International Journal of Research in Social Sciences
Vol. 15 Issue 06, June 2025,
ISSN: 2249-2496 Impact Factor: 7.081 UGC Approved Journal Number: 48887
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Sensitivity Analysis and Deep Learning of a Four Unit System with Preventive Maintenance: A case Study of R K M Industries Jodhpur

Bhoma Ram Suthar[1], Dr. Arun Kumar[2], Dr. Vineeta Basotia[3]

[1]Research Scholar, Department of Mathematics, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan
[2]Assistant Professor, Department of Mathematics, SKD University Hanumangarh, Rajasthan, India
[3]Professor, Department of Mathematics, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan

Abstract: The present paper discusses a Sensitivity Analysis and Deep Learning of a Four Unit System with Preventive Maintenance: A case Study of R K M Industries Jodhpur using the Regenerative Point Graphical Technique (RPGT) and the other of which has preventive maintenance applied before full failure and degeneration in one unit post-failure. At first, all four units—A, B, C, and D—are operating at maximum capacity. Unit A may experience a direct failure or a partial failure mode, but units B, C, and D may have a direct failure. Unit A may experience a direct failure or a partial failure mode, but units B, C, and D may have a direct failure. Preventive maintenance is performed on a system consisting of four units, and the primary unit undergoes degradation. A steady state transition diagram is generated spending the Markov process, which shows the transition rates and states, based on the consistent disappointment and repair rates of the units and conveniences. The results of the profit analysis can be used to validate or challenge existing models and assumptions about the system Using Machine Learning.

Keywords: Availability, Busy period, Machine Learning

1. Introduction

Research on redundant systems is becoming more and more important because many reliability and operation research scholars have made significant contributions to the field. These contributions have improved system effectiveness by optimizing system parametric values for various system types with various repair policies. In such four/three unit systems, three or two units are more than adequate in terms of cost effectiveness, profit optimization and system functionality. Three-out-of-four, three-out-of-five, or four-out-of-five redundant systems are instances of these kinds of systems. There are many real-world uses for these systems, particularly in the industrial sector. The present paper discusses a Sensitivity Analysis and Deep Learning of a Four Unit System with Preventive Maintenance: A case Study of R K M Industries Jodhpur using the Regenerative Point Graphical Technique (RPGT) and the other of which has preventive maintenance applied before full failure and degeneration in one unit post-failure. At first, all four units—A, B, C, and D—are operating at maximum capacity. Unit A may experience a direct failure or a partial failure mode, but units B, C, and D may have a direct failure. Unit A may experience a direct failure or a partial failure mode, but units B, C, and D may have a direct failure. Preventive maintenance is performed on a system consisting of four units, and the primary unit undergoes degradation. A steady state transition diagram is generated spending the Markov process, which shows the transition rates and states, based on the consistent disappointment and repair rates of the units and conveniences. The results of the profit analysis can be used to validate or challenge existing models and assumptions about the system Using Machine Learning. In order to do a profit analysis on a standby framework made up of dual identical units with server disappointment and ordered for preventative upkeep, Kumar et al. [2019] used RPGT. Two halves make up the current paper, one of which is in use and the other of which is in cold standby mode. The good and fully failed modes are the only differences between online and cold standby equipment. Kumar et al [2018] discussed the behavior investigation of a bread plant exhausting RPGT. In a paper mill washing unit, Kumar et al. [2019] investigated scientific formulation and performance study. In their study, Kumar et al. [2018] investigated a 3:4:: outstanding system plant's profit analysis. Using a heuristic methodology, Rajbala et al. [2022] investigated the RAP in the cylinder plant. A case study of an EAEP manufacturing facility was examined by Rajbala et al. [2019] in their work on system modeling and analysis. A study of the urea fertilizer industry's behavior was conducted by Kumar et al. [2017]. RPGT is used to describe system parameter expressions, and profit analysis is explored in relation to fixing failure/repair rates while modifying the other. To examine the impact of different failure/repair rates on the system parameters, tables and graphs are generated and then discussed. The research results obtained in this paper are beneficial for similar manufacturing businesses, offering optimized throughput as a result of this reliability study. Industrial managers value the many indicators of system efficacy that RPGT may produce, such as anticipated profit, busy period, MTSF, steady-state accessibility, and dependability. The Markov process is used to analyses the system's transition diagrams under various circumstances. For instance, extending the repair rates of sub-units would require additional costs. Various path probabilities mean sojourn time and system profit is discussed by drawing tables for increasing failure/repair rates and graphs.

