Papers Published in UGC Care List

Papers Published in UGC Care List

S. No	Title of the Paper	Name of the Author	Department of the teacher	Name of the Journal
1.	Physical and Social wellbeing of women in underpaid and overloaded jobs.	Dr. Lily Regina Arthi S	Department of Business Management	Journal of Statistics & Management System (Web of Science Coverage)
2.	The Role and Application of ICT in Agriculture: Creating Smart Farmers.	Mr. Ranjith Kumar A	Department of Commerce	Rabindra Bharati University Journal of Economics. (Hard Copy)
3.	A Research Study on Standard Wireless Network and Information Security.	Ms. Pradeepa M	Computer Application	Journal of Oriental Institute. (Hard Copy)
	A Novel Approach based on Fuzzy Rule and LSOWL-CNN Forecasting Students with dropout prediction and Recommendation Model	Ms. Marina B	Computer Application	Wireless Personal Communication (SPRINGER)
4.	Organizational Commitment- A study on Teachers Working in Engineering Colleges.	Dr. Lily Regina Arthi Moses	Business Administration/ School of Commerce & Management	IPE Journal of Management
5	The Influence of Emotional Intelligence on Investment Decisions Patterns of working Women.	Ms. Madhu T	Commerce and Management	International Journal of Cultural Studies and Social Sciences

Journal of Statistics & Management Systems
ISSN 0972-0510 (Print), ISSN 2169-0014 (Online)
Vol. 26 (2023), No. 7, pp. 1613–1626
DOI : 10.47974/JSMS-1129

Physical and social wellbeing of women in underpaid and overloaded jobs

P. Priyadarsini *
S. Prithi †
P. Anbarasan §
Department of Management Studies
Tagore Engineering College
Chennai
Tamil Nadu
India

J. Krithika ‡
Department of Management Studies
Xavier Institute of Management & Entrepreneurship
Chennai
Tamil Nadu
India

S. Lily Regina Arthi @
Department of Business Administration
St. Anne's Degree College for Women
Halasuru
Bengaluru
Karnataka
India

* *E-mail:* **hod.mba@tagore-engg.ac.in (Corresponding Author)**
Scopus ID -36867775900, Orcid ID -0000-0003-2784-8733
† *E-mail:* **sprithi@tagore-engg.ac.in**
Orcid ID -0000-0003-4831-4925
§ *E-mail:* **panbarasan@tagore-engg.ac.in**
Orcid ID -0000-0002-7915-4234
‡ *E-mail:* **krithika.j@xime.org**
Scopus Id 5802436700, Orcid ID -0000-0002-1611-3785
@ *E-mail:* **regimoses@yahoo.com**
Orcid ID -0000-0002-9446-0926

Abstract

The 21st century has seen a drastic transformational shift in the workforce. Women are actively participating in the workforce to have their own identity, source of income and career. There is no industry that women has stepped into, for instance automobiles, manufacturing industries, chemical industries etc. The penetration of women into white collared, pink collared and blue collared jobs are high compared to 19th and 20th century. Even though women have started to bloom in their career, they are still bounded by the traditional family responsibilities. Due to which women face many struggles in balancing their work and family. This paper discusses about the factors that hinder the survival and growth of women employed in underpaid and overloaded jobs. This empirical paper also narrates the effects of conflicts with family members, workplace conflicts, hindrance factors that make blue collared women to struggle to complete the related task leading to poor equilibrium between work and personal life.

Subject Classification: *90B50, 90B70.*

Keywords: *Work-life imbalance, Conflict factors, Blue-collar jobs.*

1. Introduction

Gender studies have stated that women's participation in work and educational attainment have seen an exponential growth in the past four decades. Women have enhanced their credential than earlier but the work and income prospects are not notable in jobs were women are underpaid but overloaded. Women in business, whether they work in the corporate sector or run small businesses, like Asia Ghazi, Gabriella Miramontes, and Maria Brahme, want to be a part of society. As a result, they devote a significant amount of their time to finding answers while managing their organisations or communities. Females tend to make up two-thirds of the approximately 20 million labours in the low-wage workforce - although they only make up fewer than partial of all workforces. "women's evolution in labour force during last decade has faced limited approach to excellence job roles and endless gender discriminations", mentioned by ILO Deputy Director-General, Mary Chinery-Hesse, who is also a leader of the ILO delegation at the 4th World Conference on Women, that took place in Beijing. This paper discusses on the challenges of women employed in underpaid and overloaded jobs. Abele AE, Spurk D (2011) According to the hypotheses, the study discovered that the gender self-concept's agentic component affected work hours and objective professional success, whereas the communal component affected motherhood. Phillips, J et.al, (2016) While working in rural areas, female family doctors find it difficult to strike a balance between their personal and professional lives.

Women who are employed in SEZ face more financial demand in their family and they are not able to lead a better quality of living with the changes in the economy and cost of living. Al-Asfour, et al.(2017) portrayed that impediments as include, among others, a lack of mobility, the prevalence of gender stereotypes, workplace discrimination, and a lack of possibilities for personal development and career success. Women employed in underpaid jobs have less support for house hold chores and their job demands are high. In the Indian family context women are expected to take care of the household chores and take care of children. It was found the women sleep lesser as they have to make themselves to be prepared to handle both the roles. The lifestyle builds the stress and it is reflected on their family life . Gujirat O, Kumar N (2018) Work life balance refers to maintaining the balance between responsibilities at work and at home. Lee, H.J. & Jung, .E.H. (2021) intrapersonal reserves, which are psychosocial elements including social network satisfaction, self-esteem, and perceived health status, exhibited a stronger correlation with depression in middle-aged and older men than physical reserves like SES.

1.1 *Need for study*

Women occupy 60% of industrialised world and the rate of employment is growing at a faster pace. According to Organisation of Economic Cooperation and Development (OECD), it is inferred that economically- active women in the member States have grown by 24%, double the percentage of men. Likewise in advanced countries, a higher rate of females are into the labour force: Denmark and Sweden with (75%), Switzerland (53%), United Kingdom (59%), Germany (57%.) United States (60%), France (57%) and Canada (58%).

In developing countries, it is found that women contribute to 31% in the formal labour force. It is stated that these women come across discrimination in their career and rarely rely on the organizations to protect their rights. The financial adversities found in the developing countries result in fundamental adjustment programmes, pushing more women into the unorganized sector and overcrowded jobs, as men tend to miss careers in the proper organized sector (Source ILO). With respect to women employed in unorganised sector they have less support for house hold chores and their job demands are high which is considerably different from the well organised sector where mental health and physical health awareness are created and taken care. This research is carried to understand

the physical and emotional well-being of women employed in underpaid jobs in the unorganised sector.

2. Review of Literature

2.1 *Women and Career*

Andal (2002) stated in their studies economically well-being women are developed and improved through their earning which contributed for their self-esteem and better house hold status and development of their family wellbeing. It is stated that gender gap in the proprietorship is the important contributor for the gender difference in the financial wellbeing, societal position and women empowerment'. Afrin, Islam and Ahmed (2010) in their study analysed those problems which are related to monetary management, innovative impulse, skill, self-importance, utilisation of family fund and involvement as the constraining factors. Economic necessity, new job, knowledge of business and family experience, employment of family members, independence, money earning, self-confidence, technical skills, hunger for matching career and participation in the economic development are some of the desires women have. The unfavourable correlations between academics (vs. non-academics) in factors like perceived working conditions and employee commitment were shown to be moderated by the work and personal life balance of the employees (Fontinha et.al, 2019; Yu-Cheng Lai, 2011). Labor force awareness and career counselling, linkages between groups, the function of HR managers, self-managing work teams, rewards, flexible scheduling options, and a supportive and encouraging organisational culture helps employees to have a stress less life (Ahmad S, 2013; Manish Dhingra & Vaishali Dhingra, 2020). The impact of an empowerment program offered through home visits to low-income elderly women who live alone on depression and self-esteem (Lee, J.H, 2005; Promila Das, 2022).

Legal Indian Admin (2010) portrays that 'Women in India even now face evident prejudice in organizations. Sexual harassment at workplaces is one of the challenging issues. Women working for night shifts are highly susceptible to such incidents. For instance, nurses deal with this issue and there is less support provided by hospitals to tackle this situation.

2.2 *Women Employed in Non-Prestigious Jobs*

There exists difference between women who are employed in white collar and blue-collar jobs. It is observed that Women employed in good

quality jobs have quality of working environment and support for house hold than the women who are employed in non-prestigious jobs which are overloaded and underpaid. Women working force of this category face more challenges. Women employed in high-status jobs earn more than women employed in non-prestigious jobs (Talwar & Usha, 1984; Long-Hwa Chen, et.al, 2010). Undoubtedly, they worked to meet their financial demands in family and they did face more economic pressure. The domestic tasks which these women had to do was different from women who were employed in high paid jobs. Vrinda Marwah (2021), women who serve as paid carers as community health volunteers (also known as Accredited Social Health Activists, or ASHAs), get extrinsic rewards. Voydanoff (1989) stated that the financial rewards and pay has significant influence on the positive mental wellness of working women and on the contrary non-working women and less paid women have poor mental health when analysed on the financial independence. Ibrahim, S.A. et al. (2001) high job strain was consistently linked to worse self-rated health in both models for each gender after correcting for relevant variables.

2.3 *Physical and Social Well Being of Women Work Force*

Women who play the dual role face the pressure of meeting the expectation at the workplace and family life. The gender stereo type which prevails creates a societal pressure to meet the roles in the family and expectation in the work enhances the need to satisfy the demands at workplace and degree of support they receive at work place and family influences their social wellbeing (. Women find less time to take care of their health. Sudhinta (2017) in her study conducted among respondents of working women and house wife found that working women received less social support compared to the house wives. It was also inferred that their mental wellbeing was good but their physical wellbeing was not found satisfactory.

Michel (2017) depicted that family role stressors are predictors of family-to-work conflict. Study stated that family-to-work conflict plays a facilitating role affecting work performance at job productivity and has an outcome on withdrawal behaviour. The study has identified that family to work conflict has an relationship on the family involvement.

