rs. 1100 for handloom textile industry Initially the labour force was 550 and production began with 9240 spindles and 500-600 looms. The annual production was Rs. 3.6 thousand yards of fabric and 300 kg of yarns In 1978 the cotton rate is Rs. 160 and at present cotton rate is Rs. 2200, In 1978 the silk rate is Rs. 450 and at present silk rate is Rs. 4500,In 1978 the mazuri rate is Rs. 2.75 and at present mazuri rate is Rs. 230. The textile industry is an integrated saree introducing the following main products.

Quality Characteristics Of Cotton Fiber:

1. **Cotton colour:**Cotton fibber comes in a variety of colours, including grey, kesari jamla navy blue, chocolate tambasu black reddish, and yellow stand.
2. **Cotton fibber Maturity:** Maturity is defined as ripeness or full development after one year.Cotton fibre maturity may have an impact on the quality of the next product (cotton yarn).Cotton fibber that is immature has a poor strength.
3. **Strength of cotton fiber:**It is a fiber's mechanical feature. The strength of cotton fibres is why it's important to test them. The strength of the fibre has a direct impact on the yarn and fabric's strength.
4. **Length uniformity:**There are two types of lengths. The cotton staple length uniformity is 8.29 metre and 6.20 metre.

Research Methodology

A control chart is a statistical tool that is used to distinguish between variations in a process caused by common causes and variations caused by specific factors. There is variety in every procedure. Some variations could be due to factors that aren't generally present in the procedure (Montgomery, 2008). This could be due to a unique cause. Some variety is merely the product of the process's countless, ever-present differences. These two categories of variance are distinguished using control charts. Upper Control Limit (UCL), Centre Line (CL), and Lower Control Limit (LCL) are the three horizontal lines that make up the system (LCL). The average value of the quality characteristic under investigation is represented by the control chart's centre line. When a point falls between UCL and LCL, the process is said to be under control. A point plotted outside the control limits, on the other hand, can be interpreted as indication that

the process is out of control, necessitating preventative or corrective steps to identify and eliminate the assignable cause or reasons. In this article np-chart has been applied for number defectives per day. The data was collected by using simple random sampling method. There are 85 power loom textile industries in Rabakavi-Banhatti town out of which 12 industries are selected randomly. The data for number of defectives was collected by visiting daily to selected textile industries for 15 days.

The control limits for np-chart are calculated by suing following formula.

$$CL = n\bar{p}$$

$$UCL = n\bar{p} + 3\sqrt{n\bar{p}\bar{q}}$$

$$LCL = n\bar{p} - 3\sqrt{n\bar{p}\bar{q}}$$

Where,

$$\bar{p} = \frac{\sum d}{nk}$$

Where, d - Number of defectives.

n – Number of observations per sample.

k - Number of samples.

By using the collected data np-charts for all the textile industries are prepared. The control limits for np-chart central line (CL), Upper control limit (UCL) and Lower control (LCL) are calculated(Chanda, 2000).

Result:

Control limits for np-chrats of all textile industries are as given below,

textile industries	Number of sample	Number of observations	npbar	npq	UCL	CL	LCL
MSS	15	100	3.07	2.97	8.24	3.07	-2.10
DGB	15	1500	11.2	11.12	21.20	11.20	1.20
SPK	15	500	10	9.8	19.39	10.00	0.61
JAB	15	900	5.8	5.76	13.00	5.80	-1.40
MB	15	40	1.27	1.23	4.59	1.27	-2.05
RBK	15	450	5.00	4.93	11.67	5.00	-1.67
ADA	15	210	5.27	5.15	12.07	5.27	-1.53
CDK	15	2250	11.13	11.09	21.12	11.13	1.14
SKP	15	450	5.67	5.62	12.77	5.67	-1.43
DHT	15	720	6.47	6.4	14.06	6.47	-1.12
KNH	15	1560	5.73	5.71	12.90	5.73	-1.44
SPK	15	1000	4.93	4.93	11.57	4.93	-1.72