2. Assumptions and Notations

- The repair procedure arises soon after a unit flops.
- Repaired unit seems to be as noble as if a novel.
- Failure/repair rates of units stay constant.
- A,B,C,D/a,b,c,d: Working State/ failed state.
- $w_i/\boldsymbol{\lambda}_i$ – respective mean constant repair/failure rates.; I = 0 to 6

3. System Description:

- **Forged steel ball (A):** The process of making forged steel balls includes choosing the steel ball base, blanking, heating, die forging, precooling, quenching, and tempering. It is distinguished by the fact that the steel ball undergoes two quenching steps, with the skin temperature being raised to 360–420 °C the first time and then to 170–220 °C the second time. The quench ant used in this process is 25–50 °C clear water, and the tempering unit uses air as a medium.

- **Forged bearing races (B):** A forged blank or pipe/tube stock is used to create forged bearing races, which are then machined and ground to exact specifications. 52100 steel, a chrome steel prized for its strength, hardness, and resistance to wear, is frequently used to make them. A bearing's bearing races are an essential part since they have to endure the heavy loads from the rolling elements. The races in ball bearings are rings having a groove in which the balls are positioned. In order for the ball to make contact with each race at a single location, the groove is typically constructed to allow for a slightly loose fit.

- **Bushes (C):** Bushes are cylindrical parts used in mechanical applications to lessen wear and friction. They are composed of premium steel alloys. They come in a variety of forms, such as alloy steel, carbon steel, and stainless steel, each with unique qualities and applications.

- **Forged auto components (D):** Compressive force is used to form metal pieces that are used in forged automobiles. Because they are robust, lightweight, and durable, they are found in many automobiles. Forged components are utilized in numerous systems and are crucial to the efficiency and safety of automobiles, including.

4. Transition Diagram Description

Considering the various possibilities and following the assumptions and notations the transition diagram of the system is drawn as under in Figure 1.

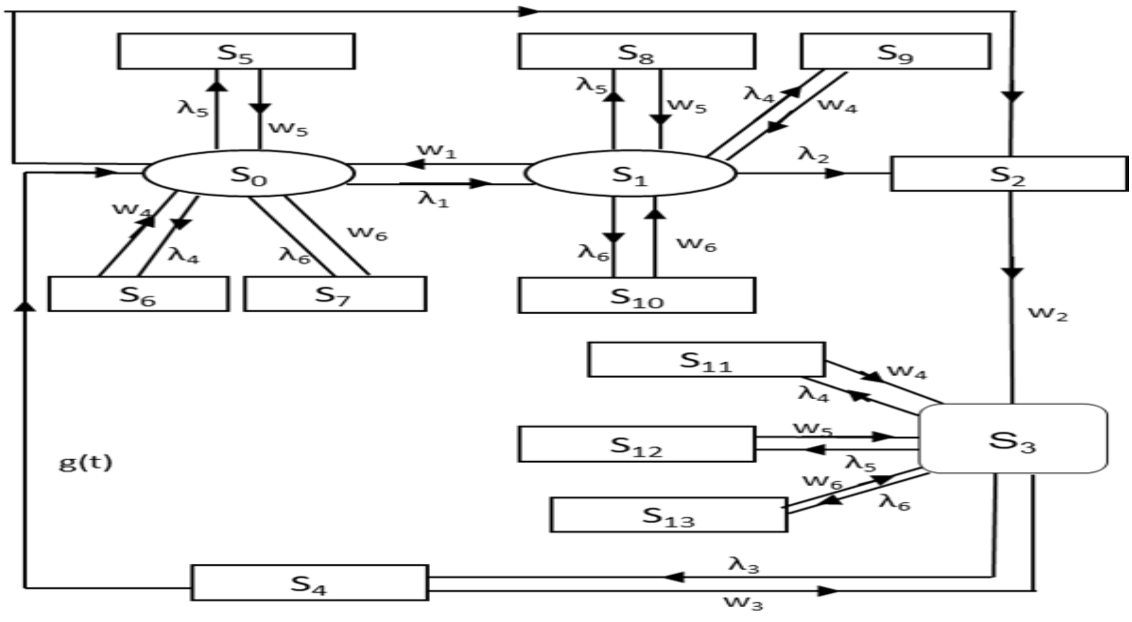

Figure 1: Transition Diagram

The system can be in any of the following states with respect to the above symbols.