Kandel in their studies of women employed in high paid jobs their mental health was good as it was an impact of stability between rewards and roles played as wife; mother and earner roles exhibited negative association between depression and working roles. Heo, S.Y. (2021)

Husbands and wives reported on their depressive symptoms and marital satisfaction.

3. Objectives of the study

To examine the variation between obstructing and conflicting factors on work and personal life.

To know the preferences of SESZ women workers towards social factors.

4. Research Methodology

4.1 *Type of Research*

The researchers have adopted empirical type of research followed by descriptive research design to study overworked and underpaid women groups.

4.2 *Sample Design*

Sample size for this study was 200. The responses were collected from women workers belonging to SEZ. Filled questionnaire were collected from the women workers working in underpaid jobs. Convenience sampling method was adopted to collect the responses.

Sample size calculation:

$$\text{Sample size, } n = N * \frac{\frac{Z^2 * p * (1-p)}{e^2}}{\left[N - 1 + \frac{Z^2 * p * (1-p)}{e^2}\right]}$$

Where,
N = Sample size
N = Total Population (Which is 600)
Z = z-Score (95% confidence level, z-score is 1.96)
P = Sample proportion (Which is 0.5)
e = Margin of error (0.05)

$$n = \frac{(1.96)2 \times 0.5 \times (1-0.5)/(0.05)2}{[600 - 1 + (1.96)2 \times 0.5 \times (1 - 0.5)/(0.05)2]}$$

Hence the sample size n = 234.48

The researchers collected around 234 samples by distributing the well - structured questionnaire to the target respondents. Completely filled in questionnaires 200 were only used for the analysis.

4.3 *Research Instrument*

well- structured questionnaire was prepared to collect the data. The questionnaire was divided into part I consisting of demographic profile, part- II consisting of Hindrances or Challenges faced by women and part-III –Comprises the factors pertaining to the physical & social wellbeing .

4.4 *Data analysis and Procedure*

Using SPSS software, ANOVA was used to evaluate the data. Anova was adopted to identify the significant variation between the variables. Weighted average method, was adopted to learn the preferences of women workers when it comes to social factors.

5. Data Analysis and Interpretation

5.1 *ANOVA*

H_1: There is a significant variation between hindering and conflict factors at work life balance.

H_1a: There is a significant variation amongst extended working hours and the respondent's responses towards there is an Imbalance among work and personal life.

H_1b: There is a significant variation amongst issues of workplace annoys me at home and the respondent's responses towards there is an Imbalance among work and personal life.

H_1c: There is a significant variation between miss family events because of work responsibilities and the respondent's responses towards there is an Imbalance among work and personal life.

H_1d: There is a significant variation between feeling Guilty for not spending enough time with family and the respondent's responses towards there is an Imbalance among work and personal life.

H_1e: There is a significant variation between my routine activities get disturbed by family conflict and the respondent's responses towards there is an Imbalance among work and personal life.

Figure 1

Descriptives table of N, mean, standard deviation, standard error & Confidence interval for mean.

Attributes		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound			
Prolonged working hours	Strongly agree	58	2.11	1.383	.127	1.86	2.36	1	5
	Agree	98	1.52	.990	.071	1.38	1.65	1	5
	Neutral	23	2.76	1.283	.156	2.45	3.08	1	5
	Disagree	17	2.67	1.379	.166	2.34	3.00	1	5
	Strongly disagree	4	1.73	1.162	.168	1.39	2.07	1	5
	Total	200	2.01	1.298	.058	1.89	2.12	1	5
Issues of work place annoys me at home	Strongly agree	58	3.74	1.004	.092	3.56	3.92	1	5
	Agree	98	3.56	.988	.071	3.42	3.70	1	5
	Neutral	23	2.85	1.149	.139	2.57	3.13	1	5
	Disagree	17	3.54	1.008	.121	3.29	3.78	1	5
	Strongly disagree	4	3.98	.601	.087	3.80	4.15	1	5
	Total	200	3.54	1.031	.046	3.45	3.63	1	5
I miss family events because of work responsibilities	Strongly agree	58	4.03	.858	.079	3.87	4.18	1	5
	Agree	98	3.63	.816	.058	3.51	3.74	1	5
	Neutral	23	3.09	.910	.110	2.87	3.31	1	5
	Disagree	17	3.70	.960	.116	3.47	3.93	1	5
	Strongly disagree	4	4.56	.848	.122	4.32	4.81	2	5
	Total	200	3.75	.941	.042	3.67	3.83	1	5
I feel Guilty for not devoting enough time with my family	Strongly agree	58	4.50	.919	.084	4.33	4.66	1	5
	Agree	98	3.75	.682	.049	3.65	3.85	1	5
	Neutral	23	3.10	1.053	.128	2.85	3.36	1	5
	Disagree	17	3.80	.833	.100	3.60	4.00	1	5
	Strongly disagree	4	3.92	.767	.111	3.69	4.14	1	5
	Total	200	3.86	.928	.041	3.78	3.94	1	5

Contd...

My routine activities get disturbed by family conflict	Strongly agree	58	2.93	1.382	.127	2.68	3.18	1	5
	Agree	98	3.71	.824	.059	3.59	3.83	1	5
	Neutral	23	3.19	1.026	.124	2.94	3.44	1	5
	Disagree	17	3.78	.921	.111	3.56	4.00	1	5
	Strongly disagree	4	4.48	.743	.107	4.26	4.70	2	5
	Total	200	3.54	1.111	.050	3.44	3.64	1	5

Figure 2

ANOVA table of sum of squares, Mean square, df and significant value

Attributes		Sum of Squares	df	Mean Square	F	Sig.
Prolonged working hours	Between Groups	121.400	4	30.350	20.878	.001
	Within Groups	119.582	195	1.454		
	Total	240.982	199			
Issues of work place infuriates me at home	Between Groups	46.143	4	11.536	11.799	.000
	Within Groups	283.975	195	.978		
	Total	330.118	199			
I miss family events because of work responsibilities	Between Groups	73.621	4	18.405	24.715	.006
	Within Groups	168.627	195	.745		
	Total	242.248	199			
I feel Guilty for not devoting enough time with my family	Between Groups	49.875	4	22.469	32.750	.000
	Within Groups	289.603	195	.686		
	Total	329.478	199			
Family issues bothers me at work	Between Groups	104.159	4	26.040	25.169	.000
	Within Groups	212.119	195	1.035		
	Total	316.278	199			

From Figure 1, it infers that the highest mean value for the first attribute is 2.76, which shows that respondents are neutral with their opinion that prolonged working hours causes less balance between work and home life. The lowest mean value 1.52 was inferred for the statement that prolonged working hours causes less balance between personal and work life. The second attribute- issues of work place infuriates me at home has the highest mean value of 3.98, with respect to being neutral was

analysed with lowest mean of 2.8.The third factor Missing family events due to roles at work has the highest mean value of 4.56 ,which exhibits that work responsibilities creates less balance between personal and work life. The minimum value of the third attribute is 3.09, which exhibits neutral opinion towards the statement I miss family events due to work responsibilities which creates less balance between personal and work life. The fourth attribute I feel guilty for not devoting enough time with family has a maximum value of 4.50.

The fifth attribute- Family issues bother me at work has the highest mean value of 4.48, inferring that family issues bothers them at work that causes less balance between personal and work life. The maximum mean value of the attribute- my routine activities get disturbed due to family conflict, is 4.02, which states that respondents strongly disagree with the statement that my routine activities get disturbed due to family conflict creating less balance between personal and work life.

From Figure 2, it is inferred that there exhibits a significant variation between obstructing and conflict factors on work and personal life Balance. Since the corresponding significance value is lesser that 0.05. Accept alternative hypothesis, H1a, H1b , H1c, H1d & H1e. Therefore, from the table it is inferred that there is a significant variation between obstructing and conflict factors on work life balance.

5.2 *Weighted Average Method*

Figure 3

Coefficient of Variations

Social Factors		**Completing Deadlines**	**Helping colleagues at work**	**Helping colleagues in their personal problem**	**Team work**	**Motivating co-workers to achieve targets**	**Interpersonal relationship**	**Counselling to friends**
N	Valid	200	200	200	200	200	200	200
	Missing	0	0	0	0	0	0	0
Mean		6.94	6.86	8.64	9.94	10.7	9.42	8.30
Std. Deviation		4.39	4.64	4.39	4.22	5.34	4.98	4.00
Coefficient of variation %		63.3	67.6	50.8	42.4	49.9	52.8	48.1

Figure 4
Ranking of Social Factors

Ranking Factors	1	2	3	4	5	6	7	Weighted Avg	Ranks
Completing Deadlines	56	90	13	25	15	0	1	40.8	1
Helping colleagues at work	16	80	65	20	10	5	4	37.17	2
Helping colleagues in their personal problem	13	15	26	96	37	6	7	29.4	5
Team work	7	28	8	17	95	27	18	16.6	7
Motivating colleagues to achieve targets	58	38	12	70	8	6	8	33.2	4
Interpersonal relationship	20	19	32	25	65	5	34	36.3	3
Counselling to friends	17	68	17	17	15	23	43	29	6

From the Figure 3 it infers that there is a greater coefficient variation (67.6%) for their responses towards helping colleagues at work and there is a lesser coefficient variation (42.4%) for the teamwork. The second greater coefficient of variation (63.3%) was accomplishing targets. It also reveals that most of the respondents gave the same kind of response towards the attribute teamwork when compared to helping colleagues at work.

Figure 4, infers that the majority of the respondents prefers to concentrate on accomplishing targets, help colleagues at work, interpersonal relationship and motivating colleagues at work. The respondents would not prefer activities such as team work and counselling friends.

6. Findings

The analysis of variation is used to find the variation between the variables. Hence, through this the researcher have inferred that extended working hours and conflicting factors related to issues in workplace affecting their personal life and issues in family bother me at work, guilt of not devoting enough time at home

Using the Weighted -Average method, inferred that most of the respondents prefer social factors such as to concentrate on accomplishing targets, help colleagues at work, interpersonal relationship and motivating colleagues at work. The respondents would least prefer activities such as teamwork and counselling friends.

7. Conclusion

Transformation in the HR policies to support WLB has been source of boon to women in white collar jobs but the policies to support work life balance of women in blue collar jobs who are underpaid but overloaded need to be considered by the organization. Working women believe the biggest support they can get is from family. Awareness to be given to the family members, hence, the family members could take initiatives to share the family responsibilities and help the women workers to balance the work and personal life roles by avoiding the traditional societal belief that women must only look after family responsibilities.

References

[1] Abele AE, Spurk D. The dual impact of gender and the influence of timing of parenthood on women's career development: Longitudinal findings. *International Journal of Behavioral Development* 35(3): 225–232 (2011).

[2] Afrina, Sharmina, Nazrul Islam and Shaid Ahmed. Micro Credit and Rural Women Entrepreneurship Development in Bangladesh: A multivariate Model, *Journal of Business & Management*, 16 (1) (2011).

[3] Ahmad S. Paradigms of quality of work life. *Journal of Human Values*, 19(1), 73–82 (2013).

[4] Al-Asfour A, Tlaiss HA, Khan SA, et al. Saudi women's work challenges and barriers to career advancement. *Career Development International* 22(2): 184–199 (2017).

[5] Andal, N. Women and Indian Society: Options and Constraints, Rawat Publications, New Delhi (2002).

[6] Asia Ghazi, Gabriella Miramontes, Maria Brahme, The Servant Leadership Style of Successful Women Leaders in Entrepreneurship, *The Palgrave Handbook of Servant Leadership*, 10.1007/978-3-031-01323-2_26, (463-487), (2023).

[7] Choi, H.K., Kim, J.E., Attitude toward Own Aging of Poor Elderly Women Living Alone and the Impact of Chronic Illness, Self-Esteem, and Social Support, *Journal of Social Science*, 29(1), 275-293 (2018).

[8] Deccan Herald. 80 per cent of women unhappy with job. *Deccan Herald*, 14 April (2003).

[9] Deccan Herald. Women in uniform want level playing field. *Deccan Herald*, 2 February (2002b).

[10] Doyal, L. *What makes women sick. Gender and political economy health*. London: Macmillan (1995).

[11] Dube, L. Anthropological Explorations in Gender: Intersecting Fields, *Sage Publications Pvt. Limited*, New Delhi (2001).

[12] Fontinha, R., Easton, S. and Van Laar, D. Overtime and quality of working life in academics and non-academics: the role of perceived work and personal life balance, *International Journal of Stress Management*, 26(2), 173-188 (2019).

[13] Gujirat O, Kumar N. Investigation of work and life balance of women employees and its effects on emotional and social well-being. *Journal of Humanities Insights* 2(3): 152–155 (2018).

[14] Heo, S.Y., Longitudinal Analyses on Contagion of Depression and Reciprocal Relationships between Depression and Marital Satisfaction of Married Elderly Couples in Korea, *Dissertation of Seoul National University, Korea* (2021).

[15] Ibrahim, S.A. et al. Job strain and self-reported health among working women and men: An analysis of the 1994/5 Canadian National population. *Women and Health*, 33(1-2), 105-124 (2001).

[16] Kandel DB, Davies M, Ravers VH. The stressfulness of daily social roles for women: Marital, occupational, and household roles. *J Health Soc Behavioural*, 26, 64–78 (1985).

[17] Lee, J.H. The Relationship of Depression, Self-Esteem and Health Promoting Behaviours in the Elderly Women Who Live Alone, *J Korean psych mental health Nurs*, 14(2), 109-118 (2005).

[18] Lee, K.J., Park, H.S. A Study on the Perceived Health Status, Depression, and Activities of Daily Living for the Elderly in Urban Areas. *Korean Journal of Women Health Nursing*, 12(3), 221-230 (2006).

[19] Lee, H.J., Jung, E.H. A study on the relationship between changes in living arrangement and changes in depression - Focused on the moderating effects of coping resources, *Korean Journal of Social Welfare*, 73(1), 169-196 (2021).

[20] Long-Hwa Chen, Tor Eriksson & Tsorng-Chyi Hwang. More proficiency, higher pay? Evidence from IT adoption in Taiwan, *Journal of Statistics and Management Systems*, 13(1), 111-129 (2010).

[21] Manish Dhingra & Vaishali Dhingra. An empirical research on relationship between adequate and fair compensation and quality of work life, *Journal of Statistics and Management Systems*, 23(2), 317-331 (2020).

[22] Phillips, J., Hustedde, C., Bjorkman, S., Prasad, R., Sola, O., Wendling, A. and Paladine, H. Rural women family physicians: strategies for successful work and personal life balance. *The Annals of Family Medicine*, 14(3), 244-251 (2016).

[23] Promila Das. Dimensions of women empowerment: A structural equation modelling approach, *Journal of Statistics and Management Systems*, 25(5), 1059-1072 (2022).

[24] Sudhinta, Multiple roles of working women and psychological well-being, *Industrial Psychiatry Journal*, Jul-Dec; 26(2), 171–177 (2017).

[25] Talwar, Usha. Social Profile of Working Woman, *Jain Brothers*, Jaipur (1984).

[26] Usha. Women employment in India, *Jain Bros*, University of Michigan (1984).

[27] Voydanoff P, Donnelly BW. Work and family roles and psychological distress. *J Marriage Family*; 51, 923–32 (1989).

[28] Vrinda Marwah, For Love of Money: Rewards of Care for India's Women Community Health Workers, *Social Problems,* 10(10), 50-62 (2021).

[29] Willem Adema, Nabil Ali, Valerie Frey, Hyunsook Kim, Mariarosa Lunati, MArio Piacentini, and Monika Quiesser. Enhancing Women's Economic Empowerment through Entrepreneurship and Business Leadership in OECD Countries (2014) https://www.oecd.org/gender/Enhancing%20Women%20Economic%20Empowerment_Fin_1_Oct_2014.pdf.

[30] Yu-Cheng Lai. The effects of overtime hour restrictions on hours and employment evidence from Taiwan ROC, *Journal of Statistics and Management Systems*, 14(4), 815-841 (2011).

Rabindra Bharati University Journal of Economics

(A UGC CARE Peer-Reviewed Journal)

Vol: XVII, 2023

ISSN 0975-802X

DEPARTMENT OF ECONOMICS

RABINDRA BHARATI UNIVERSITY

CONTENTS

THE ROLE AND APPLICATION OF ICT IN AGRICULTURE: CREATING SMART FARMERS

Mr. Ranjith Kumar. A

Dr. Ramajayam. V

Abstract

About half of the nation's population is employed in agriculture, making it one of the largest industries in the world by population. Additionally, for roughly 58% of the population, it is their primary source of nutrition. India has the world's largest agricultural exports as well as the largest area planted with different crops in different regions. The agricultural sector in India accounts for a substantial portion of the country's GDP, with the country's agricultural land area being the second largest in the world. The agricultural sector supports livelihoods and makes a significant contribution to India's GDP, particularly in the country's vast rural areas.

For planners and all other stakeholders, the future of agriculture is a critical issue. Smallholder farming, primary and secondary processing, supply chain management, infrastructure that supports resource efficiency, marketing, and fewer middlemen in the market are among the major agricultural challenges that the Indian government and other organizations are working to address. It is imperative that we develop profitable technologies that preserve the environment and our natural resources.

The farmer of today is highly knowledgeable about the application of new technologies in agriculture and is making excellent use of the information. These are all independent of the area, time of year, crop, location, or crop type. Our farmers are now SMART—self-monitoring, analyzing, and reporting thanks to the use of information technology and appropriate tools. The farmers and scientists now have a suitable platform to communicate more regularly and on time thanks to the use of appropriate IT tools.

Our farmers have brought their knowledge to the labs for further growth and development in the field of agriculture, and scientists are using ICT tools to reach the farmers on their fields. This paper reviews the ICT applications that are being used to make our farmers more self-sufficient and smarter.

Government and private groups are working together to bring our farmers closer to the technologies being developed for their advantage through a number of initiatives. In the end, the paper conceptualizes the application of ICT and its use by our farmers, attempting to visualize the efforts made by scientists and technologists in the field of information and technology for the benefit of farmers.

Keywords: ***Agriculture, Communication, ICT, Smart- Farmer.***

Research Scholar at Annamalai University and Asst.Professor, St.Anne's Degree College for Women, Halasuru, ranjithannescollege@gmail.com

Associate.Professor, Dept of Economics, Annamalai University, Tamil Nadu kavitharamajayam@rediffmail.com

INTRODUCTION

Accurate and up-to-date agricultural information is like magic for farming and agriculture. Today, there many of telecom devices and services available to assist our farmers. Televisions, cell phones, and comp are a few of them. The swift expansion of information and technology has sparked a revolution in agricu as well. Technology-enabled communication, rapid information sharing, and ease of use have made ICT i indispensable for the advancement of agriculture.

The scope of agriculture has expanded due to the globalization of agriculture and related products, bus production, and demand for produce. These days, agriculture encompasses not just the growing and harves of crops but also high-quality packaging, marketing, exporting, and processing. It encompasses not only large landowners but also the marginal and small farmers. They are now united on a single platform thank ICT, and they are all working together to advance the nation.

ICT

Technologies that offer information access through broadcast media and telecommunication are referred as information and communication technologies, or ICTs. Though it mostly concentrates on communica technologies, it is comparable to and equivalent to information technology (IT). This covers the phone, mob devices, wireless networks, the Internet, and additional channels of communication.

The information and communication technologies of the last few years have given society a great de of new communication capabilities. Voice over IP (VoIP), video conferencing, and instant messaging examples of technologies that allow people to communicate with each other across national borders. Soc networking sites such as LinkedIn, Facebook, and Twitter enable users worldwide to stay connected and ha regular conversations.

The "Global small city" that has been created by modern information and communication technolog (ICT) allow people to communicate with each other as if they were next door. Because of this, ICT is frequen examined in relation to the ways that contemporary communication technologies impact society and agriculture industry.

NEED OF ICT IN AGRICULTURE

ICT assists in getting information to farmers who are primarily located in rural areas so they can use it their daily tasks. These services are offered via linked technologies and the Internet. In order to supp the agricultural industry, this guarantees the effective and efficient use of information and communicati technologies for the creation, implementation, and analysis of new and current applications. The differ main fields or areas into which the information is divided are the services offered by e-Agriculture. These are:

- Weather Information
- Price Information
- Health and Educations Information
- Production Techniques
- Non-government and Government Facilities
- Current Stock and Demands Information

DIGITAL REVOLUTION IN INDIA AND AGRICULTURE

Devices such as computers, satellite networks, pagers, mobile phones, and the World Wide Web introduced and accelerated the global digital revolution. The introduction of computers in the 1980s marked the beginning of the digital revolution in India, which was embraced by the entire system with the introduction of satellite communication and the internet. The introduction of computer education into higher education, along with the digitization of banks, transportation, laboratories, and other areas, signaled the start of a revolution. The world became "linked" in one way or another as a result of the revolution in the use of television, radios for broadcast, and telephones for communication.

ICT INITIATIVES IN INDIA

With the advent of ICT tools, the Indian economy underwent a faster paced revolution, and there was a sharp increase in the sharing of concepts, methods, and ideas. While the introduction of satellite communication and the internet brought the global community closer at a faster rate, ICT tools were not new to any community in the world; exchanges still took place over the phone, telegraph, and other modes of communication.

Digital technology has revolutionized and reformed traditional agriculture, changing the agricultural landscape in India and making it more profitable and sustainable. Technology has shown to be useful in providing timely and accurate information, which helps farmers make informed decisions about when to carry out their farming operations.

A large number of national and international departments, agencies, and institutes are involved in the logical electronic modes of data collection, evaluation, and processing. Farmers have benefited from quick data analysis, logical assessment, and efficient information distribution at the appropriate time and location for disease control, crop assessment, processing, and crop marketing.

Our farmers can now make more informed decisions about when to sow and harvest crops, how healthy the soil is, and many other on-farm tasks like irrigation and insect and pest control thanks to technology. ICT tools are useful for informing farmers about swarm and locust problems, disease outbreaks, weather, and many other topics, keeping them informed and vigilant.

ICT has three major roles to play viz., Education, Awareness and Dissemination. It covers every facet of a farmer's life quite effectively. ICT makes it very convenient to cover a wide range of topics, including crops, livestock and poultry, family members' health and nutrition-related issues.

EDUCATION

The community can be educated through a variety of ICT tools, such as computers, mobile phones, televisions, radios, and many more, through movies, stories, conversations, e-books, e-messages, and much more. These instruments can be used to disseminate information within the relevant community regarding disease symptoms, infestation by insects and other pests, procedures related to processing and preservation, applications of fertilizer, irrigation tools, storage methods, and certain aspects of livestock and poultry operations. The farmers will become knowledgeable about a variety of topics and prepared to handle such issues in advance thanks to this information.

AWARENESS

Farmers can benefit from increased awareness of a variety of topics through the use of ICT tools, including the health of their birds and cattle, the availability of suitable seed varieties, soil conditions, extreme weather, anticipated outbreaks and their containment, processing and preservation procedures, marketing opportunities,

and many other topics. A farmer who is vigilant and conscious can make decisions quickly, which will help him to profit.

DISSEMINATION

A well-chosen ICT tool for information dissemination will facilitate the rapid and efficient dissemination of wisdom within the community. This may be useful in managing diseases, pest insects, waterlogging issues, floods, droughts, and other issues. Farmers can better manage their crops and livestock and stay prepared for future challenges by being informed beforehand about livestock health and hygiene, new variety availability, seed centers, fertilizers, etc.

ADVANTAGES OF USING ICT TOOLS IN AGRICULTURE

- These may be the most effective instruments for quickly disseminating information about agriculture to a larger audience.
- As a tool for education and awareness
- As a means of warning
- To establish virtual farmer communities for conducting conversations and other information sharing
- For generating real time pricing and marketing information
- For popularizing Government schemes and programmers
- As a tool to support agri-clinics and agri-finance systems
- As a tool for connecting to agri business units and outlets
- For providing real time information on new technologies on insect-pest control, irrigation and other related practices
- As a tool for one to one contact of farmers and scientists or experts, all over the world, for success stories.

ICT INITIATIVES FOR FARMERS

Farmers have benefited from ICT by being able to share ideas, doubts, experiences, and practices by electronic means. Today, simple agriculture has evolved into e-agriculture, which affects small, marginal, and impoverished farmers' households as well as wealthy or large landowners.

Many agriculture specific applications are targeting small holders with major two objectives:

- Giving resources and services to small and marginalized stakeholders so they can increase their incomes and productivity and improve their quality of life by guaranteeing food security.
- To take full advantage of ICT's capabilities in order to adapt to the quickly shifting global markets.

Technology is a blessing for those in the public and private sectors who are constantly looking for practical answers to the long- and short-term problems that farmers face.

SOME OF THE INITIATIVES OF FARMERS' INTEREST INCLUDE:

- Crop Specific Applications

Some of the mobile and computer based applications for farmers dealing in specific crops include (icar.gov.in

- Ikshu Kedar

This app was created by the Indian Sugarcane Research Institute, which is situated in Lucknow. Sugarcane farmers can use this app to get irrigation-related information. Farmers who grow sugarcane can use this information to determine when to irrigate their crops precisely. By doing this, the crops will avoid needless, repeated irrigation.

The app offers concise irrigation-related information. Cane farmers can access all relevant information about irrigation timing and intervals through the Ikshu Kedar app. This includes when to irrigate after planting sugarcane and how often to do so.

- Farm Tree

This mobile application, which was created by ICAR-CAFRI in Jhansi, Uttar Pradesh, is one of the best looking and most well-built ones. In addition to helping farmers who grow trees, it contains information that scientists, students, and other professionals can use. The app is beautifully designed and contains all the necessary technical information for starting a nursery and possibly using the produce that trees may yield.

- Livestock Specific Applications

A number of apps for computers and mobile devices are especially made for maintaining and caring for livestock. A few from the ICAR organization are BHealth, Buffalo Nutrition, and others. The following animals are also covered: fish, poultry, pigs, sheep, and goats. There are several of these apps that are available in both Hindi and English. These apps include a schedule for vaccinations, a gestation calendar, disease symptoms along with a diagnosis and treatment, and advice and tips for rationing. Additionally, some of these applications require careful consideration of issues related to food safety, marketing, and processing.

- E-Learning Applications

Gaining knowledge and continuing education are necessary for ongoing development. A number of completely dedicated portals and applications are also created and made accessible for farmers who wish to learn about and investigate an increasing number of options related to their conventional farming methods.

- E-Krishisiksha

It's one of those e-learning portals. The portal offers an enormous amount of e-content for reading-based training. Under the guidance of experts, farmers can investigate new opportunities, and they can access e-content on a variety of topics at any time and from any location.

- Krishi

The Indian Council of Agricultural Research (ICAR) launched the Agricultural Knowledge Resources and Information System Hub for Innovations as a way to make its knowledge resources easily accessible to all parties involved. As a centralized data repository system for ICAR, the portal will house technology, data from surveys, experiments, and observational studies, geospatial data, publications, learning resources, and more.

- E-Krishimanch

It is a query management system, akin to an interface between scientists and the general public. Here, farmers can speak with subject matter experts directly and receive prompt answers to their questions. Krishi Gyan is a regional language app, and similar apps like Kisan Mitra are also available in Gujrati.

Some of the apps for the benefit of farmers are available on the portal of Department of Agriculture and Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers welfare, Government of India.

These include;

- Kisan Suvidha

IT handles a wide range of farmer and agricultural community issues..

- Pusakrishi

This app is useful for advancing agribusiness endeavors, such as technology commercialization and ma ready technology.

- M-Kisan

It provides expert advice that is crop and season-specific. It is also a platform for a government s program designed to help farmers. The farmers receive constant updates from this SMS-based app.

- Kisan Call Centre (Kcc)

This app is based on a phone. Farmers ask questions over the phone, and experts from various fields an them.

SHETKARI MASIK ANDROID APP

It's a digital version of a monthly magazine. For farmers, it includes articles, advisories, and pert as information from experts. Since it is a monthly circular, farmers can easily stay up to date on the most re ra advancements in the agricultural industry.

- Farm-O-Pedia

It is a digital gateway for information as well. For our farmers, it contains a wealth of information ab practically every kind of crop package and practice, weather patterns, soil health, animal health, or processing, storage techniques, and much more.

- Bhuvan Hailstorm App

Its purpose is to notify farmers in the event of severe weather conditions. Farmers' expectations of hailst conditions are changed. Additionally, the app is made expressly to calculate the losses farmers have suffe c as a result of these unfavorable weather patterns. It features a built-in GPS and camera system that helpe find the farmers' field and take picture graphs. This data is sent right away to the portal so that it can be ad for claims and further analysis.

AGRI MARKET

It is helpful for farmers to directly sell their produce at MSPs and is synonymous with its name. The in prices are continuously flashed on the portal. The farmer can use the GPS locator to find the closest marke and sell his produce there.

Some of the private firms, non-government organizations, civil society organizations, research groups, ie also working for farmers and making them more techno-friendly and smart by innovating specific apps, ne

- AGRISCIENCE
- KRISHI
- AGRIBOLO
- Agrolee
- Kheti Point
- AgroEx

- KrishiGuru
- SmartKrishi
- Agrisetu
- Kheti Buddy

There are many more applications and portals for the benefit of farmers. Some of them are in regional languages

BUILDING SMART FARMERS

The indigenous knowledge that our farmers inherited from their ancestors and other farmers served as the foundation for traditional Indian farming. Though it wasn't always as successful as it should have been, the advice given by friends, input dealers, guests, and others was followed by those who revolutionized farming. Our farmers adapted some of the improved traditional agricultural practices that came about as a result of scientific and technological advancements. Yet the results were still below expectations.

The development of ICT tools accelerated scientific and technological advancements while also facilitating faster communication and information dissemination. Our farmers received information about agricultural practices directly from the subject matter experts.

Our farmers are now SMART, or self-monitoring, analyzing, and reporting through the use of appropriate technology, thanks to the introduction of portable ICT tools like computers, smartphones, and cellphones.

They can now choose the cropping schedule, seeds to use, fertilizer to use, insect, pest, and disease control, processing, marketing, etc. They can self-monitor their crops, analyze cropping conditions, including soil health, weather, water availability, and more, and report the results using appropriate technology with the timely dissemination of agricultural information. Farmers are now knowledgeable and self-sufficient.

Thanks to ICT tools, farmers can now conduct experiments in their fields. Real-time data can be evaluated to change cropping patterns and increase yield. The modern farmer is capable of handling the adaptation of techniques linked to integrated farming practices, livestock, soil health, micro-irrigation, fertilizer application, and more. To assist our farmers, ICT applications have produced real databases on a variety of topics, including weather forecasts, soil health, crop cultivation techniques, processing, marketing, and storage.

CONCLUSION

Since agriculture is the foundation of the Indian economy, it is necessary for it to periodically adopt new technologies. ICT tools have shown to be very beneficial in updating the database and providing our farmers with relevant information. They have given our farmers more power by giving the appropriate information to the right person at the right time. The difference in knowledge between the traditional farmers and the learned scientific community has decreased. They are now utilizing relevant ICT technologies to work in tandem with one another and meet growth targets more quickly.

REFERENCES

[1] N.H. Rao (2006), A framework for implementing information and communication technologies in agricultural development in India, National Academy of Agricultural Research Management (NAARM), Rajendranagar, Hyderabad 500 030, India

[2] Agu M.N. (2013). Application of ICT in agricultural sector: Women's perspective. *International Journal of Soft Computing and Engineering*,.

[3] Aker J.C. (2011). Dial 'A' for agriculture: A review of information and communication technologies for agricu extension in developing countries. *Agricultural Economics*.

[4] Manjeet J.S.M., & Kumar R. (2019). Information and communication technology for agricultural develop review. Indian Journal of Pure Applied Bioscience.

[5] Shyam, R. ICT and e-Agriculture. International Journal of Advanced Technology in Engineering and Science. 2(

[6] Shrestha A., & Sathvik V. (2021). Role and potential of information and communication technology in agricultu rural development. International Journal of Engineering Research and Technology.

[7] E-source book,World Bank(2011) ICT in Agriculture: Connecting Smallholders to Knowledge, Network Institutions

[8] Manish Mahant, Uses of ICT in Agriculture, International Journal of Advanced Computer Research (ISSN (p 2249-7277 ISSN (online): 2277-7970) Volume 2 Number 1March 2012

WEB SOURCES

[1] https://epubs.icar.org.in/index.php/IndFarm/article/view/133002

[2] https://eng.kisanofindia.com/crops/ikshu-kedar-app-for-sugarcane-farmers-2/

[3] https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=15036&context=libphilprac

[4] https://krishi.icar.gov.in/

[5] https://openknowledge.worldbank.org/bitstreams/a984a2a1-5172-52b4-8c97-718da48909f1/download

Journal
of the
Oriental Institute
M.S. University of Baroda

ISSN: 0030-5324

UGC CARE Group 1

A RESEARCH STUDY ON STANDARD WIRELESS NETWORK AND INFORMATION SECURITY

Pradeepa M
Research Scholar, Department of Computer and Information Science, Faculty of Science, Annamalai University, Tamilnadu, INDIA

E Karthika
Assistant Professor, Department of Computer Science, PSPT M.G.R Govt Arts & Science College, Sirkali, Puthur-60910, Tamilnadu, INDIA

ABSTRACT: Network security is intrinsically compromised by wireless networking. A range of attack techniques, such as jamming, spoofing, and man-in-the-middle eavesdropping, can be employed to target users of wireless networks. In order to create barriers against intrusions, modern wireless data networks employ a range of cryptographic techniques, including authentication and encryption. Unfortunately, a large number of widely implemented security measures are appallingly insufficient. Strong safety measures became necessary as the usage of wireless infrastructure networks for business purposes increased steadily. This paper describes the security flaws in the WEP (Wired Equivalent Privacy) protocol, which is used to protect wireless networks, as well as the different types of attacks that could compromise the protocol's security objectives of integrity, confidentiality, and authentication.
KEY WORDS: Wireless network, WEP, Cryptographic, Protocol and Security goals.

INTRODUCTION

The popularity of wireless networks is steadily increasing in our modern world. Big corporations are finding more and more benefits in using these networks. Local wireless networks have numerous advantages, including user mobility, easy and quick installation, flexibility, scalability, and affordability. With a Wireless Local Area Network (WLAN), users can access resources from anywhere they are located. By using mobile computers, users can connect to the network and access resources no matter where they are physically located. Wireless technologies allow devices to communicate without physical connections or the need for network cables. They utilize radio frequency transmissions to transmit data, while wired technologies rely on cables. Wireless technologies range from more complicated systems like WLAN and cell phones to simple devices like wireless headphones and microphones that do not store or process information.

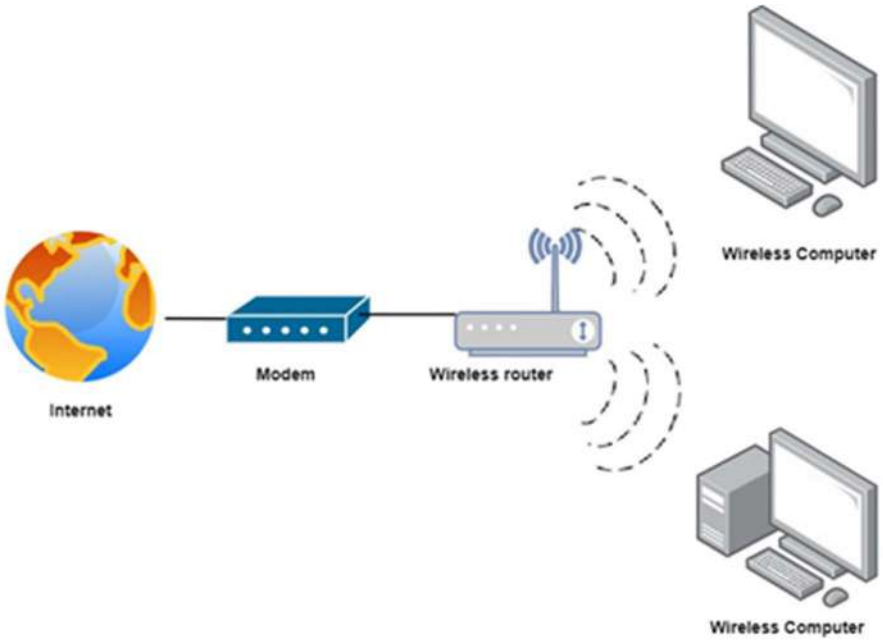


Fig 1 : Wireless Technology

Importance of Network Security for an Organization/Country

It is impossible to dispute the network's significance for any organization. In addition, businesses risk losing their assets, money, and reputation if they neglect network security. Network security guarantees that a nation or organization can access trustworthy and secure information. Thus, network security breaches have the potential to cost nations and organizations a significant amount of money. Information dependability is crucial for maintaining network security. Thus, any data on the network is regarded as a corporate asset. Businesses that provide services to satisfy the demands and specifications of their clients or end users are obliged to safeguard their network. Therefore, an organization's response and preparation can be divided into three main categories:

- Network protection: The entire network is set up and connected in the most efficient manner.
- Threat detection: An organization is ready to identify any threat at the highest level to the network or system.
- Reaction to any threat: It is crucial for any organization to respond appropriately when a threat is discovered. The response needs to be prompt and proactive.

WIRELESS NETWORKS

Wireless networks act as the means of communication between devices and traditional wired networks (such as enterprise networks and the Internet). These networks can be categorized into three groups based on their coverage range: Wireless Wide Area Networks (WWAN), Wireless Local Area Networks (WLAN), and Wireless Personal Area Networks (WPAN). WWAN includes technologies like 2G cellular, Cellular Digital Packet Data (CDPD), Global System for Mobile Communications (GSM), and Mobitex, which offer wide coverage areas. WLAN includes

technologies like 802.11, Hyper LAN, and others, which are used for local area networks. WPAN includes technologies like Bluetooth and Infra-Red (IR), which are used for personal area networks. All of these technologies are considered "tetherless" as they transmit and receive information through electromagnetic waves. The wavelengths used in wireless technologies range from radio frequency (RF) to above the IR band. The RF band covers a significant portion of the electromagnetic radiation spectrum, ranging from 9 kilohertz to thousands of gigahertz. Frequencies beyond the RF spectrum offer additional benefits such as higher data transfer rates. EM (Electromagnetic energy) travels into the infrared and then the visible spectrums as frequencies are raised beyond the radio frequency range. Devices connected to wireless networks can move around with different degrees of freedom while still staying in communication with one another. They also provide more flexibility than cabled networks, cut down on the time and resources required to set up new networks, and make it simple to build, modify, and dismantle ad hoc networks. Wireless networks come in various varieties. Taking into account the relative complexity and range of each kind of network is one method of classifying wireless networks.

WIRELESS PERSONAL AREA NETWORK (WPAN)

A tiny wireless network with a limited operating range and minimal infrastructure requirements. Instead of using cables to connect the devices, a few WPANs are usually used in a single room. Examples include printing services and connecting a wireless keyboard and mouse to a computer.

WIRELESS LOCAL AREA NETWORKS (WLAN)

These are collections of radio-capable wireless networking nodes located in a constrained geographical area, like a campus or office building. WLANs are typically added as extensions to already-existing wired local area networks in order to improve user mobility.

WIRELESS METROPOLITAN AREA NETWORKS - (WMAN)

Users spread across several locations, usually a few miles apart, can receive connectivity from us. Wireless broadband access is made available to consumers in urban areas through numerous WMAN implementations.

WIRELESS WIDE AREA NETWORKS - (WWAN)

Connect individual devices over large geographic areas. WWAN are typically used for mobile voice and data communications, for well as satellite communications.

Types	Coverage	Performance	Standards	Applications
Wireless PAN	Within reach of a person	Moderate	Wireless PAN within reach of a person Moderate Bluetooth ,IEEE 802.15 and IrDa Cable replacement for peripherals	Cable replacement for peripherals
Wireless LAN	Within a building or campus	High	IEEE 802.11,Wi-Fi and Hiper LAN	Mobile extension of wired networks
Wireless MAN	Within a city	High	Proprietary,IEEE 802.16 and WIMAX	Fixed wireless between homes and businesses and the net
Wireless WAN	WorldWide	Low	CDPD and Cellular 2G,2.5G and 3G	Mobile access to the Internet from outdoor areas

Table 1: Comparison of Wireless Network Types

WIRELESS LAN

WLANs are more portable and flexible than conventional wired local area networks (LANs). A WLAN uses an access point device to connect computers and other components to the network, as opposed to a traditional LAN, which needs a wire to connect a user's computer to the network. An RJ-45 port on an access point allows it to be connected to a wired Ethernet LAN and is used for communication with devices that have wireless network adapters. Generally speaking, access point devices can cover up to 300 feet, or roughly 100 meters. A cell or range is the name given to this coverage area. Within the cell, users are free to move about with their laptops or other network devices. Through interconnection, access point cells enable users to roam freely both inside and outside of buildings.

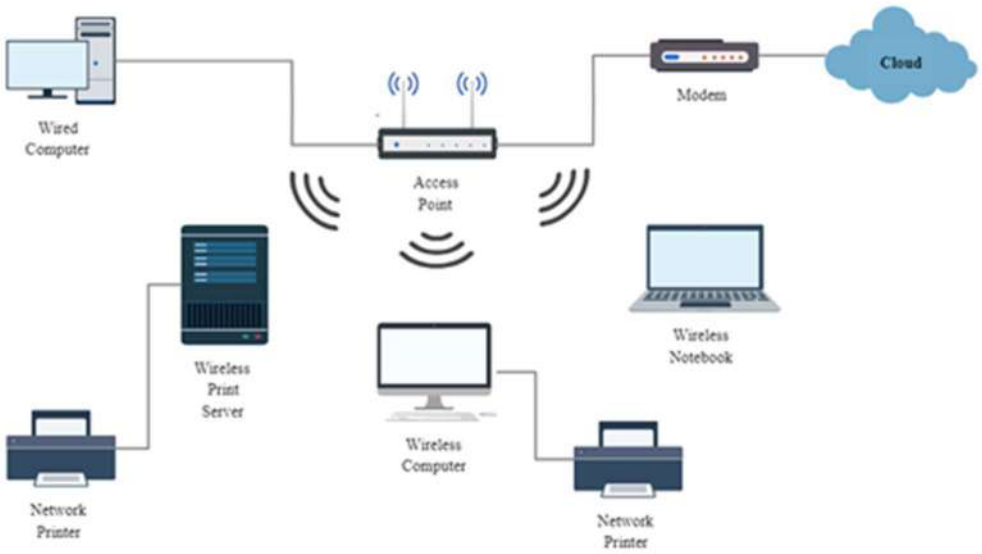


Fig 2: Working model of a wireless Network System

LAYERED SECURITY FOR WIRELESS NETWORKS

A layered approach to wireless security can provide a high degree of protection and Leverage existing network security investments. The layered approach consists of the following four levels.

- Wireless deployment and policy
- Wireless access control
- Perimeter security
- Application security

The layered approach, when implemented as will be covered below, can centralize points of access, implement manageable security at the device level, and use firewalls to control internal access, making a WLAN more secure than a typical wired network. Professionals in policy and security often refer to the "work factor," which is a crucial idea to understand when implementing layered security. While a network with a low work factor is more easily compromised, one with a high work factor is more difficult to breach. Hackers will quickly move on to networks with lower levels of security if they discover that the network has a high work factor, which is a feature of the layered approach.

. It is harder to breach a network with a high work factor than it is to compromise one with a low work factor. Hackers will quickly advance to less secure networks if they ascertain that the one with a high work factor—a feature inherent in the layered approach—has it.

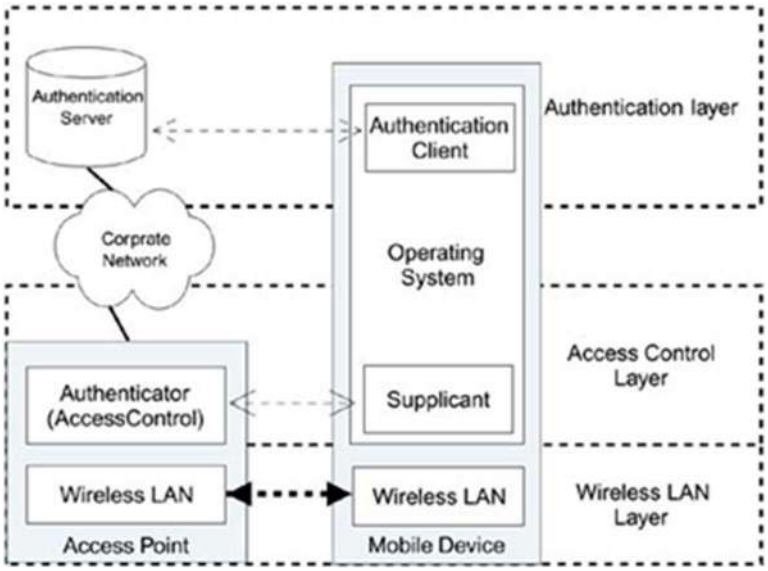


Fig 3: Wireless Security Architecture

LEVEL -1 WIRELESS DEPLOYMENT AND POLICY

Best practices for wireless deployment and policy are deploying the minimum number of WAP needed for adequate Coverage. Set WAP broadcast power to the lowest practical level.

- Verify broadcast coverage in and around facility.
- Maintain policies for
- Installation of WAP
- NIC (network interface card) operational mode
- WLAN (Wireless LAN) user-group access, including employees, visitors and Contractors.

A secure environment is built from the ground up using the physical placement of the wireless networking equipment. It is a basic rule of thumb to avoid over-designing a wireless network. Avoiding broadcasting when it is not required is the aim. Using common sense when designing the network is also beneficial. You should take into account that is accessing the WLAN, where they are located, and what the minimal coverage requirements are. For instance, it is not advisable to install four WAP in locations where one would be sufficient or in places like the waiting area at building entrances that do not require network access. It's not always better to have more. A wireless network interface card (NIC) has two operational modes: infrastructure mode, which restricts communication between the NIC and a WAP, and ad hoc mode, which permits communication with any wireless device, including other NICs. There should be a rule mandating that NIC only run in infrastructure mode. Hackers can easily take advantage of devices operating in ad hoc mode.

LEVEL – 2WIRELESS ACCESS CONTROL

Best practices for wireless access control include

- Configure the WEP for the highest level of encryption.
- Change the SSID (service set identifier) regularly, where practical.
- Do not broadcast the SSID.
- Verify the media access control (MAC) address upon device connection.
- Maintain and enforce access policies for unauthorized/unrecognized devices.

Device access control and user authentication (Personnel access control) are the two main components of access control in actuality. Device access is the focus of level two, and user authentication is the subject of level three, perimeter security. The configuration and management of the built-in security features of wireless network devices, such as SSID and WEP, is essential. The SSID needs to be changed on a regular basis, if at all possible, and the WAP needs to be set up so that it is not broadcast. Furthermore, the WEP should be set to the highest encryption level (usually 128- or 256-bit encryption), and the passphrase should be changed on a regular basis. Depending on the size of the network, this may or may not be feasible.

LEVEL - 3 PERIMETER SECURITIES

Best practices for perimeter security include

- Install an intrusion prevention system (IPS) and wireless firewall on LAN
- Encrypt WLAN traffic using a virtual private network (VPN).
- Direct all traffic through the VPN server and configure clients appropriately.
- Maintain and enforce VPN routing and access policies.
- Maintain and enforce access policies for user authentication (i.e, username/password).

VPN technology offers a way to secure data transfers over trusted network segments, like WLANs and the Internet. In essence, a VPN is an addition to the private network that includes connections that are authenticated, encrypted, and encapsulated. VPN encryption algorithms are sophisticated and very challenging to break. All WLAN traffic ought to require a VPN connection. Setting up a VPN server on the network and configuring all WLAN clients to communicate through a VPN tunnel terminated on this server are the prerequisites for implementing VPN for a wireless network

LEVEL - 4 APPLICATION SECURITIES

Best practices for application security include

- Implement an application-level user authentication system.
- Maintain and enforce permissions and password policies.
- Install vendor patches as they become available.

Implementing fundamental security measures at the application level in the network is highly recommended as a best practice, regardless of whether the connection is wired or wireless. Safeguarding network applications, including Windows NT, PeopleSoft, and other enterprise systems, through strict password policies and permissions adds an additional obstacle for hackers to overcome in order to access proprietary information. It is crucial to promptly install application patches upon release, as they often address identified security vulnerabilities. Exploiting these vulnerabilities is a common method for network breaches, making the signature-based intrusion prevention system (IPS) an essential component of a comprehensive network security program.

• The Wired Equivalent Privacy (WEP): The first wireless security protocol ever created is called Wired Equivalent Privacy, or WEP. It was created in 1997, but it's still in use today. In any case, it is regarded as the most unreliable and unsafe wireless security protocol.

• The Wi-Fi Protected Access (WPA): The WEP comes after this wireless security protocol. As a result, it is made to address the issues with the WEP protocol. Notably, it encrypts using a variety of techniques, including pre-shared key (PSK) and the Temporal Key Integrity Protocol (TKIP).

• The Wi-Fi Protected Access 2 (WPA 2): WPA 2 is the replacement for WPA and has more features and encryption power. For example, WPA 2 replaces TKIP with the Counter Mode Cipher Block Chaining Message Authentication Code Protocol (CCMP). It is well known that this replacement feature encrypts data effectively. WPA 2 is therefore regarded as the top wireless security Protocol..

	WEP	WPA	WPA2
Purpose	Provide security comparable to wired networks	Overcome the flaws of WEP without requiring new hardware, Implements majority of IEEE 802.11i standard	Implements completely IEEE 802.11i standard and an enhancement over WPA
Data Privacy (Encryption)	Rivest Cipher 4 (RC4)	Temporal Key Integrity Protocol (TKIP)	Counter Mode with Cipher block Chaining Message Authentication Code Protocol (CCMP) using block cipher Advanced Encryption Standard (AES)
Authentication	WEP-Open and WEP-Shared	WPA-PSK and WPA-Enterprise	WPA2-Personal and WPA2-enterprise
Data Integrity	CRC-32	Michael (generates Message Integrity Code (MIC))	Cipher block chaining message authentication code (CBC-MAC)
Key Management	Lack of key management	Provides robust key management and	Provides robust key management and keys are

Table2: Comparison of WEP,WPA and WPA2

THREATS IN WIRELESS NETWORK

This implied that potential attacker threats could now affect the wireless network. In order to undermine network security as unauthorized, attackers in the active attack type modify information content and fabricate false information on the network. Attacks classified as Active include: Replay, Denial of Service (DoS), Access, Active Eavesdropping, Man-in-the-Middle (MITM), and Session Hijacking. Without making any changes, the attacker uses a passive attack, which involves passively listening to network traffic, gathering information from packets, and analyzing traffic. The detection of such attacks is difficult.

Unauthorized access

There are multiple ways in which unauthorized individuals can gain access to the Company's wired and wireless networks, with differing intentions. One such method is commonly referred to as "Accidental Union". This occurs when a user turns on their computer and unintentionally connects to a nearby company's overlay network through a wireless access point. The user may be unaware

that this has happened, but it poses a security breach as it exposes the Company's confidential information to malicious users.

Denial of Service (DOS)

Denial of service (DoS), also known as a "spoiler," is a concept that everyone familiar with network security is aware of. Given that it just needs a small amount of service access, this might be one of the best network attacks. In order to slow down or stop wireless services, which allows attackers to take control of resources, view unauthorized information disclosure, and install backdoors into systems, this will be accomplished by installing virus or worm programs on your network or by sending massive volumes of traffic to a specific target. A multitude of techniques are employed to intercept signals in wireless networks Interference can occur in wireless LANs operating on the 2.4 GHz band, such as from microwaves or other access points on the same channel. This is because the 2.4 GHz band in the US only has three non-overlapping channels. An attacker can disrupt the service by interfering with these channels. This can be done in conjunction with an unauthorized access point by setting it to a channel not used by a legitimate access point. The attacker can then launch a denial of service attack on a channel currently in use, forcing connected devices to reconnect on the channel being utilized by the rogue access point. An attack known as a denial of service (DoS) happens when a hacker bombards a target AP (access point) or network repeatedly with false requests, early success connection messages, fault messages, and/or other commands. The reason is that legitimate Users can't get on the network and could even make it hold. Extensible Authentication Protocol (EAP) abuse is one of the protocols that facilitate these attacks.

Malicious Companion

The term "malicious associations" refers to environments where hackers can actively set up wireless devices to connect to the company network using your laptop as opposed to the corporate access point (AP). Referred to as a "soft AP," this type of laptop arises when an intruder installs software that imitates a legitimate access point on the user's wireless network card. When the cracker gets close, it can plant Trojans, initiate attacks on wired networks, or steal the password As a result, wireless networks operate at the layer 2 level, meaning that layer 3 security measures such as network authentication and virtual private networks (VPNs) do not provide any barriers. Although 802.1 x wireless authentication enhances security, it remains susceptible to being cracked. The essence of this attack is that the user does not need to go through a VPN or other security protocols. Perhaps, the cookie at layer 2 aims to manipulate the client to a certain extent.

Ad-hoc networks

Ad-hoc networks could be dangerous for your security. Peer-to-peer networks without an intermediary access point between wireless computers are known as ad hoc networks. Despite the lack of security on this type of network, encryption techniques are widely used and offer security. Non-traditional networks

Non-traditional networks, such as Bluetooth personal network devices, will be regarded as a security risk since they don't appear to be resistant to hacking. Insurance is required for wireless printers, copiers, portable PDAs, and barcode scanners as well.

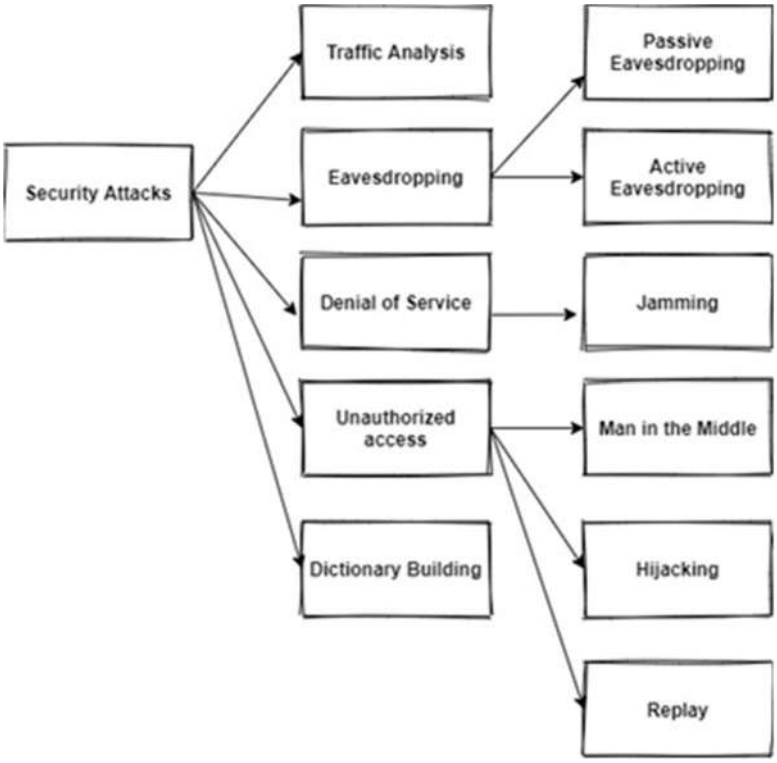


Fig 4: Different types of Security attacks

Session Hijacking

Session hijacking is similar to the Man in the Middle (MITM) attack in that the attacker intercepts the victim's session and takes control of it. The victim believes that their session ended for any reason and that the attacker now has control over it, allowing him to use it as he pleases. In order to send a MAC separation message to the victim, the attacker must first obtain the victim's MAC address and the AP's address. The victim ends his session on the network, but his session access point remains open.

Man-in-the-middle attacks

An extremely dangerous attack known as "Man in the Middle" occurs when an attacker eavesdrops on a conversation and alters it before sending it. Despite the organization's implementation of VPN, SSH, and IP sec security measures, these defences against an MITM attack are revolutionary because they are limited to knowledge privacy attacks. In this way, all user data is more developed for the attacker to access point, and the attacker can easily alter web content settings in addition to being able to sniff and modify information by executing viruses in downloaded files. Methods that won't trick the user. Furthermore, encryption has no security function in between the access points.

SECURING WIRELESS TRANSMISSIONS

Despite the numerous shortcomings of the WEP algorithm, users can still secure their individual wireless networks. The following strategies are advised to lower the security risks associated with wireless networks in order to address the security threats listed above.

Exploring proper knowledge to user Informing users about the network's security is the first step in wireless network security. It is frequently noted that end users leave many gaps for attackers to exploit because they are unaware of how to implement security. If users are knowledgeable about wireless tool settings, adjustments, and the security of their individual networks, security risks can be reduced to a minimum. One effective method for securing a wireless network is wireless network auditing. To learn about network activity, the user should scan their work using a network scanner. You can find a number of free network scanning programs online, such as Kismet and Net Stumbler.

Change the router's default password. The default username and password are set by each manufacturer of wireless routers and access points. It is strongly advised that you simply must first change the username, for example, to the default username and password. If the user doesn't change it, it's a really sweet cake for the attacker because the attacker simply scans the access point and accesses it through their default username and password.

Change SSID Every access point has a default ID, which the attacker can use to locate the access point with ease. Every device connected to a wireless network has the same SSID. It's equivalent to leaving the default password in place if the user doesn't modify the default SSID.

Attacks	Effects of attack	Countermeasures against Attack	Secure routing Protocols used
Jamming	• Confusion • Resource exhaustion Packets collision	• Spread Spectrum technique for radio communication • Use algorithms that take Radio Signal Strength Indicator (RSSI) values, carrier sense time and packet delivery ratio (PDR) techniques.	• LEACH
Tampering	• Hardware damage • Can gain access to higher level by extracting sensitive information	Using tamper-proof packing	• Direct Diffusion • SPIN
Collision	• Energy exhaustion • Interference • Discards packet	Error correction codes can be used	• LEACH
Selective Forwarding	• Packet dropping • Information loss	Transmit data through multiple paths	• Multipath Routing protocol
Sinkhole Attack	• Alter information • Drops packet • Resource exhaustion • Trigger blockhole, wormhole • Spoofing • Replay old message	• Key management • Authentication • Geographic routing	• PRSA • Geographical routing protocol
Sybil Attack	Threat to geographical routing protocols	• Authentication and encryption can prevent outsider attack • Use of public key cryptography prevents insider attacks	• Merkle hash tree • SIGF
Wormhole Attack	• Change in network topology • Information alteration	• Authentication • Encryption	• Adhoc on Demand Distance Vector (AODV) • Dynamic Source Routing (DSR)
Hello flood Attack	Data congestion	To Authenticate two way link before acting on information	• SPIN

Table 3: Various attacks and security protocols

CONCLUSION

Increased productivity and cost savings are possible with wireless networks in many situations. Furthermore, a corporation's computer security risk profile is altered. Therefore, it is impossible to totally eradicate all risks associated with wireless technology; instead, a feasible level of general security can be attained by implementing the network Systematic approach to risk assessment and management. Thus, the three fundamental technology components—authentication, confidentiality, and integrity—as well as their associated risks and vulnerabilities were covered in this survey. Lastly, the survey also includes a description of the wireless network, including the client, access point, and transmission medium, as well as a number of widely used risk-reduction

techniques. Furthermore, by protecting the network information from anonymous users, this work teaches network users to stress the value of mentoring and educating users on secure wireless networks..

REFERENCES

[1]. S. Gopalakrishnan, "International Journal of Computer Science and Mobile Computing A SURVEY OF WIRELESS NETWORK SECURITY," Int. J. Comput. Sci. Mob. Comput., vol. 3, no. 1, pp. 53–68, 2014.

[2]. Alade, O. Ajayi, S. Okolie, and D. Alao, "A Survey of Computer Network Communication Protocols and Reference Models," Am. J. Eng. Res., no. 6, pp. 174–180, 2017.

[3]. Chen, J. Law, and M. Aibin, "A Survey on Traffic Prediction Techniques Using Artificial Intelligence for Communication Networks," Telecom, vol. 2, no. 4, pp. 518–535, 2021.

[4]. R. Nazir, A. A. laghari, K. Kumar, S. David, and M. Ali, "Survey on Wireless Network Security," Arch. Comput. Methods Eng., vol. 29, no. 3, pp. 1591–1610, 2022.

[5]. J. Vanjari, B. G, and R. S. Bansode, "A Study on Wireless Network Security," SSRN Electron. J., pp. 2–6, 2022.

[6]. S. Sharma and A. Kaur, "Survey on Wireless Sensor Network, Its Applications and Issues," J. Phys. Conf. Ser., vol. 1969, no. 1, 2021.

[7]. M. Benhangi, Communication-Computation Efficient Federated Learning over Wireless Networks. 2023.

[8]. W. Shi et al., "Physical layer security techniques for data transmission for future wireless networks," Secur. Saf., vol. 1, p. 2022007, 2022.

[9]. P. Gandotra, R. Kumar Jha, and S. Jain, "A survey on device-to-device (D2D) communication: Architecture and security issues," J. Netw. Comput. Appl., vol. 78, pp. 9–29, 2017.

[10]. Hannah, A. Kamal, C. Chuah, and Y. Yen, "Security and Privacy Issues in Wireless Networks and Mitigation Methods," no. September, 2020.

[11]. S. K. S. Singh, M. P. Singh, D. Singhtise, and D. K. Singh, "A survey on network security and attack defense mechanism for wireless sensor networks," Int. J. Comput. Trends Technol., vol. 1, no. 2, pp. 9–17, 2011.

[12]. Gupta and R. K. Jha, "Security threats of wireless networks: A survey," in International Conference on Computing, Communication & Automation, 2015.

[13]. P. E. W. Ririn, N. K. Yesi, and ..., "Analysis Network Security of Local Area Network (Lan) and Wifi in Dishub Kominfo Banyuasin," … Secur. Local …, no. February, pp. 21–22, 2022.

[14]. T. Thompson, "Communication Networks," Encycl. Heal. Commun., no. January, 2014.

[15]. S. M. J. Shah, A. Nasir, and H. Ahmed, "A Survey Paper on Security Issues in Satellite Communication Network infrastructure," Int. J. Eng. Res. Gen. Sci., vol. 2, no. 6, pp. 887–900, 2014.

[16]. X. Zhang, G. Klevering, X. Lei, Y. Hu, L. Xiao, and G.-H. Tu, "The Security in Optical Wireless Communication: A Survey," ACM Comput. Surv., vol. 55, no. 14s, Jul. 2023.

[17]. J. Dizdarević, F. Carpio, A. Jukan, and X. Masip-Bruin, “A survey of communication protocols for internet of things and related challenges of fog and cloud computing integration,” ACM Comput. Surv., vol. 51, no. 6, pp. 1–30, 2019.
[18]. S. Panwar, A. Garg, and N. Kumar, “A Study Paper on Communication Network and overview of Packet Switching Technology,” Int. J. Comput. Technol., vol. 3, no. 3, pp. 387–392, 2012.
[19]. G. Narasimhan and R. Marathe, “A Research Overview Of Smart Technologies In Communication Networks Backed With Artificial Intelligence To Support Sophisticated Optimization And Reliability,” vol. 18, no. 6, pp. 10–20, 2022.
[20]. Kailas, V. Cecchi, and A. Mukherjee, “A survey of communications and networking technologies for energy management in buildings and home automation,” J. Comput. Networks Commun., vol. 2012, 2012.
[21]. J. P.-T. J. of C. and Mathematics and U. 2021, “Wireless Network Security Threats and Best Method to Warn,” Turcomat.Org, vol. 12, no. 12, pp. 4147–4155, 2021.
[22]. E. Iglesia, G. J. Hutchings, M. Neurock, S. T. Oyama, J. Lercher, and E. T. H. Zürich, “Available online at,” vol. 267, no. 4, p. 9517, 2009.
[23]. W. Jiang, “Graph-based deep learning for communication networks: A survey,” Comput. Commun., vol. 185, pp. 40–54, 2022.
[24]. Y. Zou, J. Zhu, X. Wang, and L. Hanzo, “A Survey on Wireless Security: Technical Challenges, Recent Advances, and Future Trends,” Proc. IEEE, vol. 104, no. 9, pp. 1727–1765, 2016..
[25]. H. A. Noman, S. A. Noman, and Q. Al-Maatouk, “Wireless security in Malaysia: A survey paper,” J. Crit. Rev., vol. 7, no. 4, pp. 310–312, 2020.
[26]. S. R. Tripathi and S. Khaparde, “Analysis and Survey on Past , Present and Future Generation in Mobile communication,” pp. 30–36, 2016.
[27]. M. Somasundaram and R. Sivakumar, “Security in Wireless Body Area Networks: A survey,” 2011 Int. Conf. Adv. Inf. Technol., vol. 20, pp. 18–23, 2011.
[28]. Bayılmış, M. A. Ebleme, Ü. Çavuşoğlu, K. Küçük, and A. Sevin, “A survey on communication protocols and performance evaluations for Internet of Things,” Digit. Commun. Networks, vol. 8, no. 6, pp. 1094–1104, 2022.
[29]. M. E. Rana, “Common Security Protocols for Wireless Networks: A Comparative Analysis,” Int. J. Psychosoc. Rehabil., vol. 24, no. 5, pp. 3887–3896, 2020.
[30]. E. Iglesia, G. J. Hutchings, M. Neurock, S. T. Oyama, J. Lercher, and E. T. H. Zürich, “Available online at,” vol. 267, no. 4, p. 9517, 2009.
[31]. J. P.-T. J. of C. and Mathematics and U. 2021, “Wireless Network Security Threats and Best Method to Warn,” Turcomat.Org, vol. 12, no. 12, pp. 4147–4155, 2021.
[32]. M. Bajwa, “Wireless Network Security Threats and Mitigation—A Survey,” Open J. Bus. Manag., vol. 02, no. 04, pp. 292–297, 2014.
[33]. Ezenwobodo and S. Samuel, “International Journal of Research Publication and Reviews,” Int. J. Res. Publ. Rev., vol. 04, no. 01, pp. 1806–1812, 2022.

[34]. J. Vanjari, B. G, and R. S. Bansode, “A Study on Wireless Network Security,” SSRN Electron. J., pp. 2–6, 2022.
[35]. H. Valchanov, J. Edikyan, and V. Aleksieva, “A Study of Wi-Fi Security in City Environment,” IOP Conf. Ser. Mater. Sci. Eng., vol. 618, no. 1, 2019.
[36]. M. K. Choi, R. J. Robles, C. H. Hong, and T. H. Kim, “Wireless network security: Vulnerabilities, threats and countermeasures,” Int. J. Multimed. Ubiquitous Eng., vol. 3, no. 3, pp. 77–86, 2008.

A NOVEL APPROACH BASED ON FUZZY RULE AND LSOWL-CNN FORECASTING STUDENTS WITH DROPOUT PREDICTION AND RECOMMENDATION MODEL

Ms. Marina.B[1*], Dr. A. Senthilrajan[2]

*[*1]Research Scholar, Alagappa University, Asst. Prof, St. Anne's Degree College for Women, Ulsoor, Bangalore*

[2]Professor & Director, Dept of Computational Logistics, Alagappa University, Karaikudi, Tamil Nadu

ABSTRACT

The main goal of governments is to guarantee that every individual worldwide, regardless of disability, have access to education. However, learners with disabilities exhibit higher rates of school and college dropouts than regular students. The main goal of contemporary research is to anticipate such drop-outs slightly earlier and offer recommendations and alternative pathways for their career enhancement by utilizing a novel approach LSOWL-CNN method. Initially, the dataset is pre-processed to increase the classification performance. Following that, the features are extracted and by employing ENT-QDA, the features are reduced. Rules based on fuzzy data will be created based on the features. A classification method called Linear Scaling Owl Optimal control Method with CNN (LSOWL-CNN) is employed to train the system using the created rules and testing the data the final results are classified. Results of the experiments showed that the suggested model attained an Accuracy of 96.817% which outperforms the existing models which is implementing in a python tool.

Keywords: *Dropout prediction, EDM, Fuzzy rule, QDA, CNN, OWL, Linear Scaling.*

1. INTRODUCTION

Globally, administrators of secondary and postsecondary education struggle with important problems like keeping participation rates high and preventing student dropouts. Students with disabilities still confront many challenges in their educational journey, even in the face of government initiatives to meet their needs. According to studies, students with disabilities have a twofold higher dropout rate when compared to their classmates without disabilities. Children have different learning challenges, which makes it difficult for them to learn and apply abilities. Disabled children can, nevertheless, meet high academic levels and learn coping mechanisms to get around their limitations with the right help. