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# A Review on Different Regeneration and RangeExtension Systems for Electric Vehicle

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## Abstract

*Once the public discusses electric vehicles, two questions inevitably arise: how far can it travel between charges and how fast can it travel. Both of these issues are related in part to the amount of electrical energy stored and the efficiency with which electrical energy is converted to mechanical energy. One of the most significant challenges for battery electric vehicles (BEVs) is their limited range and higher price when compared to conventionally powered vehicles. Many electric vehicle drivers have been observed using only 10-20% of the vehicle's range before recharging. The desire to avoid running out of energy and having to return to a charging station drives drivers to be extremely cautious. One solution is to outfit the vehicle with an auxiliary power supply that will recharge the batteries. Batteries in Electric Vehicle has a fairly limited driving range per charging and takes a long time to charge. Electric vehicles (EVs) are efficient, cheap and produce fewer emissions than internal combustion engines (ICEs) in use today. However, they lackgood range because the current charging infrastructure does not allow it. Many people view electric vehicles as a gimmick rather than a true daily commute due to their limited range. In Electric vehicle, batteries shape the number one energy storage. Sometimes to be had strength from battery won't be enough to satisfy high load demands. To overcome these problem different system are available. This paper examines systems based on various parameters to improve the range of EV. Improved Storage Technology, Improvement in the Motor, Contactless Power Transfer etc. these methods are reviewed. To tackle these issues, solutions that can significantly expand their range are discussed. Keywords- Battery, Super capacitor, Electric Vehicle (EV)*

## I INTRODUCTION

The current range of EVs covers in average 80- 90 % of most people's needs in most countries. However the most common explanation of not buying an EV is that the range isn't sufficient[1]. However, riding variety of EVs is a whole lot shorter than traditional vehicles. The longer riding variety is needed to disseminate[2]. Theoretically speaking, an ideal EV can get 150- 200 miles on a single charge, but practically speaking, there aren't enough charging stations compared to gas stations. This makes EVs less reliable and less convenient
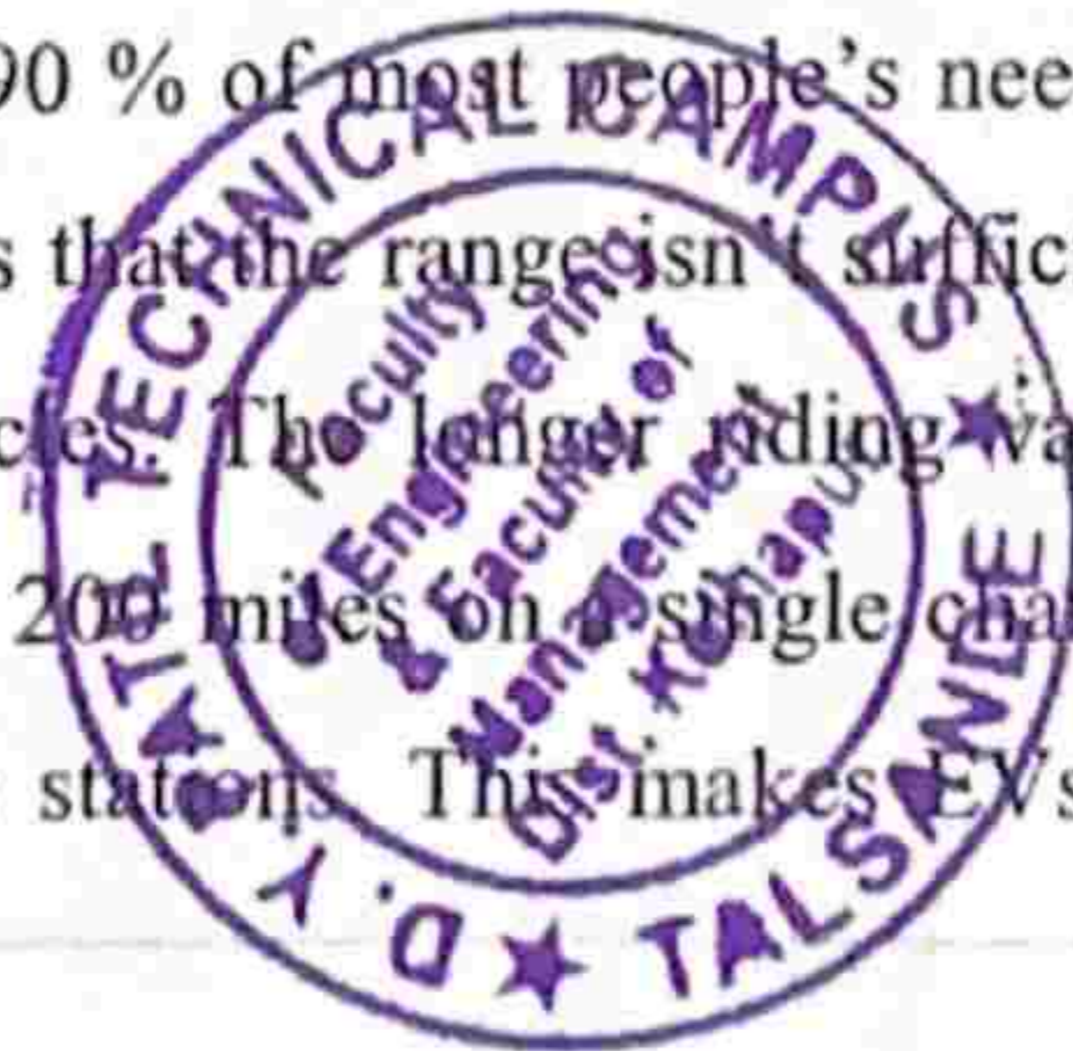
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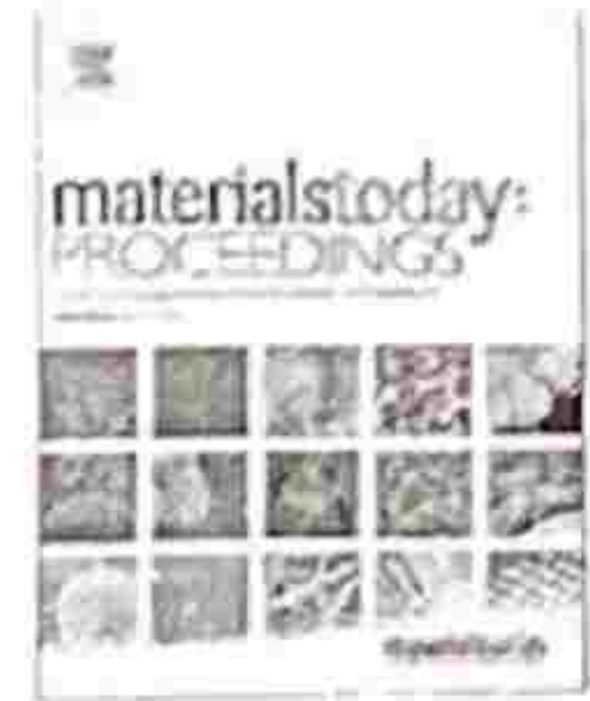
# System Reliability-Redundancy optimization with High-Level of subsystems

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## ARTICLE INFO

## ABSTRACT

High systems' reliability is crucial in competitive industrial plants. System Reliability-Redundancy Allocation (RRA) is an essential design consideration for maximizing the overall systems' reliability under various systems' constraints. This paper addresses the system RRAP problem by investigating two effective nature-inspired optimization techniques, namely Particle Swarm Optimization (PSO) and Grey Wolf Optimizer (GWO), implemented with penalty functions. Their capability in solving the RRA problem is evaluated regarding a system consisting of fifteen subsystems connected in series. Results show that the PSO is a better approach to solving this problem than the GWO.