S_0	=	ABcD	S_1	=	$\bar{A}$BCD	S_2	=	aBCD
S_3	=	$\bar{A}_1$BCD	S_4	=	a_1BcD	S_5	=	ABcD
S_6	=	AbCD	S_7	=	ABCd	S_8	=	$\bar{A}$BcD
S_9	=	$\bar{A}$bCD	S_{10}	=	$\bar{A}$BCd	S_{11}	=	$\bar{A}_1$bCD
S_{12}	=	$\bar{A}_1$BcD	S_{13}	=	$\bar{A}_1$BCd			

5. Transition Probability and the Mean sojourn times.

Table 1: Transition Probabilities

$q_{i,j}^{(t)}$	$P_{ij} = q^*_{i,j}{}^{(t)}$
$q_{4,0} = g(t)e^{-w_3(t)}$ $q_{4,3} = w_3 e^{-w_3 t}\overline{g(t)}$	$p_{4,0} = g^*(w_3)$ $p_{4,3} = 1\text{-}g^*(w_3)$
$q_{5,0} = w_5 e^{-w_3 t}$	$P_{5,0} = w_5/w_5 = 1$
$q_{6,0} = w_4 e^{-w_4 t}$	$P_{6,0} = w_4/w_4 = 1$
$q_{7,0} = w_6 e^{-w_6 t}$	$P_{7,0} = w_6/w_6 = 1$
$q_{8,1} = w_5 e^{-w_5 t}$	$P_{8,1} = w_5/w_5 = 1$
$q_{9,1} = w_4 e^{-w_4 t}$	$P_{9,1} = w_4/w_4 = 1$
$q_{10,1} = w_6 e^{-w_6 t}$	$P_{10,1} = w_6/w_6 = 1$
$q_{11,3} = w_4 e^{-w_4 t}$	$P_{11,3} = w_4/w_4 = 1$
$q_{12,3} = w_5 e^{-w_5 t}$	$P_{12,3} = w_5/w_5 = 1$
$q_{13,3} = w_6 e^{-w_6 t}$	$P_{13,3} = w_6/w_6 = 1$

Table 2: Mean Sojourn Times

$R_i(t)$	$\mu_i = R_i^*(0)$
$R_0^{(t)} = e^{-(\lambda_1+\lambda_4+\lambda_5+\lambda_6+\lambda)t}$	$\mu_0 = 1/(\lambda_1+\lambda_4+\lambda_5+\lambda_6+\lambda)$
$R_1^{(t)} = e^{-(w_1+\lambda_5+\lambda_4+\lambda_6+\lambda_2)t}$	$\mu_1 = 1/(w_1+\lambda_5+\lambda_4+\lambda_6+\lambda_2)$
$R_2^{(t)} = e^{-w_2 t}$	$\mu_2 = 1/w_2$
$R_3^{(t)} = e^{-(\lambda_3+\lambda_4+\lambda_5+\lambda_6)t}$	$\mu_3 = 1/(\lambda_3+\lambda_4+\lambda_5+\lambda_6)$
$R_4^{(t)} = e^{-w_3 t}\overline{g(t)}$	$\mu_4 = (1\text{-}g^*\ w_3)/w_3$
$R_5^{(t)} = e^{-w_5 t}$	$\mu_5 = 1/w_5$
$R_6^{(t)} = e^{-w_4 t}$	$\mu_6 = 1/w_4$
$R_7^{(t)} = e^{-w_6 t}$	$\mu_7 = 1/w_6$
$R_8^{(t)} = e^{-w_5 t}$	$\mu_8 = 1/w_5$
$R_9^{(t)} = e^{-w_4 t}$	$\mu_9 = 1/w_4$
$R_{10}^{(t)} = e^{-w_6 t}$	$\mu_{10} = 1/w_6$
$R_{11}^{(t)} = e^{-w_4 t}$	$\mu_{11} = 1/w_4$
$R_{12}^{(t)} = e^{-w_5 t}$	$\mu_{12} = 1/w_5$
$R_{13}^{(t)} = e^{-w_6 t}$	$\mu_{13} = 1/w_6$