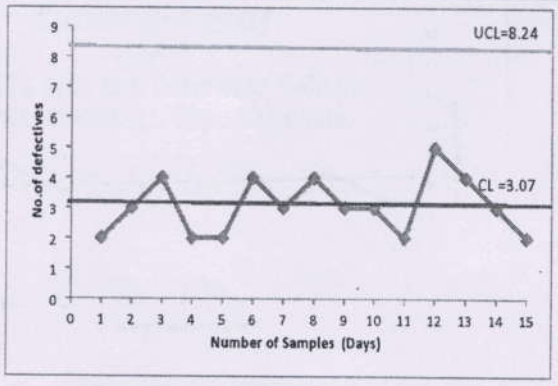

Fig. np-Chart for MSS Textile Industry

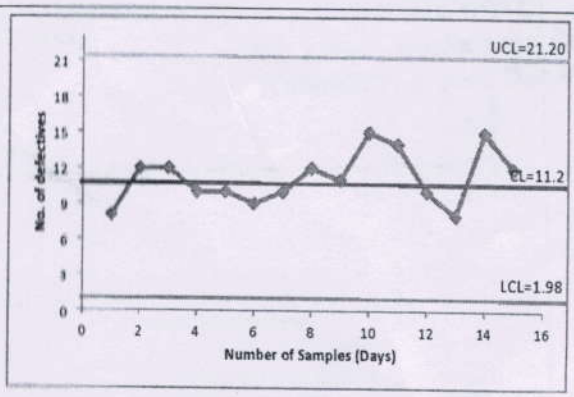

Fig: np-Chart for DGB textile

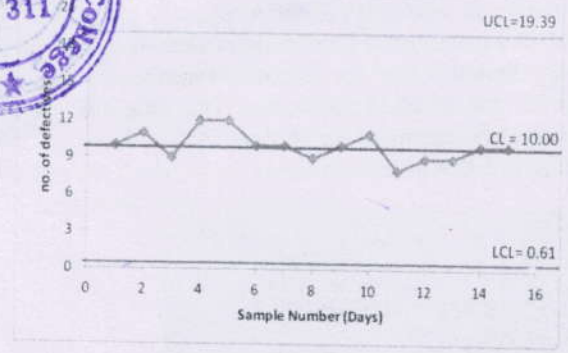

Fig: np chart for SPK textile industry.

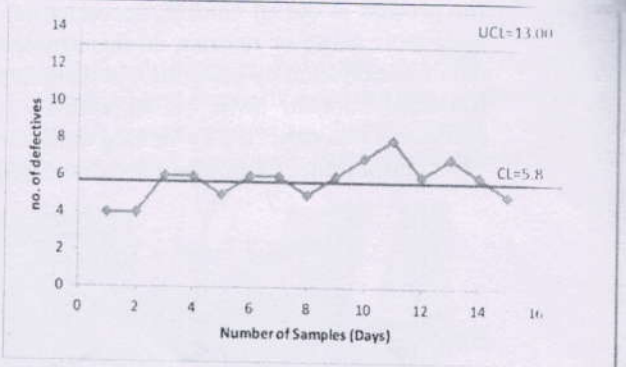

Fig: np-chart for JAB textile industry.

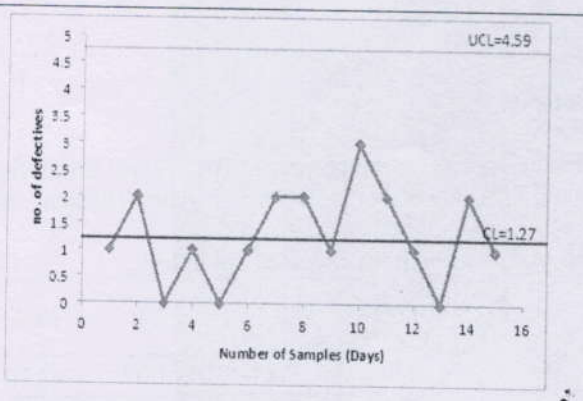

Fig: np-chart for MB textile industry.