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## 1. Introduction

System Reliability-Redundancy Allocation (RRA) is an essential design consideration for system designers [1,2]. The system is usually made up of several subsystems, each of which is made up of several components that are coupled in such a way that the overall system achieves a specific level of reliability [3]. Under various system constraints (e.g., volume, weight, cost, etc.), RRA aims to optimally allocate redundancy and reliability (i.e., decision variables) to the components of each subsystem (i.e., redundancy and reliability allocation problem, respectively) to ultimately achieve a high overall system reliability value [2]. Thus, the RRA is mathematically formulated as an NP-hard optimization problem that necessitates sophisticated solution approaches (such as those built based on the evolutionary computation methods) capable of optimizing overall system reliability while fulfilling all system constraints [2,4,5].

For example, a novel BAT-SSOA3 algorithm based on a combination of a novel small-sampling tri-objective orthogonal array (SS3OA), new simplified swarm optimization (SSO), and the binary-addition-tree algorithm (BAT) has been proposed to solve general RRA problems [6]; a novel solution based on the popular non-dominated sorting genetic algorithm-III (NSGA-III) has been proposed to solve many-objective optimization RRA problems [7]; a Random Walk Gray Wolf Optimizer (RW-GWO) [8] and the Brain Storm Optimization algorithm in Objective Space (BSO-OS) [9] have been proposed to solve the typical RRA problems. In [5], a new Simplified Swarm Optimization (SSO) with a penalty function has been proposed to solve bi-objection active RRAP problems, whereas an improved Particle Swarm Optimization (PSO) algorithm has been proposed to solve RRA problem in various system configurations [10]. In [11], a hybrid PSO and Grey Wolf Optimization (GWO) has been proposed to solve some RRA problems.

The present work aims to address the RRA problem for a system consisting of fifteen subsystems connected in series. Two effective nature-inspired optimization techniques are implemented with penalty functions, namely the Particle Swarm Optimization (PSO) [12] and the Grey Wolf Optimizer (GWO) [13], and their application results are compared. The RRA problem of this work involves XX decision variables.

The remaining of this paper is organized as follows: Section II formulates the problem under study; Section III illustrates the

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techniques employed for the RRA problem; Section IV presents and discusses the application results. Finally, Section V concludes the paper.

## 2. Problem formulation

The problem consists of a system involving fifteen subsystems connected in series (see Fig. 1).

In [14–17], the authors worked on this problem by considering the Redundancy Allocation (RA) optimization problem. This paper addresses the Reliability-Redundancy Allocation (RRA) optimization. Therefore, the problem can be written as follows:

$$\text{Maximize} R_s(r, n) = \prod_{i=1}^{15}[1 - (1 - r_i)^{n_i}] \tag{1}$$

subject to:

$$g_1(r, n) = \sum_{i=1}^{15} c_i n_i \leq C \tag{2}$$

$$g_2(r, n) = \sum_{i=1}^{15} w_i n_i \leq W \tag{3}$$

$$0.5 \leq r_i \leq r_{i,max}, 1 \leq n_i \leq 10, n_i \in Z^+; i = 1, 2, \cdots, 15$$

where $R_s$ is the system reliability, $r_i$ is the reliability of the redundant component at subsystem $i$, $n_i$ is the number of redundant components to add at subsystem $i$, $c_i$ is the cost of a redundant component at subsystem $i$, $w_i$ is the weight of a redundant component at subsystem $i$. $C$ and $W$ are the cost and weight resource limits, respectively.

## 3. Solution approaches

In order to find the best system configuration, two strong optimization techniques are implemented, namely the particle swarm optimization and the grey wolf optimizer.

### 3.1. Particle swarm optimization (PSO)

PSO is a nature-inspired optimization algorithm inspired by the moving principles of swarms in nature, such as birds and fishes. The position and velocity of the particles of the swarm update the solutions during iterations. More details on PSO can be found in [18–20]. Algorithm 1 illustrates the pseudo-code of the implemented PSO [19].

**Algorithm 1** (*Pseudo-code of the implemented PSO*).

---

Initialization;
**While** number of iterations not reached.
    Objective function evaluation;
    Constraint handling using penalty function;
    Velocity of each particle;
    Best particle;
    Update positions;
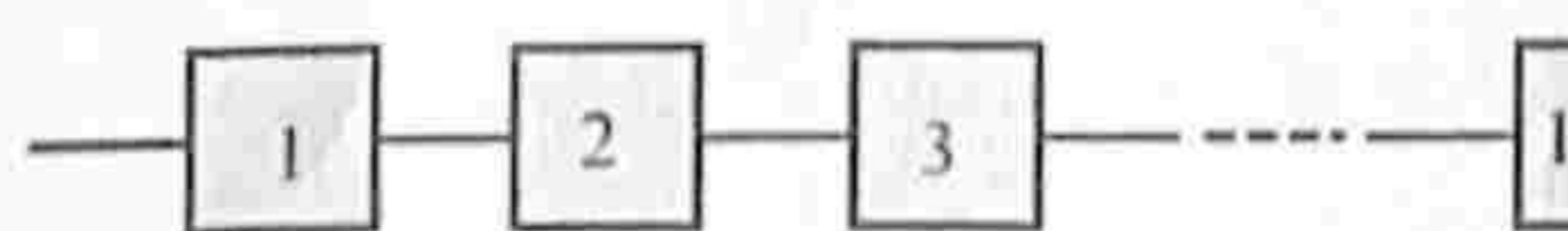**End** while.
Display the results.

---

### 3.2. Grey wolf optimizer (GWO)

GWO is a nature-inspired optimization algorithm inspired by the lifestyle of the grey wolf. This species mainly lives in four hierarchies. Hunting principles are the inspiration of this algorithm. Details on GWO can be found in [13,19,21]. Algorithm 2 illustrates the pseudo-code of the implemented GWO [19].