International Journal of Research in Social Sciences
Vol. 15 Issue 06, June 2025,
ISSN: 2249-2496 Impact Factor: 7.081 UGC Approved Journal Number: 48887
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

6. Path Probability:

Path probability are given from state 'o' to different rates 'i' are given as

$V_{0,0} = \lambda_1 w_1/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6) \div (w_1+\lambda_2+\lambda_4+\lambda_6)(w_1+\lambda_2+\lambda_5+\lambda_6)$
$(w_1+\lambda_2+\lambda_4+\lambda_5)(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)^3+(\lambda_4+\lambda_5+\lambda_6)/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)+[\lambda_1\lambda_2$
$/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)][\lambda_3/(\lambda_3+\lambda_4+\lambda_5+\lambda_6)(g^*w_3)] \div [(w_1+\lambda_2+\lambda_4+\lambda_6)$
$(w_1+\lambda_2+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5)(\lambda_4+\lambda_5+\lambda_6)(\lambda_3+\lambda_4+\lambda_5)(\lambda_3+\lambda_5+\lambda_6)(\lambda_3+\lambda_4+\lambda_6)]$
$/(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)^3(\lambda_3+\lambda_4+\lambda_5+\lambda_6)^4]+\lambda/(\lambda_1+\lambda_4+\lambda_5+\lambda_6+\lambda) \div (\lambda_4+\lambda_5+\lambda_6)(\lambda_3+\lambda_4+\lambda_5)$
$(\lambda_3+\lambda_5+\lambda_6)(\lambda_3+\lambda_4+\lambda_6)/(\lambda_3+\lambda_4+\lambda_5+\lambda_6)^4$

$V_{0,1} = p_{0,1} = \lambda_1/(\lambda_1+\lambda_4+\lambda_5+\lambda_6+\lambda)$

$V_{0,2} = \lambda_1\lambda_2/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6) \div (w_1+\lambda_2+\lambda_4+\lambda_6)(w_1+\lambda_2+\lambda_5+\lambda_6)$
$(w_1+\lambda_2+\lambda_4+\lambda_5)/(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)^3+\lambda/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)$

$V_{0,3}$ = ……..Continuous

Path Probabilities from state '3' to different vertices are given as

$V_{3,0} = \lambda_3 g^*(w_3)/(\lambda_3+\lambda_4+\lambda_5+\lambda_6) \div 1-\lambda_1 w_1/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)(\lambda+\lambda_1+$
$\lambda_4+\lambda_6)\ (\lambda+\lambda_1+\lambda_5+\lambda_6)(\lambda+\lambda_1+\lambda_4+\lambda_5)/(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)^3$

$V_{3,1} = \lambda_3\lambda_1 g^*(w_3)/(\lambda_3+\lambda_4+\lambda_5+\lambda_6)(\lambda_1+\lambda_4+\lambda_5+\lambda_6+\lambda) \div (\lambda+\lambda_1+\lambda_5+\lambda_6)(\lambda+\lambda_1+\lambda_4+\lambda_6)$
$(\lambda+\lambda_1+\lambda_4+\lambda_5)(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)^3(w_1+\lambda_2+\lambda_4+\lambda_6)(w_1+\lambda_2+\lambda_5+\lambda_6)(w_1+\lambda_2+\lambda_4+\lambda_5)$
$/(w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)^3$

$V_{3,2}$ = …..……..Continuous

7. EVALUATION OF PARAMETERS OF THE SYSTEM:

MTSF (T_0): States to which the classification dismiss transit from regenerative earlier visiting any un-failed state, taking initial state as '0', before going to failed state are: 'i' = 0 to 4.

$$\text{MTSF } (T_0) = \left[\Sigma_{i,sr}\left\{\frac{\left\{pr\left(\xi\xrightarrow{sr(sff)} i\right)\right\}\mu i}{\Pi_{m_1\neq\xi}\left\{1\text{-}V_{\overline{m_1m_1}}\right\}}\right\}\right] \div \left[1\text{-}\ \Sigma_{sr}\left\{\frac{\left\{pr\left(\xi\xrightarrow{sr(sff)}\xi\right)\right\}}{\Pi_{m_2\neq\xi}\left\{1\text{-}V_{\overline{m_2m_2}}\right\}}\right\}\right] \ldots..(1)$$

