

Lecture Notes on Data Engineering
and Communications Technologies 58

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Computer Networks and Inventive Communication Technologies

Proceedings of Third ICCNCT 2020

 Springer

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Survey on Techniques in Improving Quality of Underwater Imaging



Nagaraj V. Dharwadkar and Anjali M. Yadav

Abstract The quality and appearance of underwater images perform a relevant role in the underwater computer vision paradigm. Wherein, the underwater images are useful in various applications to make a detailed study on underwater life. Despite the hype, the images captured underwater undergoes various challenges like light attenuation, color absorption, type of water, etc. To address these types of issues, many algorithms are proposed. This paper provides a comprehensive study of frequent methods used to intensify the visual nature of underwater images and different underwater image datasets that are used to perform tasks regarding underwater imaging. The different quality assessment measures are also summarized in this research work. The presented methods and their shortcomings are studied to enable the in-depth comprehension of underwater image enhancement. In the end, possible future research directions are also implied.

Keywords Underwater image enhancement · Deep learning · Underwater image dataset · Generative adversarial network · Convolution neural network · Residual network

1 Introduction

Exact, high-resolution undersea images are crucial in tracking sea nature, inspecting the underwater world, and detecting sea bed objects. Despite that, it is difficult to accomplish such an objective because of the light attenuation and scattering and deformation of image color in the underwater scene. Water contains sea organisms, floating particles called marine snow [1], and other different obstacles. Because of the depth of water level, types of water, light conditions, and different wavelengths of light, the quality of underwater images is rapidly degraded. According to the light wavelengths, a light that has the longest wavelength disappears first. Hence, the

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Data Structures using C

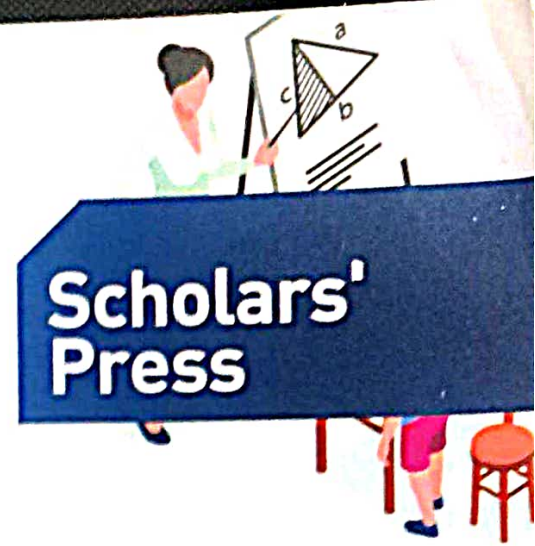
A Practical Approach for Beginners

Amol M Jagtap
Ajit S Mali



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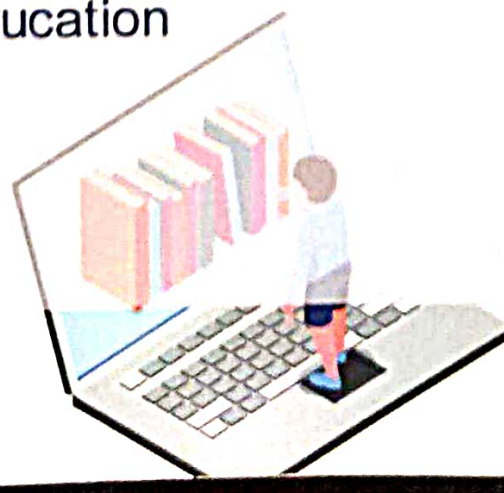
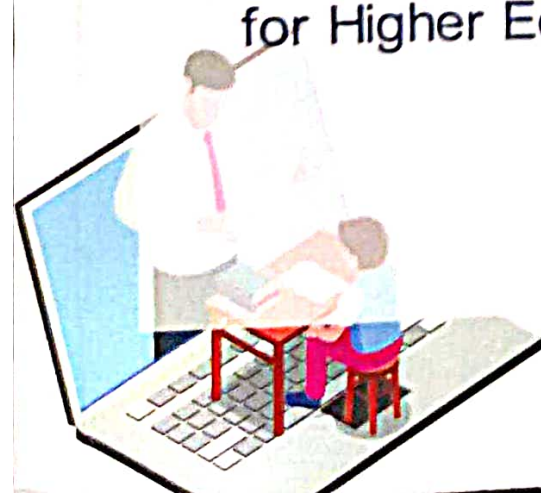
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Dr. Rukmini S

TEACHING PARADIGMS IN ENGLISH LANGUAGE AND LITERATURE

for Higher Education



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Flipped Classroom: A Technology-driven approach for enhancing English Language Skills of Engineering students during Covid-19 Pandemic

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Abstract: The Covid-19 pandemic has a significant impact on the teaching-learning process. To tackle this situation, all educational institutes accepted the Online Teaching mode. The engineering classroom is currently experiencing a paradigm shift from remote classroom-teaching to online - teaching through innovative teaching-learning techniques where teacher focused on what students are learning by changing the role from teacher to facilitator.

During this challenging time teacher has to be forced to be more creative and collaborative in instructions. With the advancement of technology and globalisation, Communication skills as a life-long learning skill are an essential component in engineering education to facilitate students' academics and prepare them for their careers. Communication is one of 11 critical outcomes designed by ABET Engineering Accreditation Criteria, and communication in the English language is the need of today's era.

The Flipped Classroom is an instructional strategy that blends technology effectively with active learning. In a flipped classroom, students watch instructional videos outside the classroom and do assignments or engage in activities inside the classroom. This approach offers significant benefits both for the instructor and the students as class time is applied in a creative way to foster English language communication. The present paper investigates the efficiency of using the Flipped Classroom approach facilitated by LMS (Learning Management System) in Professional Communication or English Language virtual class.

Key Words: *Communication, English Language, Active learning, OBE, Flipped Classroom, LMS.*

1. Introduction:

Covid 19 Pandemic has affected all sectors, including social, economic, automotive, and so on. Even the Education system was also diversely affected due to emergency lockdown from March 2020. The education system has undergone a transformation from offline or chalk and talk method to Online teaching mode. Engineering education has always tried innovations in teaching-learning by incorporating several ICT enabled techniques in the remote classroom to achieve desired outcomes. Still, nowadays, there is a paradigm shift from remote classroom teaching to online teaching due to the Covid situation. Faculty members effectively shoulder the challenging task by acquiring new or innovative techniques for an online class to make classroom learning more fruitful as technical education adopted outcomes-based education. In online teaching, sometimes faculty has no control over the online learning of students. Sometimes students are reluctant to online teaching due to internet connectivity, technical issues and the gap in a two-way communication of teacher and student. To assess the

Chapter 11

Tribo-Corrosion Behaviour and Characterization of Biocompatible Coatings

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ABSTRACT

Commercially available metallic orthopaedic implant materials cause major problems like stress shielding and the release of harmful ions due to corrosion and wear. Also, the secondary operation is a must for the implant removal. Therefore, the biodegradable and biocompatible magnesium (Mg) implant materials

with the natural bone. Mg alloys rapidly corrode in the physiological environment, which cause failure of the implant before completing the expected function. Surface coating is the most effective method for improving the corrosion performance of Mg and its alloys. Hydroxyapatite (HA) being the most suitable

coating on Mg alloys. The results are useful for future research on orthopaedic implants. The study of coatings and process parameters to maximize the life of bio-implants.

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Handbook of Smart Materials, Technologies, and Devices pp 1–11

Detection of Tuberculosis and Lung Cancer Using CNN

S. N. Hankare & S. S. Shirguppikar 

Living reference work entry | First Online: 08 October 2021

20 Accesses

Abstract

Tuberculosis (TB) is contagious disease spread through air from bacteria called *M. tuberculosis*. This disorder has high risk factor in humans. It also causes a high risk of lung cancer. Pulmonary tuberculosis and lung cancer share same clinical as well as radiological features. This imitation of symptoms between tuberculosis and lung cancer may lead radiologist to misdiagnose one for the other. This chapter discusses the Machine Learning

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Handbook of Smart Materials, Technologies, and Devices pp 1–12

Covid-19 or Viral Pneumonia Detection Using AI Tools

M. V. Pachore & S. S. Shirguppikar 

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Abstract

Viral pneumonia is a disease which occurs in lungs due to bacterial infection. Since middle of December 2019, many cases of pneumonia with unknown cause were found in Wuhan City, China; at present, it has been confirmed that it is a new respiratory disorder caused due to coronavirus infection.

Lungs abnormality is highly risky condition in humans; the reduction of the risk is done by enabling quick and efficient treatment. The Covid-19

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MANAGEMENT CASES FROM INDIAN PERSPECTIVE

VOLUME -3

MANAGEMENT CASES FROM INDIAN PERSPECTIVE



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MANAGEMENT CASES FROM INDIAN PERSPECTIVE

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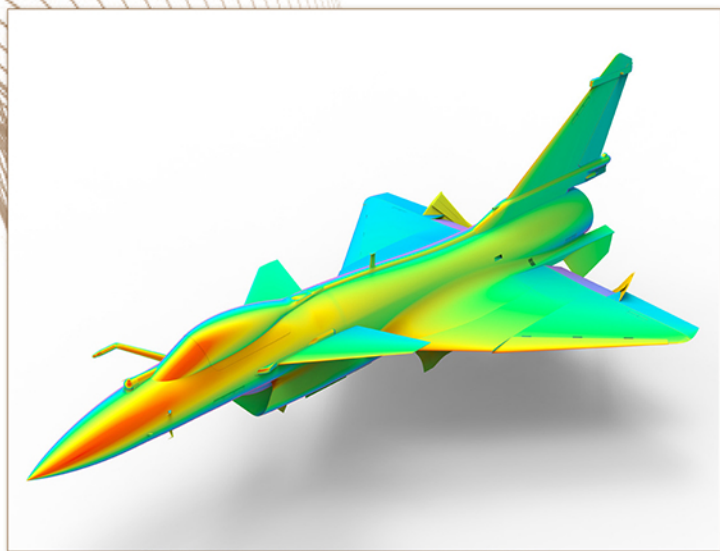
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ADVANCED COMPOSITE MATERIALS AND STRUCTURES