**Algorithm 2** (*Pseudo-code of the implemented GWO.*).

---

Initialize the gray wolf population;
Calculate the suitability of each research agent;
Best search agent;
Second best search agent;
Third best search agent;
**While** number of iterations not reached.
For each search agent.
    Update current search agent position;
End for.
Updates;
Calculate the suitability of each research agent;
Constraint handling using penalty functions;
Updates;
**End** while.
Display the results.

---

## 4. Results and discussion

The date considered for the system is reported in Table 1. The cost and weight are in arbitrary units. The PSO and GWO have been implemented using MATLAB 2019a and run on a PC (I5-7300U vPro 7th Generation, 2.7 GHz, 8 GB of RAM). The population size and the maximum number of iterations are 100 and 200, respectively. Each algorithm has been run over ten independent runs

The system reliability, required number of function evaluations, and CPU time of each run are reported in Table 2.

From Table 2, it can be observed that the best system reliability value obtained by the PSO is at run#7 ($R_s = 0.93319$) with NFE = 18600 and CPU = 1.2353 s, whereas those obtained by the GWO was at run#1 ($R_s = 0.92901$) with NFE = 20000, and CPU = 0.5917 s. The statistical comparison, including the optimal component reliabilities and redundancies are reported in Table 3.

It can be observed that PSO provided better system reliability, required fewer number of function evaluation. Moreover, PSO has less standard deviation than GWO (6.1629E-04 and 5.9928E-03, respectively). GWO consumed less CPU time. It can be concluded that PSO has outperformed GWO. Fig. 2 illustrated the convergence of both algorithms.

## 5. Conclusion

In this paper, the reliability-redundancy allocation problem of a high-level series system involving fifteen subsystems has been addressed. Two strong nature-inspired optimization techniques, namely the particle swarm optimization (PSO) and the grey wolf optimizer (GWO) have been implemented with penalty functions. The results obtained show that the PSO is a better solution approach to solve this problem than the GWO. Future works will be devoted to the development of a hybrid approach for more efficiency.



Fig. 1. Series system with fifteen subsystems.

**Table 1**
Data of the system.

| Subsystem $i$ | $c_i$ | $w_i$ | $[r_{i,min}, r_{i,max}]$ | $C$ | $W$ |
|---|---|---|---|---|---|
| 1 | 5 | 8 | [0.5,0.80] | 400 | 414 |
| 2 | 4 | 9 | [0.5,0.75] | | |
| 3 | 9 | 6 | [0.5,0.65] | | |
| 4 | 7 | 7 | [0.5,0.80] | | |
| 5 | 7 | 8 | [0.5,0.85] | | |
| 6 | 5 | 8 | [0.5,0.83] | | |
| 7 | 6 | 9 | [0.5,0.78] | | |
| 8 | 9 | 6 | [0.5,0.66] | | |
| 9 | 4 | 7 | [0.5,0.78] | | |
| 10 | 5 | 8 | [0.5,0.90] | | |
| 11 | 6 | 9 | [0.5,0.79] | | |
| 12 | 7 | 7 | [0.5,0.77] | | |
| 13 | 9 | 6 | [0.5,0.70] | | |
| 14 | 8 | 5 | [0.5,0.79] | | |
| 15 | 6 | 7 | [0.5,0.67] | | |

**Table 2**
Results obtained over ten independent runs.

| Run # | $R_s$ | | NFE (x10$^4$) | | CPU (s) | |
|---|---|---|---|---|---|---|
| | PSO | GWO | PSO | GWO | PSO | GWO |
| 1 | 0.93069 | 0.92901 | 1.97 | 2 | 1.1978 | 0.5917 |
| 2 | 0.93248 | 0.92084 | 1.82 | 1.99 | 1.1254 | 0.2266 |
| 3 | 0.93244 | 0.92190 | 1.98 | 1.98 | 1.1644 | 0.2150 |
| 4 | 0.93248 | 0.92027 | 1.97 | 1.99 | 1.1825 | 0.2245 |
| 5 | 0.93224 | 0.91254 | 1.98 | 1.99 | 1.3034 | 0.2298 |
| 6 | 0.93248 | 0.92806 | 1.95 | 1.99 | 1.3256 | 0.2283 |
| 7 | 0.93319 | 0.92732 | 1.86 | 2 | 1.2353 | 0.2247 |
| 8 | 0.93280 | 0.91103 | 1.93 | 1.95 | 1.2630 | 0.2041 |
| 9 | 0.93246 | 0.9222 | 1.99 | 1.99 | 1.2048 | 0.2362 |
| 10 | 0.93212 | 0.92755 | 1.86 | 1.99 | 1.3170 | 0.2178 |