$T_0 = (w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)+\lambda_1 \div (w_1+\lambda_2+\lambda_4+\lambda_5+\lambda_6)(\lambda+\lambda_1+\lambda_4+\lambda_5+\lambda_6)-\lambda_1 w_1$

Availability of the System: The states (recreating) at which the coordination stands working partially/ fully are 'j' = 0 to 4 and the degenerative states stand 'i' = 0 to 10 taking base state as 'ξ' = '0' using RPGT is given as

$$A_0 = \left[\Sigma_{j,sr}\left\{\frac{\{pr(\xi^{sr\rightarrow} j)\}fj,\mu j}{\Pi_{m_1\neq\xi}\left\{1\text{-}V_{\overline{m_1m_1}}\right\}}\right\}\right] \div \left[\Sigma_{i,s_r}\left\{\frac{\{pr(\xi^{sr\rightarrow} i)\}\mu_i^1}{\Pi_{m_2\neq\xi}\left\{1\text{-}V_{\overline{m_2m_2}}\right\}}\right\}\right]$$

$A_0 = \left[\sum_j V_{\xi,j}\,, f_j, \mu_j\right] \div \left[\sum_i V_{\xi,i}\,, f_j, \mu_i^1\right] \ldots.(2)$

$A_0 = (V_{3,0}\mu_0+V_{3,1}\mu_1+V_{3,3}\mu_3) \div (V_{3,0}\mu_0+V_{3,1}\mu_1+V_{3,2}\mu_2+V_{3,3}\mu_3+V_{3,4}\mu_4+V_{3,5}\mu_5+$
$V_{3,6}\mu_6+V_{3,7}\mu_7+V_{3,8}\mu_8+V_{3,9}\mu_9+V_{3,10}\mu_{10}+V_{3,11}\mu_{11}+V_{3,12}\mu_{12}+V_{3,13}\mu_{13})$

Proportional Busy Period of the Server: Recreating states where the unusual server is eventful is 'j' = 1 to 10 and recreating states stand 'i' = 0 to 10, enchanting ξ = '0',

$$B_0 = \left[\Sigma_{j,sr}\left\{\frac{\{pr(\xi^{sr\rightarrow} j)\},nj}{\Pi_{m_1\neq\xi}\left\{1\text{-}V_{\overline{m_1m_1}}\right\}}\right\}\right] \div \left[\Sigma_{i,s_r}\left\{\frac{\{pr(\xi^{sr\rightarrow} i)\}\mu_i^1}{\Pi_{m_2\neq\xi}\left\{1\text{-}V_{\overline{m_2m_2}}\right\}}\right\}\right] \ldots..(3)$$

$B_0 = \left[\sum_j V_{\xi,j}\,, n_j\right] \div \left[\sum_i V_{\xi,i}\,, \mu_i^1\right]$

$B_0 = (V_{3,1}\mu_1+V_{3,2}\mu_2+V_{3,4}\mu_4+V_{3,5}\mu_5+V_{3,6}\mu_6+V_{3,7}\mu_7+V_{3,8}\mu_8+V_{3,9}\mu_9+V_{3,10}\mu_{10}+V_{3,11}\mu_{11}$

$+V_{3,12}\mu_{12}+V_{3,13}\mu_{13})\div(V_{3,0}\mu_0+V_{3,1}\mu_1+V_{3,2}\mu_2+V_{3,3}\mu_3+V_{3,4}\mu_4+V_{3,5}\mu_5+V_{3,6}\mu_6+V_{3,7}\mu_7$
$+V_{3,8}\mu_8+V_{3,9}\mu_9+V_{3,10}\mu_{10}+V_{3,11}\mu_{11}+V_{3,12}\mu_{12}+V_{3,13}\mu_{13})$