Modeling and Analysis



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1 Multi-Directional Graded Composites *An Introduction*

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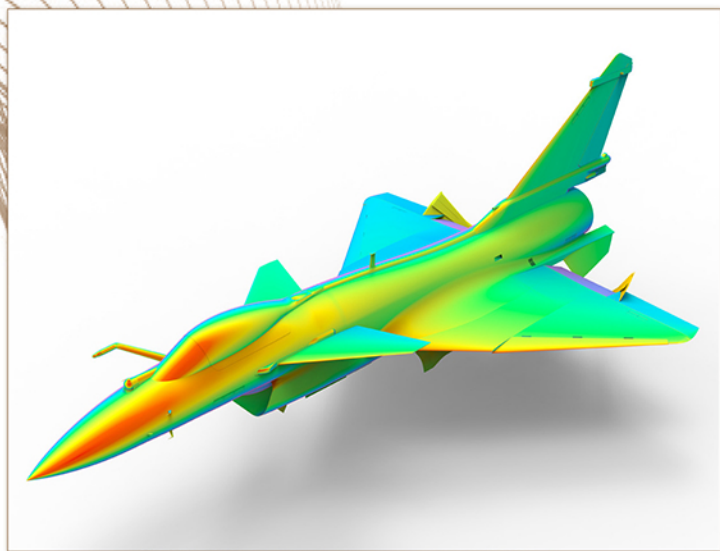
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ADVANCED COMPOSITE MATERIALS AND STRUCTURES

Modeling and Analysis



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2 Free Vibration Characteristics of Bi-Directional Functionally Graded Composite Panels

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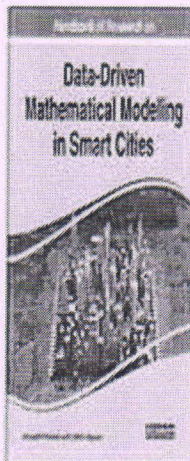
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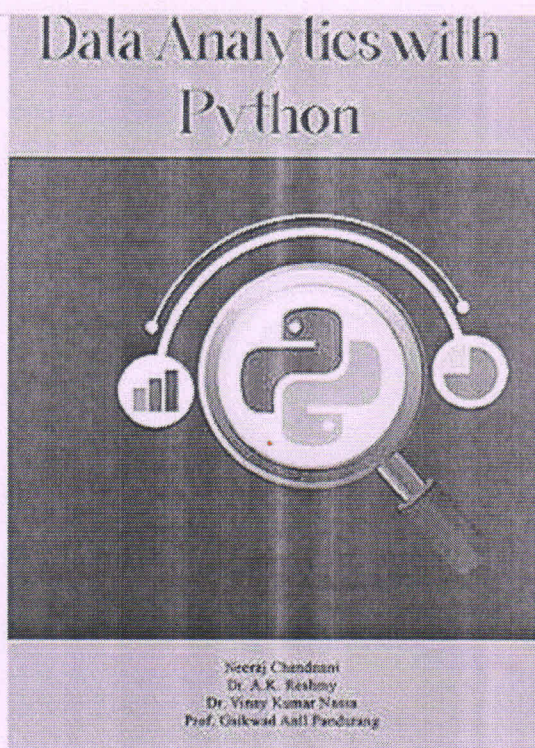
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Chapter 13

The Impact of Artificial Intelligence in the Talent Acquisition Lifecycle of an Organization

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Abstract

Artificial Intelligence (AI) seems to be the rule of the day. AI has invaded every aspect of existence, including institutional environments. While AI is establishing an influence in practically every role in a company, its impact on the Human Resources (HR) department must be carefully addressed, particularly because this is the highest 'human' of several verticals in a company. Human resource executives are using AI technology to perform a variety of human resource management duties, ranging from personnel planning to personnel leave. The procedure of finding, employing, activating, retaining, and growing personnel is unquestionably the foundation of a company's strong economic condition. In enterprises, AI technologies are widely employed for talent acquisition. AI-based platforms are presently assisting HR in automating a massive section of repeatable activities in mechanisms like talent tests, recruitment, participating, re-engaging, employee connections, onboarding, and so forth that were employed to intake numerous employment hours in the earlier days, allowing the HR unit to be quite effective and concentrate on developing compliant and legislative initiatives. Amongst the key domains of the HR operation that AI affects, Talent Acquisition is among those where AI has emerged as nothing less of a big draw - Talent Acquisition is situated at the tip of the talent administration lifecycle for organizations. This research investigates the impacts of Artificial Intelligence platforms on organizations' talent acquisition operations. It provides a greater comprehension of existing AI paradigms and their capacity to automate time-consuming TA operations, hence improving operational effectiveness and

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Preface

This book contains outstanding research papers as the proceedings of the 3rd International Conference on Sustainable and Innovative Solutions for Current Challenges in Engineering and Technology (ICSISCET 2021). ICSISCET 2021 has been organized by Madhav Institute of Technology and Science, Gwalior, India, and technically sponsored by Soft Computing Research Society, India. It was held on November 13–14, 2021, at Madhav Institute of Technology and Science, Gwalior, in virtual mode due to the COVID-19 pandemic. The conference was conceived as a platform for disseminating and exchanging ideas, concepts, and results of the researchers from academia and industry to develop a comprehensive understanding of the challenges of the advancements of sustainable and innovative solutions for current challenges in engineering and technology viewpoints. This book will help in strengthening congenial networking between academia and industry. The conference focused on collective intelligence, sustainable computing and information technology, computational intelligence and machine learning, embedded systems and VLSI design.

We have tried our best to enrich the quality of the ICSISCET 2021 through a stringent and careful peer-review process. ICSISCET 2021 received a significant number of technical contributed articles from distinguished participants from home and abroad. ICSISCET 2021 received 267 research submissions from 40 different countries, viz. Algeria, Austria, Bangladesh, Canada, China, Egypt, Ethiopia, Finland, Germany, Ghana, Greece, India, Iran, Italy, Kenya, Liberia, Malaysia, Mexico, Morocco, Nepal, New Caledonia, Oman, Peru, Poland, Portugal, Romania, Russia, Saudi Arabia, Senegal, Serbia, Slovakia, Spain, Sri Lanka, Turkey, Ukraine, United Arab Emirates, UK, USA, Vietnam and Yemen. After a very stringent peer-reviewing process, only 55 high-quality papers were finally accepted for presentation and the final proceedings.

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Chapter 43

All-Digital ADC Using Time-to-Digital Converter



Darshan R. Shaha, Mahadev S. Patil, and Sachin Magdum

1 Introduction

Current versions of FPGAs have become extremely puissant logic devices. Interfacing different sensors and further data processing have become valuable collection nodes for the physical sciences. Applications designed are verbally expressed to be feasible and reliable when they are

- Compact form factor (i.e., small footprint)
- Ultra-low-power compared to discrete system having same functionality.
- Use of limited input–output pins.
- Less affected to external parameters.

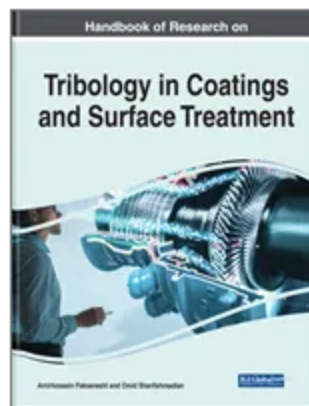
When an application is designed by taking all the above parameters into account, it amasses data from external sensors and processes it in FPGAs. The sensors used in many applications are the analog sensors, i.e., processing of continuous signal; due to advancement in digital field, analog approaches are losing their advantages to process and analyze output, so it can be further transformed using ADC into a digital signal. In many applications, ADC consequently plays a critical role, since it is the first phase of any design that uses analog-based circuitry/sensors.

The implementation of time-based ADC has increased in many of the emerging applications over traditional ADC. Currently, the key method used to implement an

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Tribo-Corrosion Behaviour and Characterization of Biocompatible Coatings

Amol Bajarang Chavan, Sanjaykumar S. Gawade, Digvijay G. Bhosale

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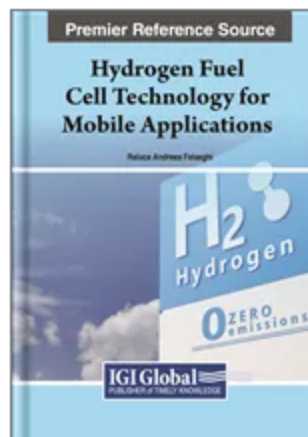
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Abstract

Commercially available metallic orthopaedic implant materials cause major problems like stress shielding and the release of harmful ions due to corrosion and wear. Also, the secondary operation is a must for the implant removal. Therefore, the biodegradable and biocompatible magnesium (Mg) implant materials have been investigated. Mg shows favorable biological properties and matching mechanical properties with the natural bone. Mg alloys rapidly corrode in the physiological environment, which cause failure of the implant before completing the expected function. Surface coating is the most effective method for improving the corrosion performance of Mg and its alloys. Hydroxyapatite (HA), being the most stable phase of calcium phosphates in physiological conditions, is preferred as a coating material. The chapter focuses on the tribo-corrosion and characterization of HA coatings prepared by electrodeposition process on Mg alloys. The results are useful for the designer community in the selection of biocompatible coatings and process parameters to maximize the life of bio-implants.

Chapter Preview



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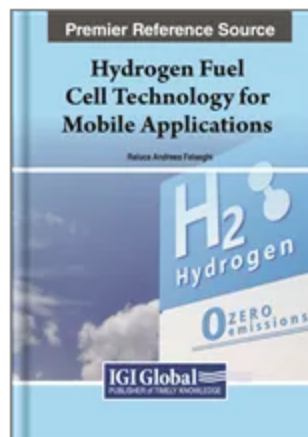
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Abstract

The energy demands of the future are ever increasing, and hydrogen as an ideal energy carrier can fulfil these demands. The production, purification, delivery, storage, and application are the significant measures of the hydrogen-based economy. The utmost challenge to utilize hydrogen as a fuel lies in the improvement of storage techniques. Hydrogen storage technologies comprise of high-pressure compression, cryogenic liquefaction, and absorption in solid state such as metal hydrides and complex hydrides. As compared with other techniques, hydrogen storage in solid form seems to be one of the utmost likely solutions. However, it involves extremely coupled transport processes such as chemical kinetics, heat, and mass transfer. Complex hydrides are capable substitute aspirants for solid state hydrogen storage because of many advantages, but many of such hydrides suffer from poor kinetics as well as great thermodynamic stability. Significant heat transfer techniques and issues associated with hydrogen storage methods are discussed, with emphasis on metal hydride.