**Table 3**
Statistical Comparison.

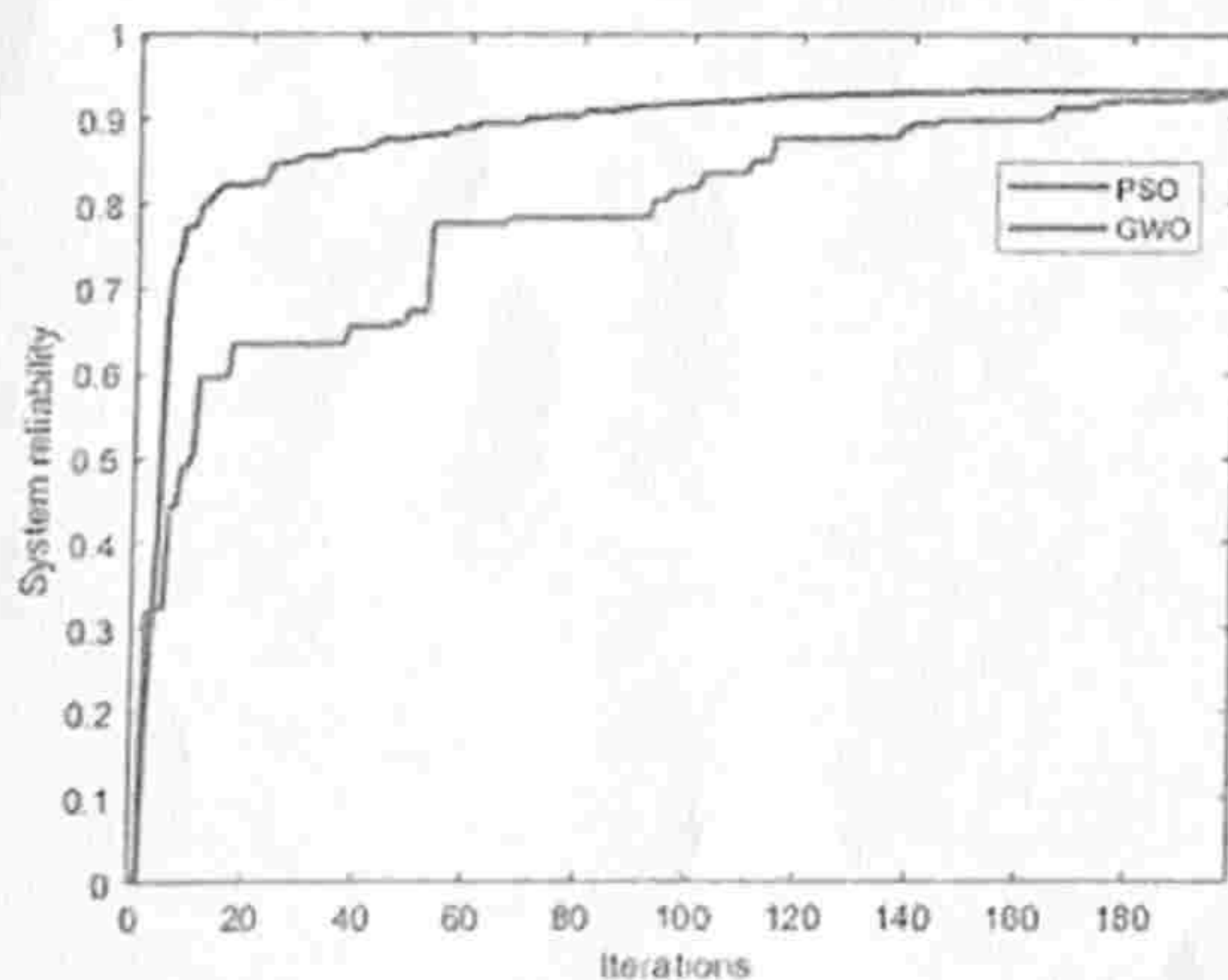| $r$ | | $n$ | $R_s$ | NFE | CPU | $\sigma$ |
|---|---|---|---|---|---|---|
| **PSO** | | | | | | |
| (0.8, 0.749998, 0.649996, 0.8, 0.849996, 0.829999, 0.779999, 0.659997, 0.779998, 0.899999, 0.789999, 0.769999, 0.699998, 0.789999, 0.669999) | | (3, 4, 6, 3, 3, 3, 3, 5, 4, 3, 3, 4, 5, 4, 5) | 0.93319 | 1.86x10$^4$ | 1.235 | 6.1629x10$^{-4}$ |
| **GWO** | | | | | | |
| (0.797501, 0.748950, 0.65, 0.791910, 0.85, 0.83, 0.78, 0.658206, 0.78, 0.897605, 0.79, 0.77, 0.698285, 0.79, 0.668822) | | (4, 4, 5, 4, 3, 3, 3, 5, 4, 3, 3, 4, 4, 3, 5) | 0.92901 | 2x10$^4$ | 0.592 | 5.9928x10$^{-3}$ |



**Fig. 2.** Convergence of both algorithm.

## Data availability

The data that has been used is confidential.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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# Effects of Human and Organizational Factors on the Reliability and Maintainability of CNC Turning Center

Rajkumar B. Patil, Basavraj S. Kothavale and Rajendra S. Powar

**Abstract** Human and Organizational Factors (HOFs) play an important role in the safe, reliable, and maintainable operation of the CNC turning center (CNCTC). Several human performance influencing factors (PIFs) and organizational factors (OFs) influence the human reliability. In this paper, some human PIFs and OFs which may affect the human reliability during maintenance phase are defined and considered for the prioritization according to their criticality using the expert judgments. It is observed that experience is the most important human performance influencing factor (PIF) and safety culture is the most critical organizational factor (OF) affecting the human reliability. The time-between-failure (TBF) and time-to-repair (TTR) data significantly influenced by HOFs are analyzed using the techniques of reliability and maintainability, and the results of the analysis are compared with those of the TBF and TTR data which are not significantly affected by HOFs. The field failure and repair data were sorted considering the influence of hardware, software, and HOFs using expert judgments and outcomes of reliability and maintainability analysis. It has been observed that 16.33% of the total failures and 15.49% of total repairs are significantly influenced by HOFs. Nearly 66% of the total failures and repairs are due to hardware system. The reliability and maintainability of the CNCTC are greatly influenced by HOFs. The HOFs can reduce the expected life of the components or sub-systems of the CNCTC by 33%.

**Keywords** Human and organizational factors · Human reliability · Maintainability analysis · Performance influencing factors · Reliability analysis

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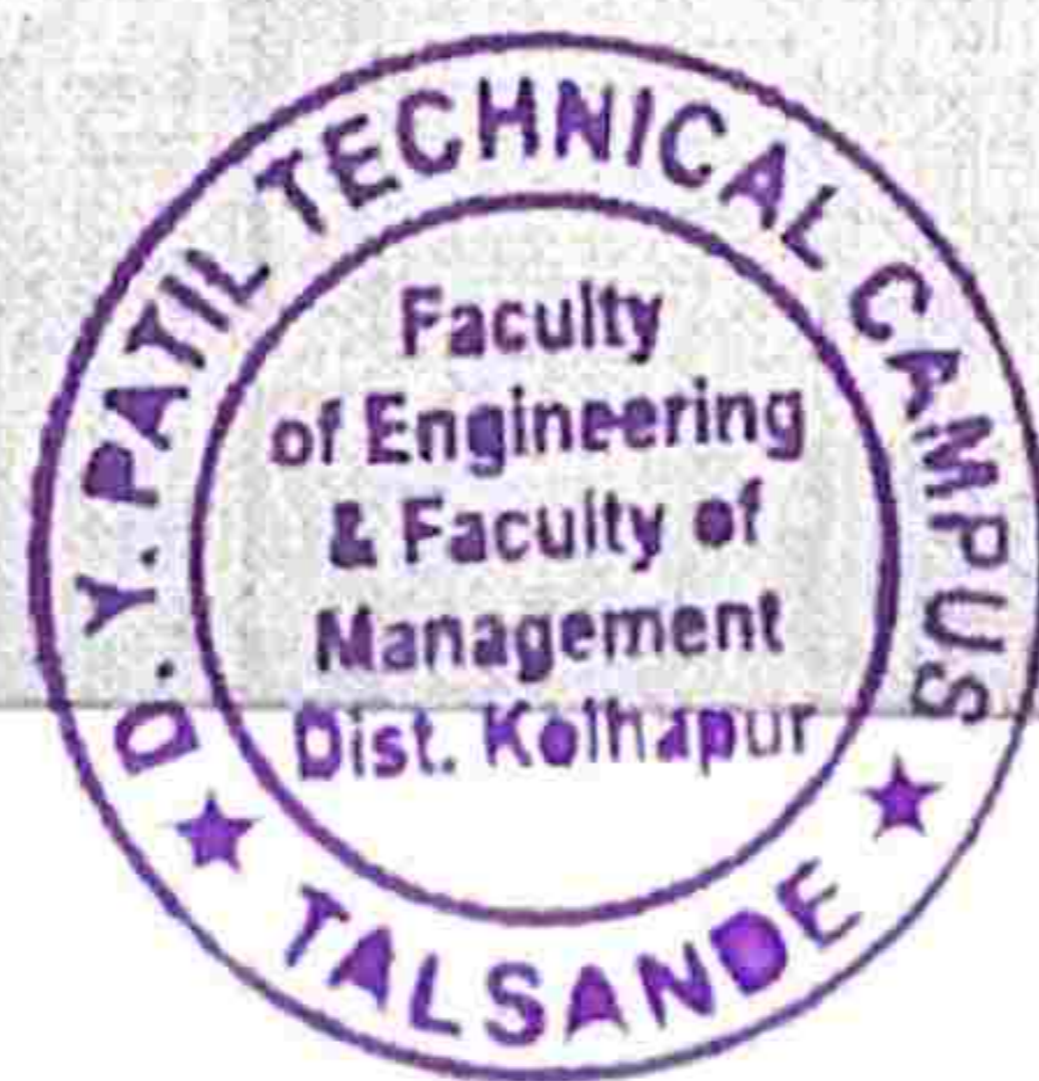
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# Reliability, Safety and Hazard Assessment for Risk-Based Technologies