Expected Fractional Number of repairman's visits: Re-forming states where the overhaul man fixes this job j = 1 to 10 and i = 0 to 10 Captivating 'ξ' = '0',

$$V_0=\left[\sum_{j,sr}\left\{\frac{\{pr(\xi^{sr\to}j)\}}{\Pi_{k_{1\neq\xi}}\left\{1\text{-}V_{\overline{k_1k_1}}\right\}}\right\}\right]\div\left[\sum_{i,s_r}\left\{\frac{\{pr(\xi^{sr\to}i)\}\mu_i^1}{\Pi_{k_{2\neq\xi}}\left\{1\text{-}V_{\overline{k_2k_2}}\right\}}\right\}\right]\ldots..(4)$$

$$V_0=\left[\sum_j V_{\xi,j}\right]\div\left[\sum_i V_{\xi,i},\mu_i^1\right]$$

$V_0=(V_{3,1}+V_{3,2}+V_{3,4}+V_{3,5}+V_{3,6}+V_{3,7}+V_{3,8}+V_{3,9}+V_{3,10}+V_{3,11}+V_{3,11}+V_{3,12}+V_{3,13})$
$/(V_{3,0}\mu_0+V_{3,1}\mu_1+V_{3,2}\mu_2+V_{3,3}\mu_3+V_{3,4}\mu_4+V_{3,5}\mu_5+V_{3,6}\mu_6+V_{3,7}\mu_7+V_{3,8}\mu_8+V_{3,9}\mu_9$
$+V_{3,10}\mu_{10}+V_{3,11}\mu_{11}+V_{3,12}\mu_{12}+V_{3,13}\mu_{13})$

8. Dataset:

Sensitivity analysis in machine learning is a technique used to appraise the strength of a model's act to variations in its effort variables or strictures. In the situation of the Four Unit Cold Standby Classification, sensitivity analysis can stand secondhand to assess the impression of vicissitudes in input variables (such as the quality of raw materials or processing parameters) on the output capricious (such as the excellence of the refined oil or yield).

Table 3: Table of parameter

W (w1, w2,--------, wn)	$\lambda(\lambda 1, \lambda 2, \ldots\ldots, \lambda n)$	**S (s1, s2, -------,sn)**	**p**
(0- 20, 21- 100)	**(0 - 30, 31 - 100)**	**(0 - 100)**	**(0- 80)**

The system's availability, the profit function, and the anticipated number of repairman inspections are all observed to decrease with an rise in failure rate and to rise with the repair rate, based on the analytical and figure discussions. Increased repair rates result in a decrease in the MTSF breakdown and busiest period of the server. A degraded state is a state of the classification in which the system or units perform a function continuously up to a satisfactory but lower (lower) limit than specified due to its required functions. The system's availability, the profit function, and the anticipated number of repairman inspections are all observed to decrease with an increase in failure rate and to increase with the repair rate, based on the analytical and figure discussions. In general, sensitivity analysis can assist you in determining which input variables are critical to the four unit system's output variable prediction. By using this data, processing parameters may be optimized, raw material quality can be raised, and industry productivity and profitability can eventually rise.

9. Results and discussion:

Table 4: Performance of model

Model	**Accuracy (MTSF)**	**F1 Score (**Expected No. of Examinations by repair man**)**	**Recall (Busy Period)**	**Precision (Availability of System)**
Linear SVC Classifier	**0.9624**	**0.9604**	0.9610	0.9723
Logistic Regression	0.9503	0.9603	0.9524	0.9645

The Four Unit Cold Standby System dataset's sensitivity analysis results can offer insightful information about how variations in input factors affect the yield variable. The following are some potential findings and conversation topics that could come from this kind of research:

1. **Identification of key input variables:** Which input factors have the most effects on the output variable can be determined with the aid of sensitivity analysis. For instance, the analysis can show that the Four Unit Cold Standby System's quality is mostly determined by the quality of the raw materials.

2. **Trade-offs between input variables:** It is also possible to uncover trade-offs between various input variables through sensitivity analysis. For instance, raising the temperature during the refining process would make the Four Unit Cold Standby System work better, but the quality would suffer as a result.

3. **Robustness of the model:** Sensitivity analysis can also be utilized to assess how resilient the model is to differences in the input variables. On the other hand, a robust and trustworthy model is one that can continue to produce consistent predictions in the face of shifting input variables.

4. **Optimization of input variables:** The Four Unit Cold Standby System's input variables can be made more efficient using the findings of the sensitivity analysis. This can enhance the industry's efficacy and profitability while also raising the standard of the finished good.

Figure 2: Accuracy between models

Figure 3: F_1 score between models

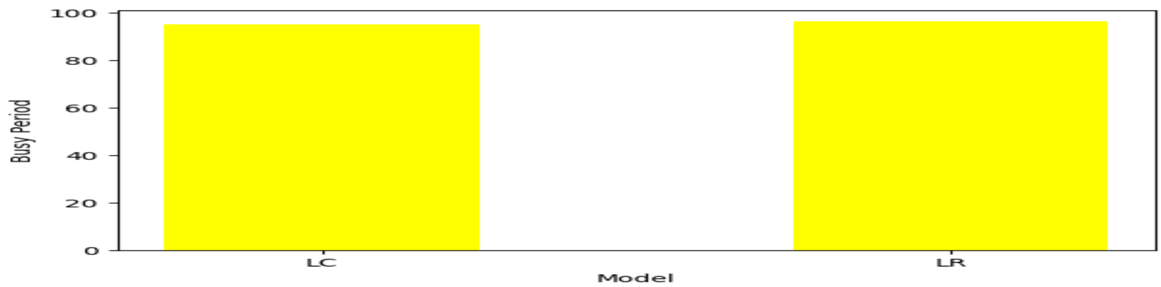

Figure 4: Busy period between models

Figure 5: Availability between models

According to table 3 and Table 4, Comparative analysis of models in figure 2, 3, 4 and 5 in **Linear Classifier is better than** Logistic **Regression in figure 2, 3, 4 and 5.**

10. Conclusion:

Sensitivity analysis, in general, can offer insightful information about the relationship between the Four Unit Cold Standby System's input and output variables. By using these insights, processing parameters may be optimized, raw material quality can be raised, and industrial efficiency and profitability can eventually rise. Methods of controlling unit failure along with repair rates relating to financial resources but instead market conditions to obtain optimum values for system parameters. It is based on these parameters. For each of these models, the articulations for system parameters, for example, server of busy, availability, MTSF, and expected the fractional number of inspections by repairman and so forth have been developed using RPGT for the models have also been assessed/evaluated. The research design and methodology employed in this chapter are replicable to other industries with the assumptions and limitations taken into consideration. Industrial managers value the many indicators of system efficacy that RPGT may produce, such as anticipated profit, busy period, MTSF, steady-state accessibility, and dependability. The Markov process is used to analyses the system's transition diagrams under various circumstances. Although the organization of tiny and large diverse sub-units is extremely complex, various people are always interested in finding the extra efforts. For instance, extending the repair rates of sub-units would require additional costs. So we also consider a fix cost that is involved in the profit function by using expert server and a good quality machine, the industry person can increase the productivity by reducing or minimizing the busy period and expected no. of visits. The research may reveal, for instance, that a particular parameter significantly affects system performance more than previously believed. It can lessen maintenance expenses and downtime, enhances system design, and optimizes maintenance plans.

10. **References: -**

- Kumar, A., Goel, P. and Garg, D. (2018). Behaviour analysis of a bread making system. *International Journal of Statistics and Applied Mathematics*, 3(6), 56-61.
- Kumar, A., Garg, D., Goel, P., Ozer, O. (2018). Profit analysis of 3:4:: good system. *International Journal of Advance Research in Science and Engineering*, 7(2), 851-862.
- Rajbala, Kumar, A. and Khurana, P. (2022). Redundancy allocation problem: Jayfe cylinder Manufacturing Plant. *International Journal of Engineering, Science & Mathematic*, 1-7.
- Kumar, A., Garg, D., and Goel, P. (2019). Mathematical modelling and behavioural analysis of a washing unit in paper mill. *International Journal of System Assurance Engineering and Management*, 1(6), 1639-1645.
- Rajbala, Kumar, A. and Garg, D. (2019). Systems Modelling and Analysis: A Case Study of EAEP Manufacturing Plant. *International Journal of Advanced Science and Technology*, 8-18.
- Kumar, A., Garg, D., and Goel, P. (2019). Profit analysis of a cold standby system with priority for preventive maintenance. *Journal of Advance and Scholarly Researches in Allied Education*, 16(4), 253-258.
- Kumar, A., Goel, P., Garg, D., and Sahu, A. (2017). System behaviour analysis in the urea fertilizer industry. *Book: Data and Analysis [978-981-10-8526-0] Communications in computer and information Science (CCIS), Springer*, 3-12.