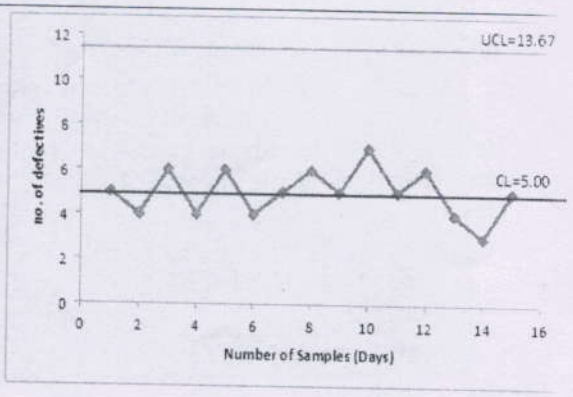

Fig: np-chart for RBK textile industry

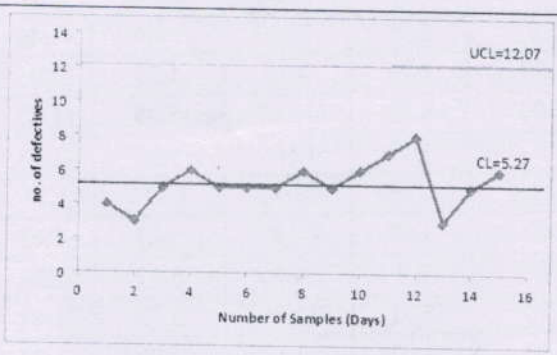

Fig: np-chart for ADA textile industry

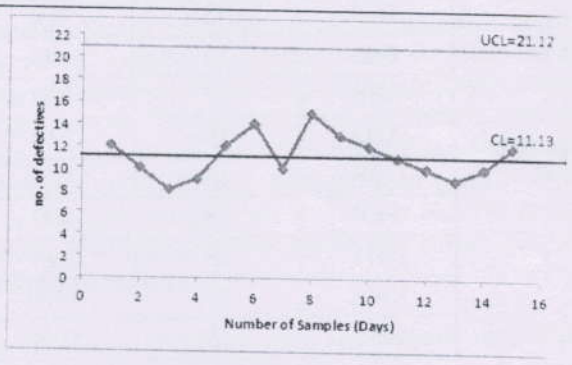

Fig: np-chart for CDK textile industry

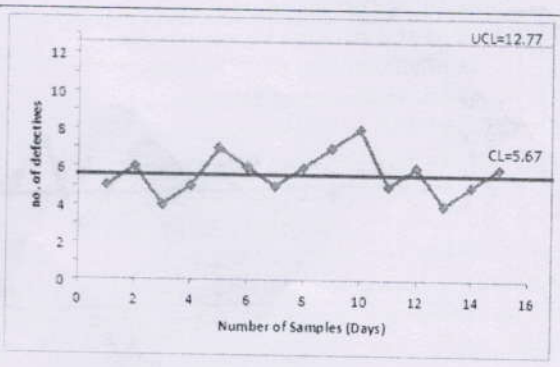

Fig: np-chart for SKP textile industry

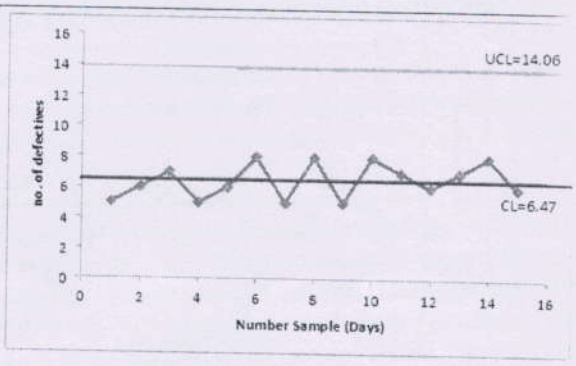

Fig: np=chart for DHT textile industry

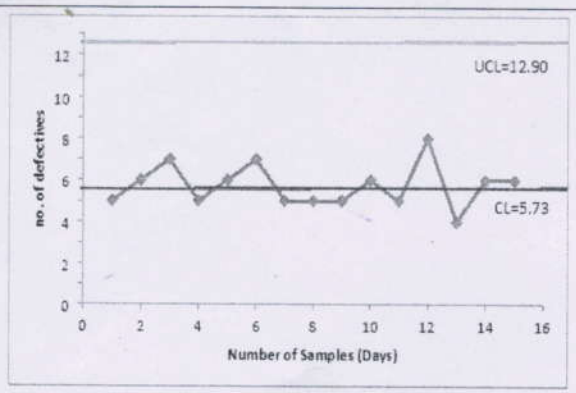

Fig: np-chart for KNH textile industry

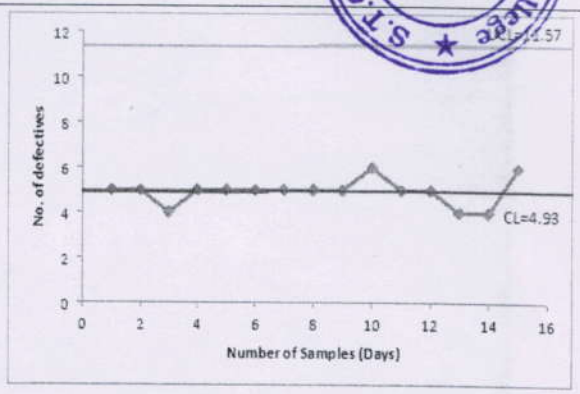

Fig: np-chart for SPK textile industry

Interpretation: np-charts of all the textile industries are in control, all the points are fall within the upper control limit and lower control limit. So the processes of all the textile industries at Rabkavi-Banhatti are in a state of Statistical control.This is because of first quality raw materials and skilled workers.

Conclusion: np-charts of all the textile industries at Rabkavi-Banhatti are within the control, in all the np-charts all the points are fall within the control limit. So the process of all the textile industries is in a state of Statistical control. Thus, It can be conclude that entire process in textile industries at Rabkavi-Banhatti are within the control. It can be seen that textile industrialist of Rabkkavi-Banhhati never compromises in quality as such.

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