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### About the Author

**Mr. Uday V. Hiremath** has 13 years' experience in teaching to undergraduates and post graduate students of rural and urban area. His academic qualifications are M.A., R.B.A.(Econ.), M.B.A., M. Phill., M. Phill. also his Ph.D is registered. He is currently working as Assistant Professor in ATS, Sanjay Bhokare Group of Institutes, Faculty of Management, Miraj Dist - Sangli (Maharashtra). He has 3 years industrial experience with national and multinational brands. He taught the syllabus of Guru Jambheshwar University, Hissar (Haryana), Maharshi Dayamand University, Rohtak (Haryana). He worked in Delhi NCR. He also taught the syllabi of Delhi University, Delhi. At present he is teaching major subject of Marketing Management of Shivaji University, Kolhapur. He attended and organised many SDP, FDP, MDP as well as STTP under the area of management. He presented articles and research papers in many conferences, seminars, workshops etc. He published 16 National and 5 International level research papers. One of the article entitled "Digitalisation in Rural Entrepreneurship: A Paradigm Shift" get the international recognition by IA digital library which is in California in US. The research work stored for the further study on rural entrepreneurs. He worked with Shivaji University as Paper setter, Examiner, Moderator, CAP Director, Exam Co-ordinator, Internal as well as External senior supervisor, also worked on grievance redressal committee of Shivaji University, Kolhapur. He also guide the youths who are the part of Yuva Sanskar Vargrun by JVM, NGO, Mumbai.

**Mr. Rajendra Sudhir Panditrao** has educational qualification is B.A. (Eco.), M.B.A., M.Phil & Ph.D. (Pursuing). Currently he is working as Assistant Professor at D.Y. Patil Technical Campus, Faculty of Engineering and Faculty of Management Talsande Kolhapur. He has 10 years teaching experience and 3 years industrial experience. His area of specialisation is Marketing Management and Human Resource Management. He has published various research papers related to Marketing Management in national and International journals and also attended various seminars, workshops, FDP's conferences. He has worked different academic and administrative platforms of Institute and Shivaji University Kolhapur.

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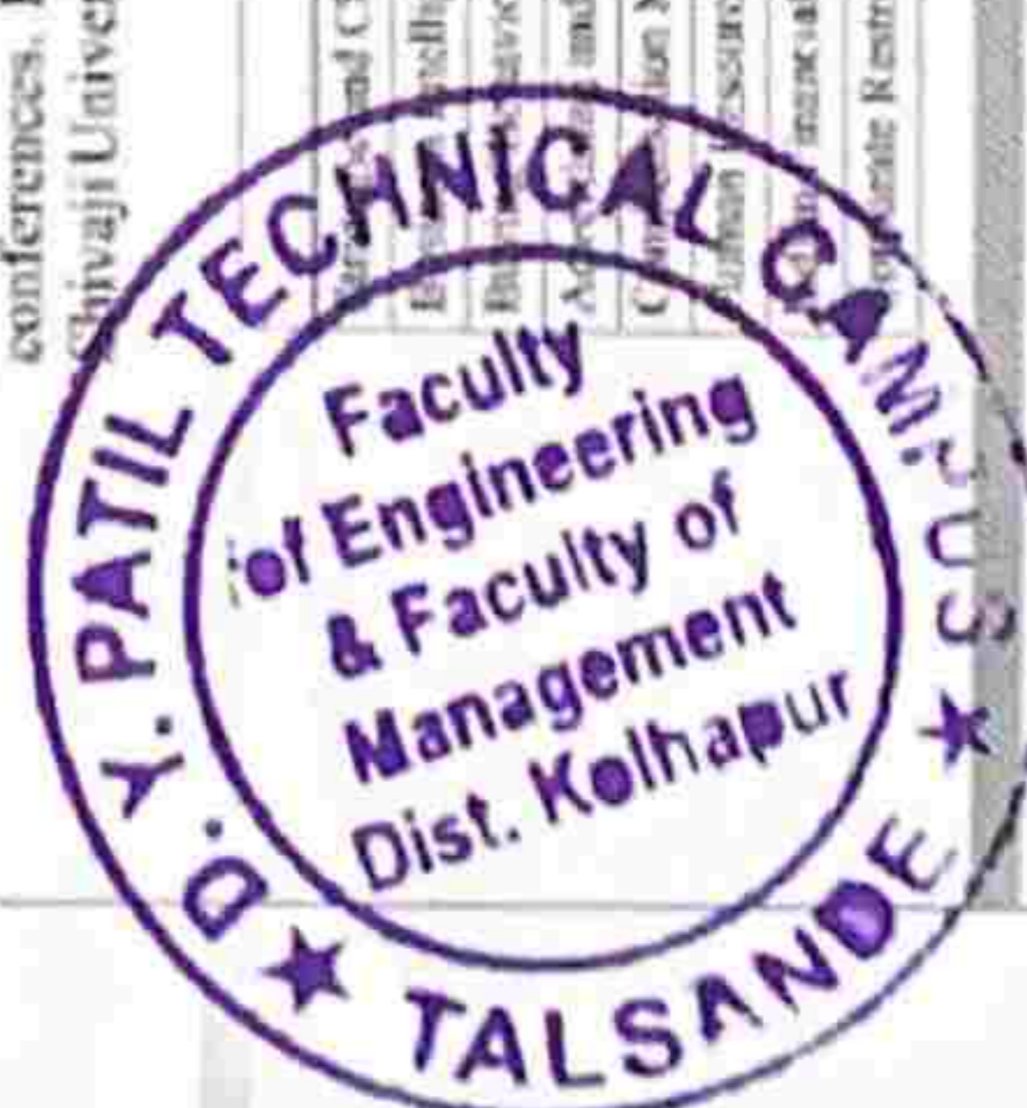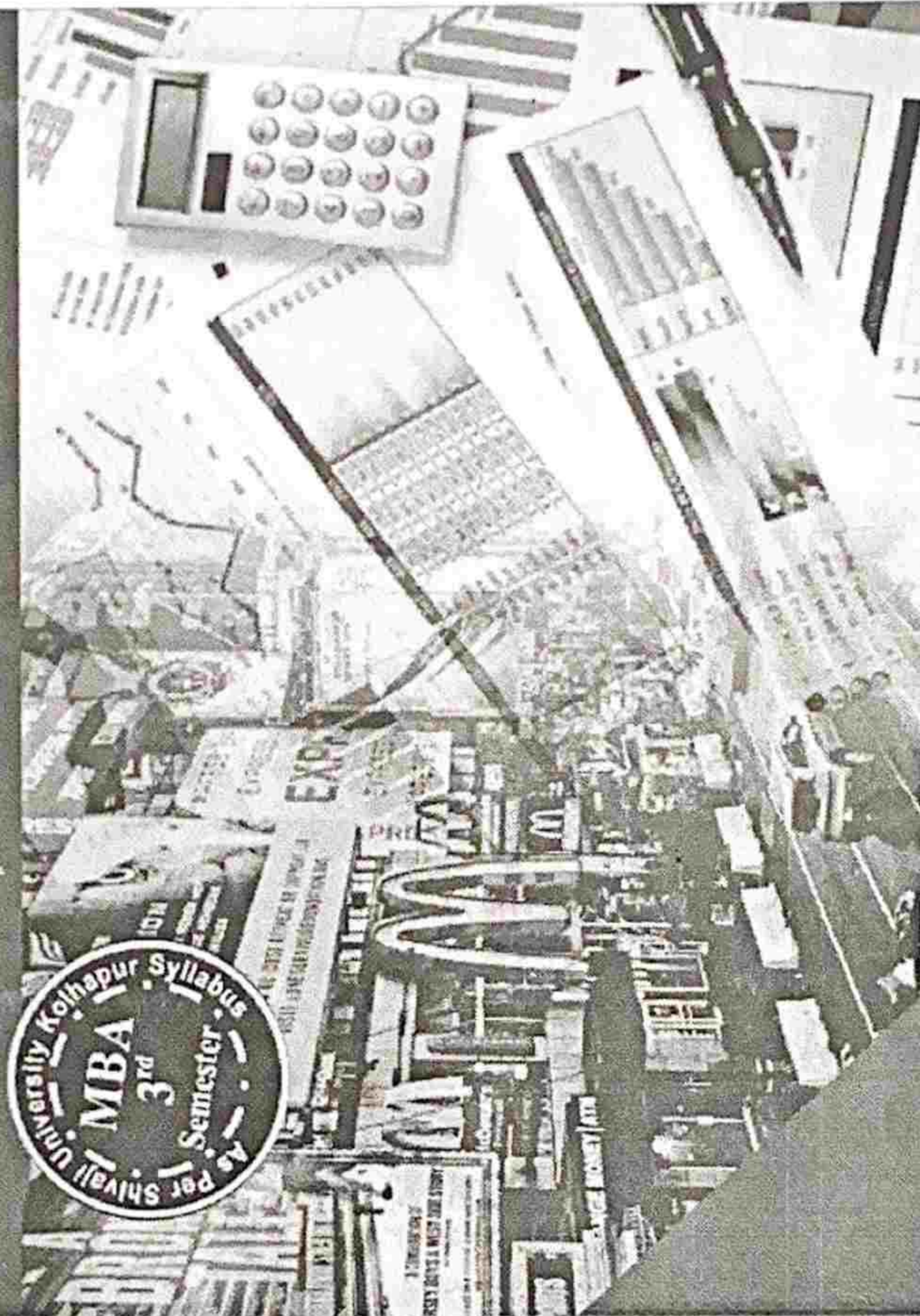
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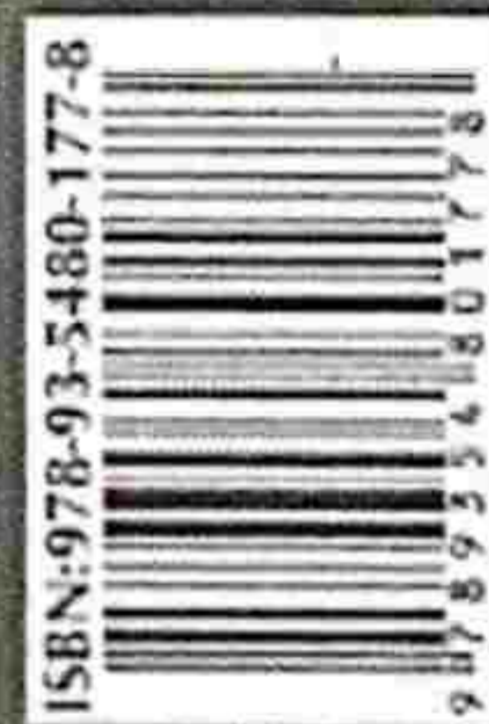
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# "A role of RSETI in rural development – Comparative study of Kolhapur and Nanded District"

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## Abstract:

This study reviews the role of RSETI in Rural Development in Kolhapur and Nanded District. Researcher has focused on SHG members for this study. The objective of the study is to study the Entrepreneurship skills provided by RSETI as well as Impact of Entrepreneurship skill on SHG group under RSETI Training in Kolhapur and Nanded District. Rural Self Employment Training Institute (RSETI) is a replicated model of Rural Development and Self Employment Training Institute (RUDSETI) and a unique initiative which not only imparts training to the rural youths for different economic activities but also extends supports to beneficiaries to settle through self-employment by providing credit linkage to the beneficiaries. RSETI Institutions designed as to ensure necessary skill training and skill up gradation of the rural BPL youth to mitigate the unemployment problem. The SHGs plays a major part in achieving a sustaining livelihood by easing the rural women to enter into entrepreneurial conditioning. Globally, it's slowly proving one of the most effective strategies to neutralize poverty.

Keywords: RSETI, Entrepreneurship Skills, SHG, RUDSETI.
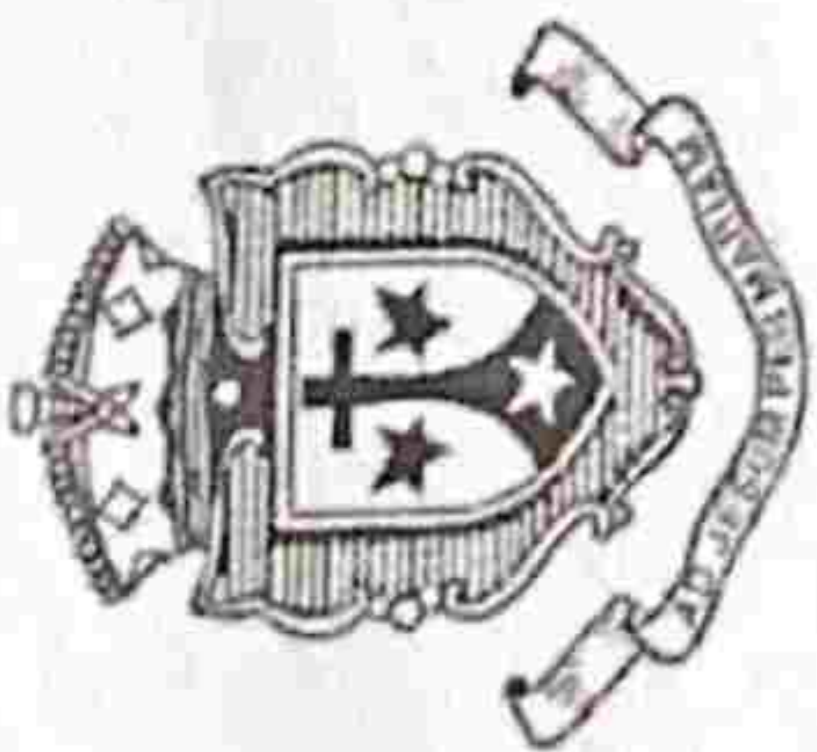
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has participated in the International Conference on "Global Business Transformation - Leveraging Technology" on 14th and 15th July, 2022. He/She also presented paper titled

**A ROLE OF RSETI IN RURAL DEVELOPMENT WITH SPECIAL REFERENCE TO KOLHAPUR DISTRICT**

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Head, International Programs
& Partnerships

**Dr. Geoff Willis**
Assistant Dean,
Curriculam Management & Global Activities,
University of Central Oklahoma, USA

**Dr.Sr. Arpana**
Principal

# A STUDY OF GREEN MARKETING AWARENESS IN SELECTED AUTOMOBILE COMPANIES AND ITS IMPACT ON THE CONSUMER BUYING BEHAVIOUR

**Mr. Rajendra S. Panditrao**

Assistant Professor

D.Y.Patil Technical Campus, Talsande Kolhapur

*Abstract* :

This study reviews the Green marketing practices of automobile industries in Kolhapur District. The objective of the study is to find out Green Marketing awareness in selected automobile companies and its impact on consumers in Kolhapur. Research study was carried out to understand the awareness, attitude and behavior of consumers in terms of environment more specifically related to automobile sectors in Kolhapur. Vehicular Pollution is one of the biggest threats to human life as it creates air pollution and this pollution exists at that level from where humans use air to breath. Rapid increase of passenger cars and commercial vehicles are one of the main reasons of air pollution in the environment. Green Marketing is the marketing of products that are presumed to be environmentally safe. It includes a wide range of activities i.e. Product modification, changes in the production processes, modification of the advertising messages, etc.

Keywords : Green Marketing strategies, Consumer awareness, Buying behavior, Automobile industries.

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in the two day International Conference on

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March 11th & 12th, 2021

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# A study of Impact of Demonetisation on Educational Sector in India

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*Abstract:*

*On 8th November 2016, Indian Prime Minister Mr. Narendra Modi announced that the notes of Rs.500 &Rs.1000 would no longer be recognized legally as currency. Demonetisation is the act of stripping currency units of its status as legal tender. The demonetisation had a great significant and immediate impact of the state of Indian economy. For a common man demonetisation means the change in old currency or the conversion of old notes into new notes and denominations.*

*Demonetisation had significant impact on various sectors of the Indian economy. One of these sectors is education sector. This paper is a review of the impacts of demonetisation on educational sector.*

- **Introduction:**

The demonetisation had a great significant and immediate impact on the state of Indian economy. Demonetisation for us means that Reserve Bank of India has withdrawn the old Rs.500 & Rs.1000 notes from the circulation and has come up with the new notes as an official mode of payment. A common man has taken demonetisation as just a change in the currency of Rs.500 & Rs.1000 notes. The 'demon' in demonetisation is in the beginning. Any government withdraws the legal tender rights of any denomination of currency, it is known as demonetisation. On November 8, 2016 Indian Prime Minister Mr. Narendra Modi announced that notes of Rs.500 & Rs.1000 would no longer be recognized legally as currency.

Demonetisation is the act of stripping a currency units of its status as legal tender. The government believes that this demonetisation is required for the reasons like:

a) For stopping the funding of terrorism

b) For facing the problem of fake currency
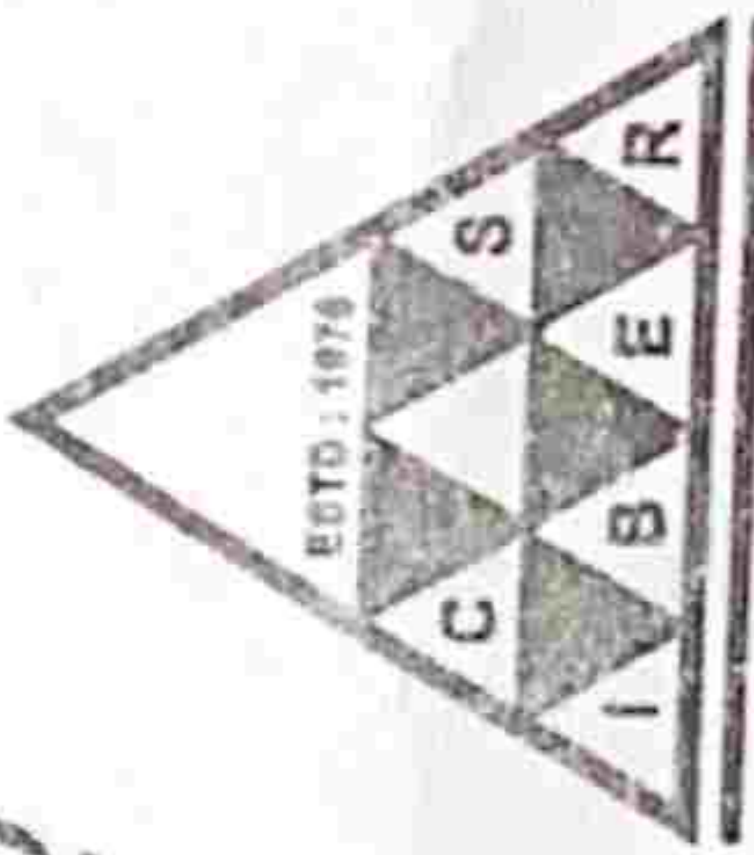
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# A Study of Normality Distribution of Quality of Work-Life & Work Life Balance of Employees in Foundry Units in Kolhapur District, Maharashtra

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## Abstract

The economic, social, and cultural development of any country mostly depends on human resources it has. The 21st century most of the business houses understand that their distinctive competencies depend not in particular products or technologies but in distinctive expertise, skills and knowledge pool of their people. According to Arthur Lewis "there is big contrast in development between countries with approximately the same resources. Therefore, it is necessary to find difference in human behavior." Though the countries are endowed with same level of natural resources like natural, international aid and technological etc. Countries development largely depends upon. The availability of effective human resources, as well as their dedication, is critical to a country's growth. Human resources, not technical, economic, or social issues, cause the majority of difficulties in any business. When individuals labour to the best of their ability and with zeal, excitement and dedication to the company skyrocket. In actuality, every group has about the same resources to work with, such as supplies, equipment, cash, land, and buildings, among other things. The only thing that sets you apart from the competition is your attitude. Associations are nothing more than groups of individuals. They employ physical, financial, and human resources to achieve long-term goals. As a result, any organization necessitates remarkable efforts from its members. It has been observed that when there is a difficulty at work or in the home, the individual becomes psychologically disturbed, which can affect the individual's professional as well as personal life. If there is a work–life balance issue, it might affect the quality of Foundry's goods.
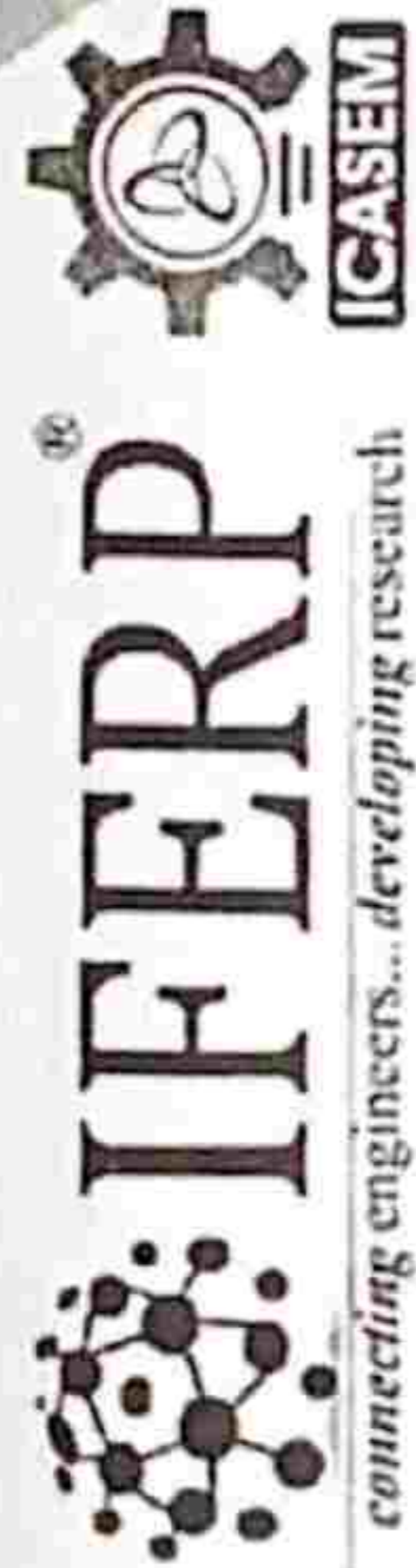
## Keywords

quality of life, quality of work life, work life balance, organizational outcomes, achieve long term goals.

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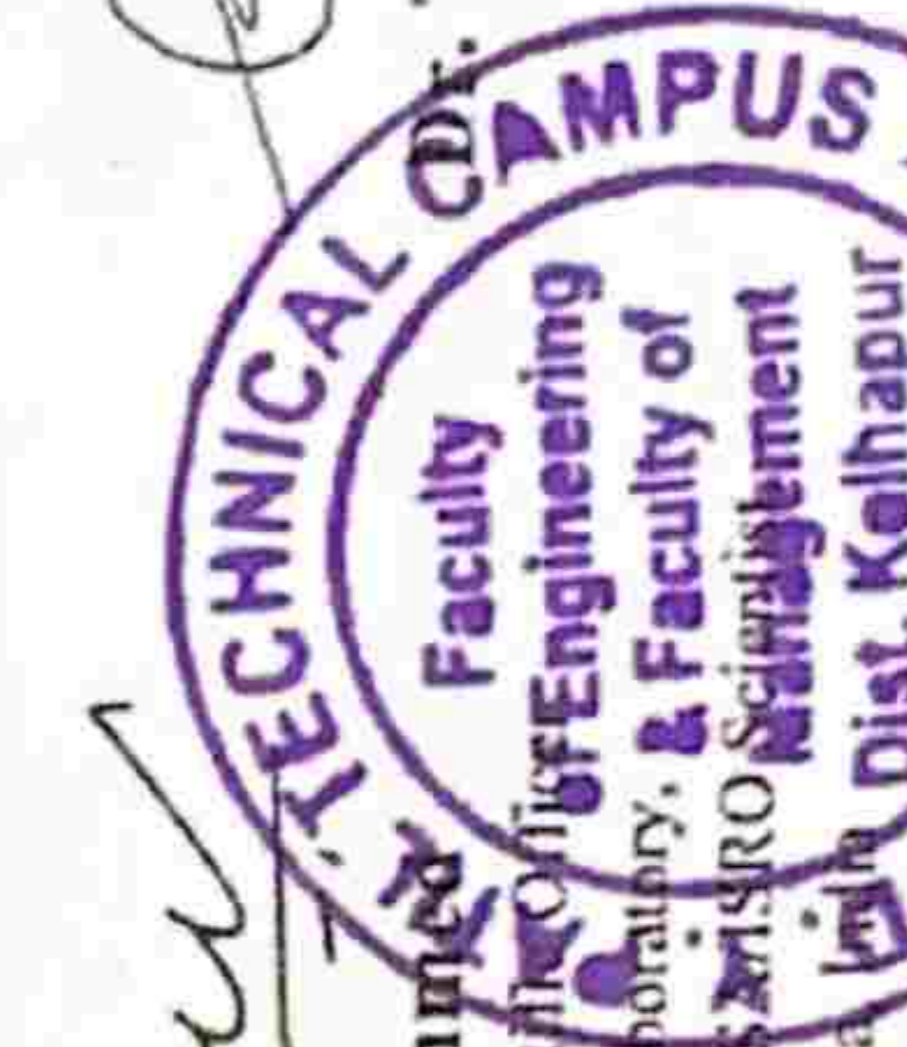
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