Chapter Preview



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Rahul Uday Urunkar, Sharad Dattatray Patil

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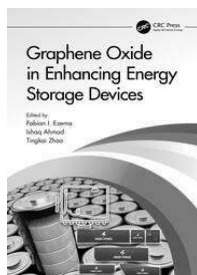


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Chapter



Flexible Supercapacitors Based on Graphene Oxide

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Abstract

Circular supply chain (CSC) has gained attention in the recent years amongst the research communities due to concerns of waste generation, global warming, climate change, resource scarceness, and ecological degradation. CSC amalgamates the circular economy (CE) into supply chain operation of industry. It is considered as a cradle-to-cradle approach to traditional supply chain model known as cradle to grave or linear economic model of production and consumptions. Several manufacturing organizations across the globe have started to adopt CSC into their business practice due to its wide range of sustainable benefits.

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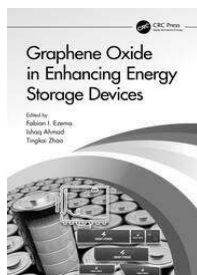
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Chapter



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Employee Attitude Towards Stress and Absenteeism

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The primary aim of this research is to identify the key factors contributing to stress and absenteeism among employees in IT companies located in Pune and to examine how these factors impact overall employee performance. The prevalence of stress and absenteeism in the workplace is on the rise, and responsible corporate organizations must take action by providing assistance and support. Our team specializes in this specific area, offering practical strategies to address issues like stress, anxiety, depression, changes in work-life circumstances, work-life balance, and the impact of employee relocation within Pune. (NIOSH Work Organization and Stress Related Disorders: In the document: "According to the United States National Institute for Occupational Safety and Health (NIOSH), work organization and stress-related disorders are of significant concern (NIOSH Work , 2004) Reducing absenteeism can be a significant step in cutting down on business costs. Due to intense competition, companies can no longer afford to tolerate unnecessary absenteeism as they might have in the past. Consequently, many companies are focusing on eliminating or, at the very least, reducing excessive absenteeism. The pressure to meet targets and deadlines not only affects top-level management but also extends to employees across all levels. If stress management concerns are not promptly and adequately addressed, it can lead to decreased productivity among both workers and executives, adding to the burdens management faces.

Keywords: Stress, employee, absenteeism, attitude, IT Companies

1. Introduction

In the dynamic and competitive landscape of the Information Technology (IT) sector, the well-being and performance of employees play a pivotal role in the success of companies. This research endeavors to unravel the intricate web of factors contributing to stress and absenteeism among employees in IT companies situated in Pune, shedding light on the broader implications these issues may have on overall organizational performance.

The escalating prevalence of stress and absenteeism in the contemporary workplace has become a matter of paramount concern. As underscored by the United States National Institute for Occupational Safety and Health (NIOSH), work organization and stress-related disorders have emerged as significant challenges (NIOSH Work, 2014) [1]. The repercussions of unaddressed stress are profound, affecting not only the mental and physical health of employees but also permeating through the fabric of organizational efficiency.

The context of Pune, a vibrant hub of IT activity, adds a unique dimension to our investigation. The competitive nature of the industry places immense pressure on employees at all levels, from executives to frontline workers. Consequently, the urgency to meet stringent targets and deadlines becomes an omnipresent stressor. This not only poses a threat to individual well-being but also has cascading effects on organizational productivity.

Furthermore, as companies grapple with the imperative of reducing costs and enhancing efficiency, the toll of unnecessary absenteeism cannot be overlooked. In a landscape where every resource is invaluable, companies can ill-afford the luxury of tolerating excessive absenteeism. This research seeks to identify actionable strategies for responsible corporate entities in Pune to address stress, anxiety, depression, and challenges related to work-life balance, including the impact of employee relocation.

2. Objectives

1. To identify the main reasons of stress among Employee in IT Companies.
2. To examine how stress impacts their job performance.
3. To study the employee attitude on stress and absenteeism in IT Companies.
4. To depict the effects of absenteeism on the growth of the IT Companies.
5. Suggesting measures to minimize absenteeism to certain extent.
6. To assess the various elements influencing employees' job performance within the organization.
7. To assess measures aimed at mitigating job-related stress in order to lower the rate of employee absenteeism in IT companies.

3. Scope

This study aims to center on the primary challenges arising from occupational stress and how it affects employee absenteeism. The research carries particular significance for employees seeking to alleviate their own job-related stress and protect themselves from a range of health issues. Additionally, it provides valuable insights for management on reducing absenteeism rates, thereby improving overall organizational performance.

Every IT employee was requested to indicate the count of days within the recent month when their mental well-being, involving stress, depression, and emotional difficulties, was below par. The employed adults in the IT sector who acknowledged undergoing a minimum of 15 days of mental health challenges in the month prior (NIOSH Worker Health Chartbook, , 2016) [4].

Hypothesis:

H1: There is a significant relationship between the respondent's marital status and stress existing in IT Companies.

H2: There is a significant relationship between gender and stress and absenteeism.

H3: There is a significant difference in days absent between older employees and younger employees.

4. Research Methodology

The objective of this study is to investigate employee attitudes regarding stress and absenteeism. The fundamental purpose of this research is to provide precise information to assist in decision-making. Research can be described as the methodical and unbiased approach to collecting, documenting, and evaluating data to support business decision-making.

SAMPLE - This study was conducted with a sample size of 50 respondents. Sampling is limited to the employees of IT Companies, in Pune. The respondents mainly belong to Pune. The selection of respondents was done based on convenience sampling (non-probability).

5. Data Processing

1. Analysis was done using licensed SPSS version 22 (licensed to JSSAHER).
2. MS-EXCEL was used to prepare pie- charts and graphs and MS-WORD was used to prepare or write the whole project report.
3. Categorical data was analyzed using the Chi-Square Test for inferential statistical tests. Chi-Square Test is used to reach a conclusion or to test the hypothesis.

Data Analysis & Interpretation: Classification and tabulation are processes that convert the raw data gathered from questionnaires into valuable information. This is achieved by structuring and aggregating the individual pieces of data found in each questionnaire, including observations and responses, into coherent and systematic statistics that can be employed to arrange and examine the data:

1. Basic data organization through the use of tally marks.
2. Determining the percentage of responses.
3. The formula employed is (number of responses / total responses) * 100.
4. Limitations of the study:
5. The scope of the research might be relatively small, and confined to a specific geographical region.
6. Respondents may have constraints on their time availability.
7. There is a possibility of respondents providing biased information.
8. Since only one area was surveyed, the findings may not reflect the comprehensive perspective across various fields.
9. It is conceivable that some respondents might furnish inaccurate information.

6. Data Analysis:

1. The provided pie chart displays the distribution of respondents' ages. It's evident that the largest portion, accounting for 40% of the total, falls within the 20-30 age range. Following that, 26% of respondents are aged between 30-40, while 18% fall into the 40-50 age category. Lastly, 16% of the respondents are in the age group above 50. This information reveals the age demographics of the surveyed population.

2. According to the provided chart, it is evident that the majority of respondents, comprising 70% of the total, are married. In contrast, the remaining 30% of respondents are unmarried. This data highlights the marital status distribution within the surveyed group, with a significant majority being married while a minority is unmarried.
3. Based on the information presented in the chart, it is clear that the majority of respondents, specifically 86% of them, are female. In contrast, a smaller proportion, constituting 14% of the total, represents male respondents. This data highlights a significant gender imbalance within the surveyed group, with a significantly higher number of female respondents compared to male respondents.
4. This data provides insight into the extent of stress-related leave among the surveyed individuals. It suggests that a significant portion took 2 or 3 holidays, while a smaller but notable percentage took even more than 3 holidays in a month to manage job-related stress.
5. Chermiss (2013) [5] discusses the critical role of addressing issues related to staff burnout and job stress in the human service industry. While our study did not explicitly explore the human service industry, the insights from Chermiss align with the notion that workplace stress is a multifaceted challenge, with various factors contributing to employees' perceptions of stress. This underscores the importance of comprehensive strategies to address stressors beyond interpersonal relationships.
6. Workload: A significant portion, accounting for 44% of the respondents, identified workload as the major cause of stress in their jobs. This indicates that a substantial number of individuals feel overwhelmed by the amount of work they have to handle.
7. Daily Changes in Work Schedules: Approximately 26% of the respondents agreed that daily changes in work schedules are a source of stress for them. This suggests that irregular or unpredictable work hours can be a significant stressor for this portion of the workforce.
8. Excessive Organizational Rules: About 22% of the respondents indicated that excessive organizational rules contribute to their job-related stress. This implies that strict or complex rules and regulations within their workplace can be burdensome and stressful.
9. Interpersonal Relationships: Only a small minority, comprising 8% of the respondents, identified interpersonal relationships as a cause of stress in their jobs. This suggests that relatively few individuals attribute their to issues with colleagues or workplace relationships.

In summary, the data shows that workload is the most prevalent source of stress among the respondents, followed by daily schedule changes and excessive organizational rules. Interpersonal relationships are cited by a relatively small percentage of respondents as a cause of job-related stress.

According to the information provided in the pie chart, it is evident that a significant majority, accounting for 70% of the respondents, experience irritation when they are unable to take tea and lunch breaks during work. In contrast, a smaller portion, constituting 30% of the respondents, do not share this sentiment and are not bothered by the lack of breaks. This data highlights that a substantial proportion of those surveyed value and are affected by the availability of tea and lunch breaks during their workday, finding their absence to be a source of irritation.

7. Hypothesis Testing

H1: There is significant relationship between the respondent's marital status and stress existing in IT Companies.

The data shows that out of the respondents, 70 are married, while 30 are unmarried. An analysis was conducted to explore the relationship between marital status and stress in IT companies. The chi-square value obtained was 8, which exceeds the critical table value of 3.841 at a 5% significance level.

As a result, based on these findings, the null hypothesis is rejected. (See Table No. 1: Marital status and stress existing in IT Companies)

Table No. 1: Marital status and stress existing in IT Companies

Observed(O)	Expected(E)	O-E	(O-E) ^2	(O-E) ^2/E
35	25	10	100	4
15	25	-10	100	4
50				8

Table No. 2: Marital status and stress existing in IT Companies

Degree of Freedom(df)	1
Chi-Square(x) ²	8
Table Value	3.841
A	0.05
(x) ² >Table value	8>3.841

The chi-square value surpasses the table value in the survey results, leading to the rejection of the null hypothesis.

There is a substantial correlation between the marital status of respondents and the stress levels within Cognizant Technology Solutions, as evidenced by the observation that the chi-square value of 8 surpasses the critical table value of 3.841 at a 5% level of significance. Consequently, based on these findings, we reject the null hypothesis. (See Table No. 2: Marital status and stress existing in IT Companies)

H2: There is significant relationship between the gender and stress and absenteeism.

Out of the total respondents, 43 are female, and 7 are male. An analysis was conducted to assess the relationship between gender and stress-related absenteeism. The obtained chi- square value of 25.92 exceeds the critical table value of 3.841 at a 5% significance level. Consequently, based on these results, the null hypothesis is rejected. (See Table No. 3: Relationship between the gender and stress and absenteeism)

Table No. 3: Relationship between the gender and stress and absenteeism

Observed(O)	Expected(E)	O-E	(O-E) ^2	(O-E) ^2/E
43	25	18	324	12.96
7	25	-18	324	12.96
50				25.92

Table No. 4: Relationship between the gender and stress and absenteeism

Degree of Freedom(df)	1
Chi-Square(x) ²	25.92
Table Value	3.841
A	0.05
(x) ² >Table value	25.92>3.841

The null hypothesis is rejected based on the survey results because the chi-square value is greater than the table value. (See Table No. 4: Relationship between the gender and stress and absenteeism)

8. Findings

1. **Age and Marital Status of Respondents:** Most respondents were in the age group of 20-30, and many were married. Research in various industries often shows that younger employees may experience stress due to the pressure to establish their careers, while marital status can influence stress levels i.e. married employees may have additional family-related responsibilities that contribute to stress.
2. **Frequency of Holidays Due to Job Stress:** A significant portion of respondents reported taking multiple holidays per month due to job stress. High absenteeism rates due to stress are a concern in many industries. Frequent absenteeism can lead to decreased productivity and increased costs for employers.
3. **Sources of Job Stress:** Respondents identified junior employees and colleagues as sources of stress, especially when senior employees become angry over non-compliance with their requests. Heavy workloads, changing work schedules, and excessive organizational rules were also mentioned. Workplace relationships and hierarchy often play a role in stress. Research in various industries suggests that conflicts with colleagues or superiors and excessive work demands are common stressors.
4. **Physical and Emotional Impact of Stress:** Many employees reported feeling physically and emotionally drained at the end of the day, and some mentioned becoming frustrated when things didn't go smoothly. Such physical and emotional symptoms are consistent with stress-related issues seen across industries. These symptoms can lead to absenteeism as employees may need time off to recover. [2] "Thomas, Colligan, and Higgins (2015) conducted a study on workplace stress, highlighting its impact on employees' efficiency and health. They found that job stress can lead to various physical and emotional issues (Thomas et al., 2015)
5. **Workplace Environment and Rules:** Daily changes in work schedules and excessive organizational rules were cited as causes of stress. Research indicates that work environments with rigid rules and frequent changes can increase stress levels and decrease job satisfaction. This is not unique to the IT industry. (Srivastava, 2014) [3] "An article titled 'Workplace Stress Greater for Women' (2013) reported on gender differences in workplace stress levels (Workplace Stress Greater for Women, 2013)."
6. **Impact on Absenteeism:** The findings suggest a potential link between job stress and absenteeism. High levels of stress have been associated with increased absenteeism in various industries. Absenteeism can result from employees needing time off to cope with stress or because they feel overwhelmed by their work environment. (Thomas & Colligan MSW, 2015)

In summary, while the specific findings relate to the IT industry, they align with broader patterns observed in various sectors. Stress and absenteeism are complex issues affected by a combination of factors, including workplace relationships, workload, and organizational policies. Addressing these issues requires industry-specific strategies but can also benefit from insights and solutions developed in other industries and regions where similar challenges are faced. (Srivastava, 2014) [6]

9. Suggestions

1. **Offer Vacation Days and Paid-Time Off** - Employee absenteeism is often a result of burnout, or employees feeling they need to take days off for personal obligations. By offering a fair amount of paid-time off and vacation days (maybe even unlimited?), you can help

employees feel happier about their work-life balance, and mentally recharge -- a win-win for them, and for your team's productivity.

2. **Consider Flexible Hours** - Offering a remote option could significantly decrease employee absenteeism, as ironic as it might sound. Working from home enables your employees to take care of sick kids, run errands, or let the electrician in without taking a full day off from work.
3. **Implement a Wellness Program** - A wellness program can help IT Companies mitigate health-related absences, while simultaneously lowering health care costs and reducing employee stress. Additionally, a wellness program can help improve morale and workplace culture, and even increase productivity.
4. **A workplace culture** - By taking steps to create a workplace culture that prioritizes health and wellness, you're able to decrease unhealthy habits that lead to employee absenteeism. For instance, if an employee is able to mitigate stress during your office's lunchtime yoga, she might be less likely to let that stress build up and lead to bigger problems down the road.
5. **Improve Workplace Morale** - IT companies can boost employee morale by organizing team-building activities, fostering friendly competition among departments, and arranging community service outings. Providing chances for employees to interact with their colleagues and instilling a sense of pride and inspiration within their teams is crucial in addressing employee absenteeism. When an employee feels valued and acknowledged by their peers, they will be more motivated to attend work. ("Workplace Stress Greater for Women", 2013)

10. Future Scope

Employee Attitudes Towards Stress And Absenteeism play a critical role in shaping the future prospects of any organization. While reducing absenteeism is undoubtedly important for maintaining productivity and operational efficiency, it's equally essential to focus on promoting employee engagement. In this detailed explanation, we'll explore why enhancing employee empowerment and improving workplace satisfaction go hand-in-hand with fostering long-term success within a company.

Understanding Employee Engagement: Employee engagement refers to the emotional commitment and connection that employees have with their jobs, colleagues, and the organization as a whole. Engaged employees are enthusiastic about their work, motivated to contribute their best, and feel a sense of ownership and loyalty towards the company.

The Link between Employee Engagement and Performance: Numerous studies have demonstrated a strong correlation between employee engagement and performance. Engaged employees tend to be more productive, innovative, and customer-focused. They are more likely to meet or exceed performance expectations and are less likely to be absent from work.

11. Factors Contributing to Employee Engagement

1. **Empowerment:** When employees feel that they have a say in decision-making processes and are trusted with responsibilities, they become more engaged. Empowerment boosts their sense of ownership and accountability.
2. **Workplace Satisfaction:** A satisfied workforce is more likely to be engaged. Factors like a positive work culture, work-life balance, recognition for achievements, and opportunities for growth contribute to workplace satisfaction.
3. **Effective Leadership:** Leaders who are supportive, communicative, and provide clear direction foster engagement among their teams.

4. **Reducing Absenteeism through Employee Engagement:** High levels of absenteeism can be indicative of disengagement and job dissatisfaction. When employees are engaged and satisfied with their work, they are more likely to show up consistently and contribute positively to the workplace. (Srivastava, 2014)
5. **Long-term Organizational Success:** Sustainable success for any company goes beyond short-term gains. To thrive in the long run, organizations need a committed and motivated workforce. Engaged employees are more likely to stay with the company, reducing turnover costs and the need for constant recruitment and training.

12. Practical Steps for Promoting Employee Engagement:

1. **Open Communication:** Encourage two-way communication between employees and management, allowing employees to express concerns and ideas.
2. **Training and Development:** Invest in continuous learning and development opportunities to empower employees and help them grow in their roles.
3. **Recognition and Rewards:** Acknowledge and reward employees for their contributions, both big and small.
4. **Work-Life Balance:** Promote a healthy work-life balance by offering flexible work arrangements and supporting employees' personal well-being.

13. Conclusions

In conclusion, focusing on employee engagement, empowerment, and workplace satisfaction is not just about mitigating absenteeism; it's a strategic imperative for long-term success. Engaged employees are the backbone of a thriving organization, and their commitment and performance significantly impact the bottom line. Therefore, forward-thinking companies should invest in initiatives that foster employee engagement, as it pays dividends in terms of performance, employee retention, and overall organizational health.

Job stress is a crucial factor affecting employees' working conditions and their engagement in their tasks. Employees without job stress tend to work more efficiently than those experiencing stress. Therefore, IT companies should create a healthy working environment with reduced job-related stress among their employees.

All employees working in IT companies report experiencing a high level of job stress. The primary causes of this stress are excessive workloads and inadequate work schedules. Furthermore, personal issues at home can negatively impact job performance and contribute to job-related stress.

The impact of job stress on the overall health of young employees is substantial. Some of them suffer from headaches, backaches, and irritability by the end of the day. Unfortunately, most organizations lack stress management programs. Many young employees believe that it is essential for organizations to implement stress management programs.

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Smart and Sustainable Agriculture: Systematic Literature Review and Bibliometric Analysis

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Abstract

The digital farming ecosystem involves multiple stakeholders including farmers, customers, vendors, consumers, retail malls, and a third party. The system involves multiple processes including farming, the use of pesticides, food security, buying, lending, and auction. The system is highly complex in nature involving data sources in heterogeneous formats involving multiple stakeholders and processes that are crucial. In recent times, terms like smart agriculture, sustainable agriculture, and precision agriculture have started gaining momentum. The technology is the “cure” or “curse.” The cure lies in the implementation of multiple technologies such as blockchain, the Internet of Things, big data analytics, machine learning, artificial intelligence, and soft computing. Also, it may become a curse for maintaining the agricultural ecosystem related to privacy concerns, security issues, data leakage, etc. It has become very crucial to design robust technology strategies to solve agriculture problems and even to predict the problems that may arise in the future. The current agriculture system has to look beyond the horizon so that the door to new problems and solutions is opened to give a wide spectrum to the agriculture system worldwide. The chapters provide multiple dimensions of agriculture with technology at heart.

Keywords: Smart agriculture, sustainable agriculture, PRISMA, bibliometric analysis, VOSviewer

2.1 Introduction

In India, agriculture is the backbone of the agrarian economy, and most of the rural population of the country depends on it as it is a hereditary occupation; the urban population is also influenced by zero residual, zero waste, and organic agricultural products. In the twenty-first century, technology has the supremacy to bring “dawn” or “dusk” to multiple sectors, which are currently in the spawning or mature stage of their growth. On the planet, every sector is witnessing digital transformations due to the gigantic nature of IT to solve

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multiple problems associated with various sectors. In India, 70% of the earning population depends on the agricultural sector directly or indirectly. Across the globe, India's agriculture has made a significant contribution to the country's GDP. Fifty percent of labor is generated by agriculture and related functions, making it the dominant source of income for many in rural and urban communities. Thus, it contributes significantly to the global economy and is responsible for the well-being of people depending directly or indirectly on agriculture. Agriculture is the primary source of farm-generated products such as food grains, vegetables, and fruits [1]. A country's economic growth is greatly impacted by its agricultural sector. It is the main source of income and is vital to enhancing the country's economic status [2]. Additionally, agriculture accounts for a sizeable portion of India's exports, which greatly boosts the nation's benefits in foreign cash [3]. India has a long history that dates back thousands of years. Early texts like the Arthashastra and Vedas, which chronicle the existence of ingrained farming practices throughout the Indian subcontinent, are evidence of this rich legacy [4]. In recent years, India has observed numerous innovative technologies and practices that have transformed the agricultural sector. These innovations have been expected to enhance profitability, productivity, and sustainability for farmers while ensuring food security for the growing population. Due to ignorance and the lack of access to local experts, farmers have historically been unable to identify the majority of problems. The integration of Internet technologies and future-oriented technologies for usage as smart objects is the most fundamental prerequisite for the growth of agriculture [5–9]. Applying data-driven agriculture management can help solve production problems, but for better results, competent data analysis is required. As experts rethink agricultural practices, robots are positioned to be a key player in the evolution of agriculture [10].

Technology advancements promote the growth of agriculture [11, 12]. Increased agricultural output strength results from the use of cutting-edge technology like geographic information systems (GIS), unmanned aerial vehicles (UAVs), image processing, land management, and precision agriculture. Farmers may obtain crucial crop and market information using digital agriculture, which uses information and communication technology [13]. Agriculture revolves around the principles of productivity, control, and delivering optimal outcomes. However, the challenge lies in automating all agricultural activities using machines and robots. This necessitates the development of new technological innovations to achieve a seamless agriculture industry [14]. Smart agriculture, as the name suggests, embodies the qualities of cleverness, perception, and intelligence [15]. Smart agriculture is a highly automated and systematic method of farming. It involves the continuous monitoring of multiple aspects within the farm environment, including climate conditions, water availability, humidity levels, livestock health, and crop growth. By doing so, the system generates intelligent decisions and valuable insights, either to guide human intervention or autonomously optimize farming processes [16]. These advanced technologies enable the visualization of the collected information and the performance of in-depth analysis to extract meaningful insights. With the aid of these technologies, farmers may gain a full understanding of the conditions on their farms and use data analysis to inform their actions [17]. Smart agriculture makes use of cutting-edge technologies like big data, cloud computing, and the Internet of Things (IoT) to automate and expedite multiple farming activities. It enables the recognition, automation, and exploration of diverse farm operations. This involves leveraging hardware and software technologies such as sensor nodes, control systems, robotics, satellite imaging and positioning, data storage and analysis, alert systems,

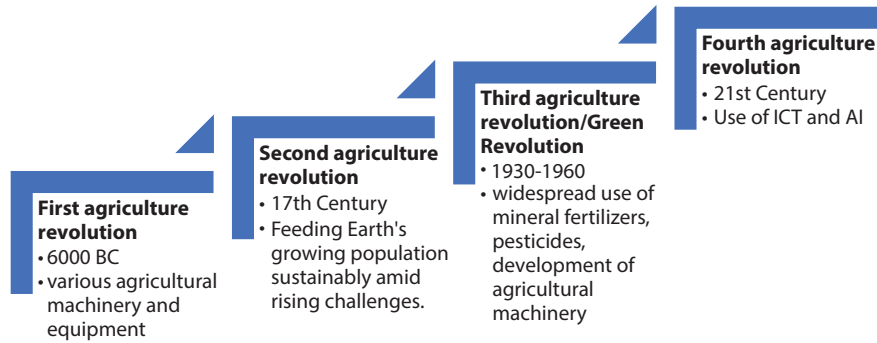


Figure 2.1 Agricultural revolution phases.

drones, and robots [18]. The leading goal of smart agriculture is to enhance the agricultural sector by promoting efficiency, sustainability, and superior quality throughout the entire farming cycle while addressing the specific needs of the farmers. Figure 2.1 indicates the progressive agriculture revolution phases in India and use of ICT and AI for its betterment.

The next section describes the systematic literature review comprised of two subsections: first, the PRISMA method was used to short-list the research articles for the review purpose. Furthermore, a visual literature review is provided so that the various associated terms with the given topic are visualized well in advance.

2.2 Systematic Literature Review

A thorough and methodical technique to examine the body of literature on a particular subject or research issue is known as a systematic literature review. It entails a methodical and organized process of locating, picking, assessing, and synthesizing pertinent research in order to present an objective and thorough overview of the state of knowledge of a certain topic. The objective of a literature review is to provide openness in the selection and assessment of research while minimizing bias.

2.2.1 PRISMA Protocol

For a solid and robust literature review, content analysis as part of the meta-analysis has to be conducted [19]. The quantitative method of analysis was chosen as suggested by previous studies [20, 21]. PRISMA, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses, is a universally designed set of guidelines [22] helpful to conduct systematic reviews and meta-analyses. The PRISMA protocol as previously mentioned consists of a checklist [23] item and a research flow diagram which clarifies the purpose of systematic reviews and meta-analyses so that the entire process is visualized with transparency to the stakeholders. The checklist consists of crucial components such as the title, abstract, methods, results, discussion, and funding. These components are very much helpful for applying search strategy, filter strategy, data collection, data extraction and analysis, and interpretation of the results.

The PRISMA flow diagram is a four-phase pictorial representation of a process—identification, screening, eligibility, and inclusion of research articles as shown in Figure 2.2.

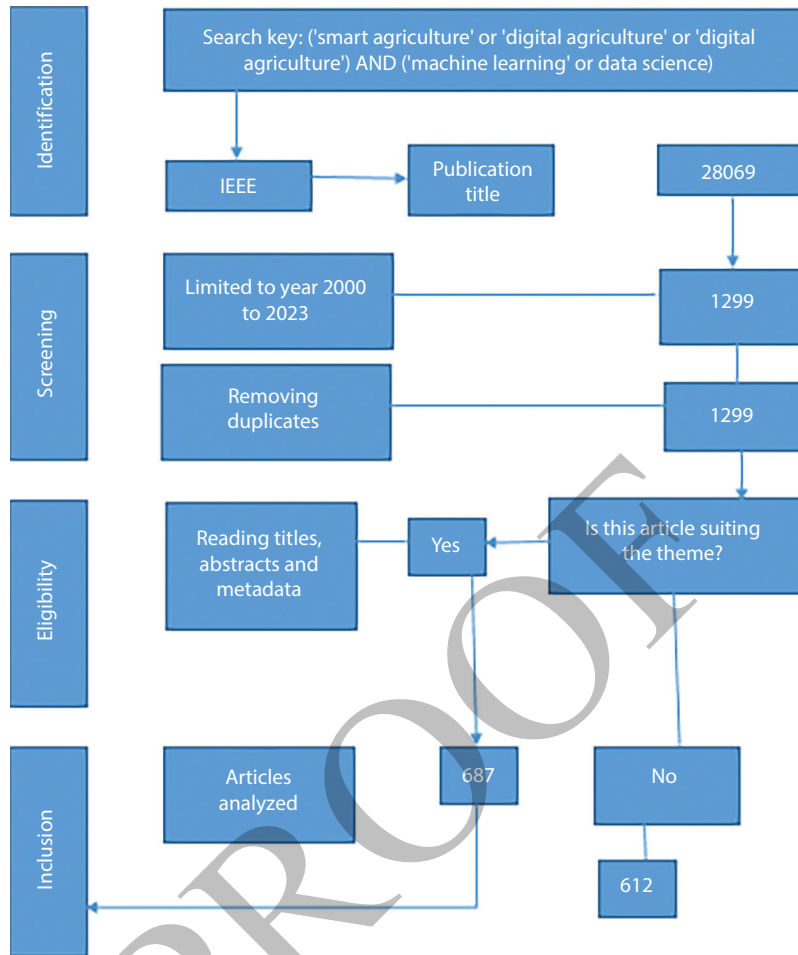


Figure 2.2 Application of PRISMA for literature review.

2.2.2 Visual Literature Review

The research subtopics are being noted by performing a literature review using various research tools that create the image for the review at a glance. The tools used are Carrot2, Open Knowledge Maps, and Citation Gecko. Carrot2 is an open-source engine [24] that creates clusters of documents and represents them pictorially. It supports five different languages, namely, English, French, German, Italian, and Spanish, and supports documents from eight countries, i.e., Austria, France, Germany, Great Britain, Lichtenstein, Italy, Spain, and Switzerland. A visual representation as indicated in Figure 2.3 was generated when the search keyword “smart agriculture” was used. Figure 2.4 depicts the sunburst chart generated from Carrot website with keyword ‘smart agriculture’, thus elaborating major concerns of the related.

Citation Gecko is a graphical user interface [25] exclusively created to find the association between various papers for the related keyword(s). A visual representation was generated when using the search keyword “smart agriculture,” and all the papers were considered to be “seed papers.” As a result, two visualizations were created: a list of seed papers and clusters of seed papers and related papers. The visualizations are given below:

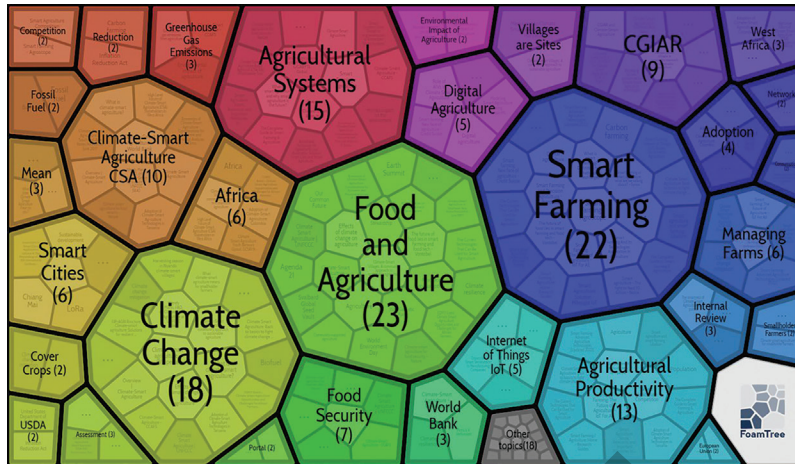


Figure 2.3 Tree map generated with the keyword “smart agriculture” from Carrot2.

As shown in Figure 2.5, the center of the cluster is the seed paper and the others are the papers citing the seed paper shown in yellow color. It can be noted that the seed papers are surrounded by many other papers in most of the cases; however, in some cases, the seed papers are in isolation.

After a sound understanding of the systematic literature review and visualizing various dimensions of the given topic, bibliometric analysis is performed. Bibliometric analysis is used to quantify the research article data to know the impact of various research articles.

2.3 Bibliometric Analysis

The effect and visibility of research articles within a particular subject or discipline are assessed using bibliometric analysis, a sort of quantitative data analysis. Bibliometric analysis [26], a type of quantitative data analysis, is used to evaluate the impact and visibility of research articles within a given subject or discipline [27, 28].

2.3.1 Research Database

To initiate a bibliometric study, the initial step involves determining a suitable database from which to retrieve relevant documents. A bibliometric analysis was performed utilizing IEEE Xplore (Institute of Electrical and Electronics Engineers), a research database providing a collection of various research articles in the field of electrical engineering, electronics, computer science, and concerned domains [30]. It consists of four million documents comprised of research articles, conference proceedings, standards, books [31], and other publications. IEEE Xplore considers data in various formats: .ris, .bib, and .csv. IEEE Xplore performs basic and advanced search to apply the foundation queries or filter methods respectively. Moreover, the platform offers data with multiple dimensions, including article type, publication year, author, affiliation, publication title, publisher, conference location, standard status, standard type, and publication topics. This enables users to search for terms within titles, titles/abstracts, journal names, author names, or affiliations, facilitating

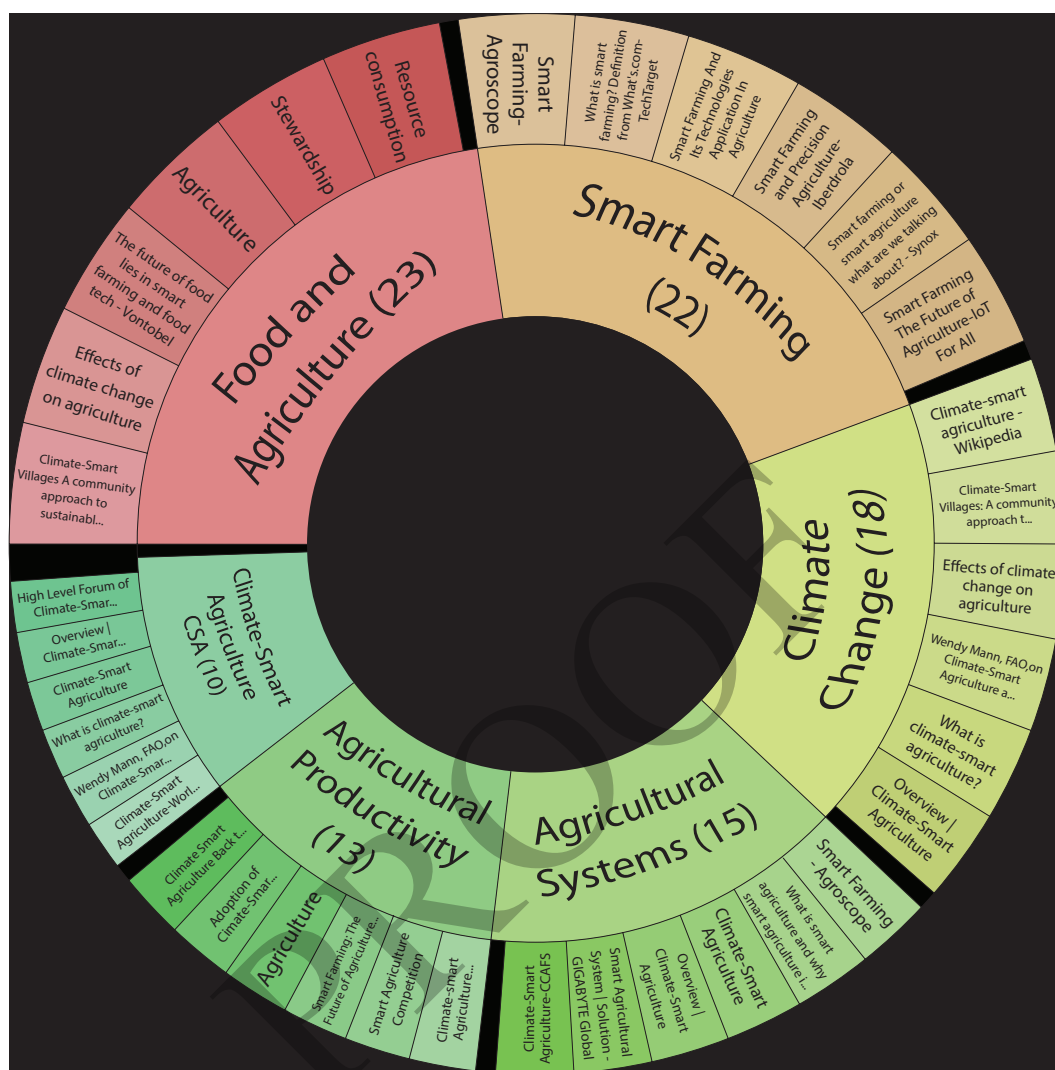


Figure 2.4 Sunburst chart generated with the keyword “smart agriculture” from Carrot2.

precise and targeted searches within the database. Data from about 2,000 research articles have been selected and downloaded in .csv format.

2.3.2 Search Strategy

Another challenge in bibliometric studies is constructing a valid search query that strikes a balance between retrieving a significant number of relevant documents while minimizing the presence of irrelevant (false-positive) results. This challenge is particularly relevant in the field of agriculture, where numerous technologies are augmenting research endeavors. The technologies include big data, artificial intelligence, and machine learning. However, in the current study, since machine learning is one of the disruptive technologies, the authors reviewed multiple articles on the said technology. As depicted in Table 2.1, the search query term “smart agriculture” and “machine learning” were searched for “full text

Table 2.1 Cluster of seed papers generated with the keyword “smart agriculture” from Citation Gecko.

Sr. no.	Theme	Description
1.	The motor themes	The field of research structuring themes is highly significant and well-developed. These themes hold a prominent position on the strategic map, specifically in the upper right quadrant.
2.	The niche themes	The themes within this domain are characterized by their specialized nature and peripheral position. These themes are situated in the upper left quadrant of the strategic map.
3.	The emerging or declining themes	Themes with low density and low centrality on the strategic map represent emerging or declining topics. These themes are located in the lower left quadrant, indicating their potential for growth or the possibility of diminishing importance.
4.	The basic themes	The themes located in the lower right quadrant are significant and hold potential although they are not yet well-developed in the research field. These themes are fundamental, encompassing general concepts that cut across various areas within the research field. They are considered transversal, providing a foundation for further exploration and advancement.

and metadata,” and this was done to gain more dimensions about the query terms. The year of search selected was from 2001 to 2023. A metric known as centrality measures how much a network of keywords interacts with other keyword networks. It gauges the degree to which various networks are interconnected. Contrarily, density measures a network’s internal cohesiveness or strength by examining how closely and intricately interwoven its words are. We may divide the themes into four different groups based on their varied levels of centrality and density by taking both centrality and density into account [32]. As depicted in Figures 2.5 and 2.6, the cluster of research paper generated from the search term termed as ‘seed term’, in this case ‘smart agriculture’ is searched at citation gecko website. As a result a linear and cluster of research papers related to the seed papers are being generated and are depicted in Figures 2.5 and 2.6. Citation gecko is a search engine website to generate a relationships among various research papers.

Q1

2.3.3 Advance Search

(“Document Title”:agriculture) OR (“Document Title”:farming) AND (“Document Title”:big data) AND (“Author Keywords”:climate) OR (“Author Keywords”:environment, global warming) OR (“Author Keywords”:temperature, hot, heat, season, wind, air, rain).

Data were exported from the obtained literature into Microsoft Excel. The data that were exported contained information on the yearly increases in publications, document types, languages, nations, authors, institutions, journals, citations, and funding organizations. In order to construct network visualization maps, the acquired literature was also exported to

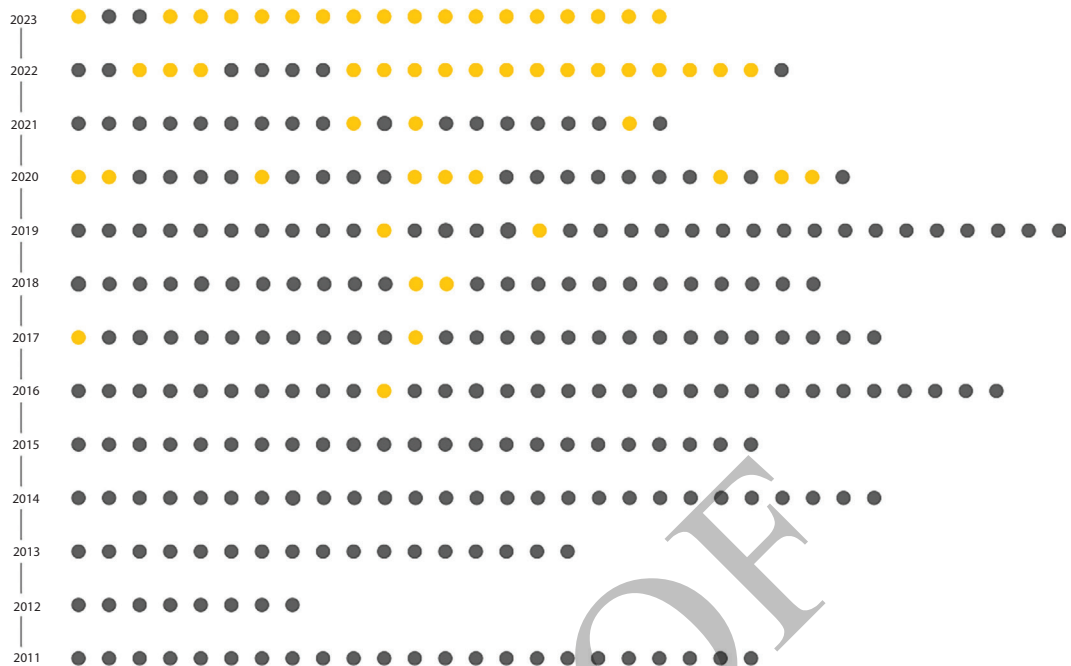


Figure 2.5 List of seed papers generated with the keyword “smart agriculture” from Citation Gecko.



Figure 2.6 Cluster of seed papers generated with the keyword “smart agriculture” from Citation Gecko.

the VOSviewer. The VOSviewer software possesses the ability to establish networks among concepts, terms, and keywords. Utilizing the Visualization of Similarity (VOS) algorithm, VOSviewer generates maps that visually represent these networks. The distances between pairs of objects on the map accurately depict their similarity with high mathematical precision [33]. We utilize a feature that enables the creation of co-occurrence networks using keywords. In these networks, keywords utilized by authors are represented as nodes. The size of each node reflects the frequency of occurrence of the respective keyword. Additionally, the links between nodes are proportional to the degree of co-occurrence between the associated words [34].

To showcase the strength of international research collaboration, we utilized the total link strength (TLS) metric, which is automatically generated by VOSviewer when mapping the research activities of selected nations. The TLS metric serves as an indicator of the extent and intensity of collaborative ties between countries in the research domain, providing valuable insights into the level of cooperation and knowledge exchange among nations. The degree of international research collaboration is inversely correlated with the TLS, with a higher TLS value indicating more collaboration. During that period, the primary research focused on the advancement of digital agriculture encompassing several key areas. These included the establishment of comprehensive databases, the formulation of metadata standards, the innovation of monitoring systems, the design of decision-making forecasting systems, and the implementation of information dissemination systems. These research endeavors aimed to lay the foundation for the progress and development of digital agriculture [35, 36]. However, in the subsequent years, there was a scarcity of publications focusing on these subjects. For the study, the quality journals were considered with high citations and h-index [37]. The top 10 active bibliometric indicators were displayed. Tableau was utilized to depict the annual growth of publications.

In the present study, the authors devised an extensive and inclusive search query with the aim of retrieving all relevant documents pertaining to different aspects of agriculture.

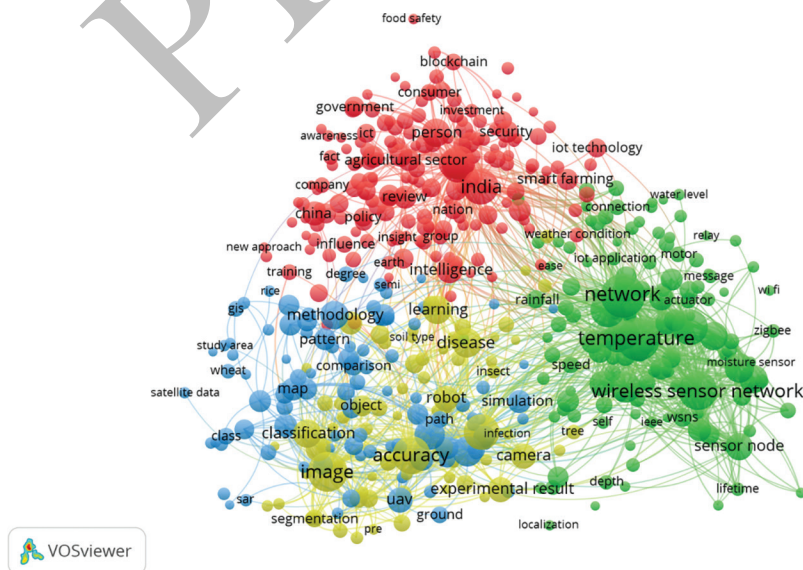


Figure 2.7 Binary counting 409/845.

The search query was meticulously constructed, primarily focusing on both the full document and metadata, ensuring that the retrieved documents were clearly and directly related to the subject of interest. The documents obtained from the search query specifically targeting climate change were referred to as “climate-related literature.”

Documents related to various technologies and related to agriculture such as wireless sensor network, artificial intelligence, and blockchain along with the various issues and concerns such as privacy, security, scalability, and reliability were obtained. The documents retrieved for technology were called “technology-related literature.”

Documents related to agriculture and related dimensions such as global warming, farming, vegetation, disease, food safety, food security, smart farming, and traditional farming were obtained. The documents retrieved for technology were called “agriculture-related literature.”

As shown in Figure 2.7, the three clusters thus formed provide a list of items (see also Table 2.2).

As part of the visual representation of the literature review, it was decided to find article citation and patent citation number. As a result, the following visualization “viz” to be precise was created using Tableau Desktop. It was found that article citation count gradually increased; it was more significant in the years 2017, 2018, and 2019, and then it declined. However, for the patent citation number, we can find a sudden hike in the form of “spikes” for the years 2005, 2007, 2012, and 2018. The article citation and patent citation numbers from 2001 to 2022 are shown in Figure 2.8. Furthermore, Figure 2.9 depicts the exponential rise in the article and reference count is given in Figure 2.9.

Table 2.2 Types of cluster, cluster color, and the related significant words.

Cluster no.	Cluster color	No. of items	Percentage of items in the cluster (%)	Name of items arranged in ascending order
1	Red	177	36.49	Agricultural sector, communication sector, population, India, smart farming
2	Green	133	27.42	Network, communication, humidity, temperature, soil moisture, wireless sensor network, irrigation system
3	Blue	100	20.61	Experiment, index, mapping, imagery classification, UAV, season, measurement
4	Yellowish green	75	15.46	Accuracy, camera, image, disease, deep learning, robot

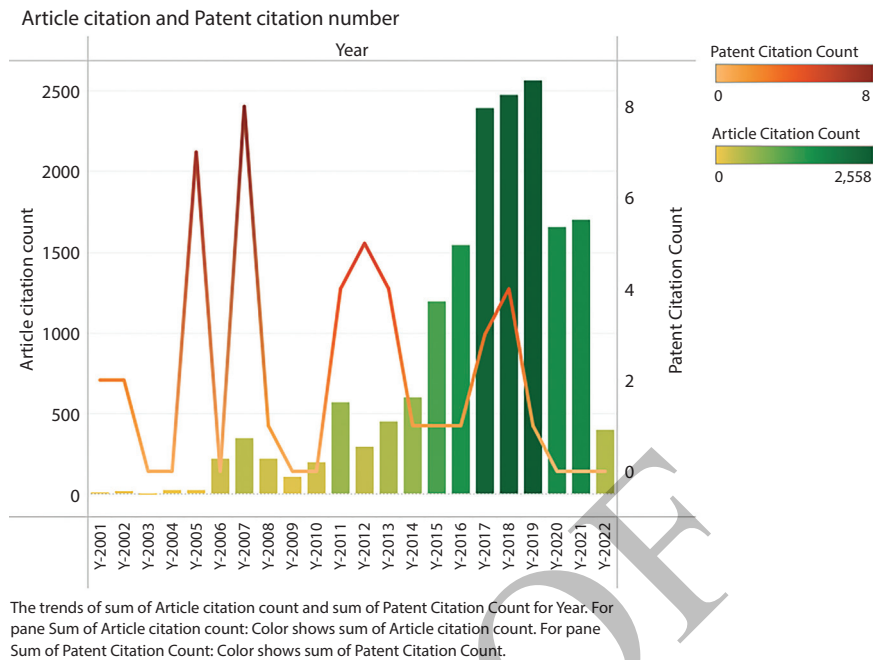


Figure 2.8 Article and patent citation count from 2001 to 2022.

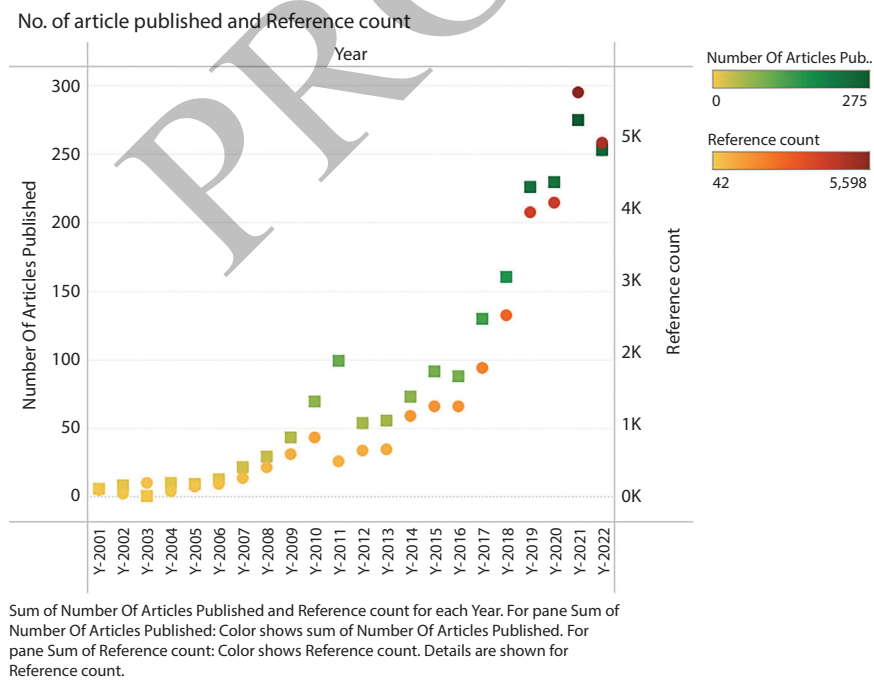


Figure 2.9 Article published and reference count from 2001 to 2022.

As part of the visual representation of the literature review, it was decided to explore the number of articles published and their reference count. As a result, the following visualization “viz” to be precise was created using Tableau Desktop. It was found that the reference count growth is proportional to the number of articles published.

The subsequent section describes the study of various technologies performed for smarter and sustainable agriculture. The work conducted so far gives an idea about various agriculture functions and technology utilization for effective implementation.

2.4 Related Study

After performing the systematic literature review, three types of reviews were conducted: climate literature review, technology literature review, and agriculture literature review. The climate-related literature review comprises the rain prediction model, climate-oriented agricultural activities, paperless organization strategy to reduce paper consumption, use of decision support tools, greenhouse effects, etc. The agriculture-related literature consists of technology; thus, the following section specifies the techno-agricultural review claiming the entire section as smart agriculture.

2.4.1 Climate-Related Literature

Weather conditions are highly unpredictable leading to loss of agriculture yield, negatively impacting its quality and yield stability. More focus has been placed on shifting climatic circumstances as a result of scholars’ growing interest in the study of weather and how it affects agriculture. Climate conditions are largely associated with rainfall frequency and quantity in terms of water level. Hence as per [38], a long short-term memory (LSTM) system is required for the rainfall prediction model, which is built on the deep learning framework, to produce a superior prediction performance. The climatic conditions are highly unpredictable, and farm production is dependent on the behavior of the respective climate location. Optimizing the impact of weather on agriculture involves employing a range of techniques, including correlation analysis, multidimensional modeling, k-means clustering, artificial neural networks (ANNs), support vector machines (SVMs), knowledge graph classification (KG classification), partitioning around medoids (PAM), clustering large applications (CLARA), and density-based spatial clustering of applications with noise (DBSCAN) [39]. There is a need to develop a tool that takes into account the conventional farmers’ crop calendars created by years of farming experience and has strong relevance and adaptability to the changing climate conditions and predictions of agricultural activities. The CCAFS research program on Climate Change, Agriculture and Food Security [9] is interested in connecting its research findings with open data sources, software developers, and problems in Latin America, and they held a hackathon in Lima in 2014 to create innovative applications that assist farmers in basing their decisions on scientific evidence. The demand and supply relation prevails: if the demand increases, supply also increases, and vice versa. In this case, the more the amount of pages used in any organization, the more impact it has on global warming. When we concentrate on the studies, we found that deforestation caused by the growing demand for paper has a negative impact on our planet [40]. The massive clearing of trees has a negative impact on the earth’s climate impacting global pollution.

To support agricultural decisions, decision support tools (DSTs) are used by NASA for the following uses/cases: a) GISS GCM and other GCMs consider the synoptic of the region than just designing a scenario product to understand how fluctuations in climate affect major climate variability systems and their Central American teleconnections; b) the use of DST-GISS GCM, other GCMs, and RCMs to analyze extreme climate changes such as heat waves, droughts, and floods; and c) TRMM, GPCP, PERSIANN, and CMORPH to develop probable scenarios which cater the various climate changes that could occur in the future [41]. The climatic quantitative data such as temperature, humidity, and direction of the wind can be measured by cloud-based and lab stations to simulate farm scenarios [42]. Agricultural activity impacted by greenhouse effects is significantly affected by global warming. This study examines the economic impacts of global warming on agriculture using a worldwide CGE-GTAP model [43].

2.4.2 Technology-Related Literature

Modern technology is used in “smart agriculture,” often referred to as “precision agriculture” or “digital farming,” to optimize agricultural practices, increase output, and use as few resources as possible. This literature review examines the most recent advancements in smart agriculture, concentrating on the tools and software used in this field. The paper emphasizes how smart agriculture affects a variety of factors, including agricultural productivity, resource efficiency, environmental sustainability, and economic viability. This review seeks to provide light on the state of smart agriculture now and suggest areas for future research by looking at a variety of studies. By carefully monitoring and managing numerous elements including irrigation, fertilization, and pest control, farmers can increase crop yields, enhance crop quality, and reduce input wastage by utilizing smart agricultural techniques. Maximizing agricultural productivity helps to ensure global food security while simultaneously increasing farmer profitability. Additionally, essential in encouraging sustainable farming methods is smart agriculture. Farmers may effectively manage their water resources, use less chemicals, and embrace eco-friendly pest management methods by utilizing sensor networks, satellite images, and predictive analytics. This helps to lessen the negative consequences of climate change, conserve natural resources, and lessen the impact of agriculture on the environment. Additionally, smart agriculture improves decision-making by giving farmers access to real-time data and insights. By examining a lot of data, farmers may make informed decisions about crop planning, market trends, and resource allocation. Farmers now have the chance to boost the output, efficiency, and overall profitability of their farms. Although smart agriculture offers a lot of potential, some issues still need to be resolved before it can be employed extensively. The main obstacles are issues with data security and privacy, poor connectivity in rural areas, and the requirement for specific solutions for small-scale farmers. Additionally, frameworks for policy and regulation need to be created to encourage the use of smart agriculture techniques and guarantee that all farmers have equitable access to technology.

The research article outlines the key metrics that need to be tracked in order to maximize the automation system’s efficiency. In MATLAB, a mathematical model was created using the measured precipitation, perturbations, and soil humidity as input and output variables [44]. The prototype thus designed is termed the DesignWare ARC EM Starter Kit [45]. The Synopsys ARC EM family of embedded CPU cores is used to monitor plant development.

This is accomplished by keeping an eye on a number of characteristics, including soil moisture, nutrients, pH, temperature, soil texture, weather, and light, utilizing a network of sensors. Actuators are also used by the system to maintain and modify these settings as needed. This paper presents a unique technique that incorporates information from vineyard 3D point cloud models, thermal imaging, and multispectral pictures to reliably measure the variability of canopy states within row plan vineyards. The proposed approach seeks to analyze and combine these many data sources to offer a thorough insight into the health and growth trends of the grapevine. In [46], the authors make use of spectral and spatial data collected using remote sensing methods. For precision agriculture, the ATmega328P microcontroller in Arduino Uno was used to sense the soil moisture, turn on the sprinklers, generate an alarm signal in case of external agents, and monitor in real time agriculture fields with good efficiency [47]. In [48], a new approach for processing and combining data from a vineyard 3D point cloud model, thermal imagery, and multispectral imagery was presented, with the goal of accurately representing the canopy state fluctuation among row layout vineyards.

2.5 Conclusion

In conclusion, smart agriculture has enormous potential to revolutionize conventional farming methods and solve farmer problems, hence transforming the agricultural industry. Smart agriculture has given the road map for the future economy across the nation and worldwide and has given directions for the current and forthcoming agriculture systems to witness changes in the economy using smart agriculture. The technologies are disruptive in nature and overpromising and provide multifaceted and one-click solutions. The present chapter discusses about various technology frontiers to devise the smart ecosystem for the agricultural ecosystem.

The book chapter discusses the emerging research trend using PRISMA to filter research articles in a systematic and structured manner. The visual literature review is an unconventional method used to leverage the utilization of artificial intelligence tools to facilitate the research processes. The systematic literature review augmented by various graphs and images makes the review much stronger and lays an impact on the depth of smart agriculture coupled with the implementation of tools. The impact of climate change on socioeconomic life and more precisely on traditional and modern agriculture is crucial, which is also highlighted in this research.

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(M.B.A.)**

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Unit-2

(A) Production Planning System and (B) Forecasting

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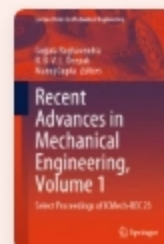
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Analysis of Vibration of a Rotor-Bearing System Caused by Radial Clearance, Number of Balls and Rotor Speed

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Abstract

This article aims to study the effects of changes in internal radial clearance, number of balls and rotor speed on the vibration responses of a balanced rotor-bearing system. This rotor-bearing system is modeled and simulated using FEA software ‘COMSOL Multiphysics’. The rotor-bearing system consists of a rotor shaft and rigid disk, which are supported by two SKF 6205 bearings. Three levels of each factor are considered, i.e., three radial clearances: 1, 27 and 53 μm , three ball numbers: 6, 9 and 12 and three rotor speeds: 2800, 6500 and 10200 rpm. The mean displacement (MEANZ) and RMS velocity (RMSVZ) of the inner race center (IRC) in vertical direction (Z-direction) are used as output vibration responses. Full factorial design (FFD) and analysis of variance (ANOVA) are used for design of experiments and their analysis, respectively. Regression equations are prepared, and various plots are plotted using Design Expert software. The results show that MEANZ increases considerably with increase in radial clearance; however, it decreases slightly with increase in number of balls. But, MEANZ is not affected by the change in rotor speed. Also, the RMSVZ increases significantly with increase in radial clearance, increases slightly with rotor speed, and decreases with increase in the ball numbers. This study will enable vibration diagnostic experts to grasp the impact of three factors that lead to vibrations in the rotor-bearing system.

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Advances in Research
and Applications



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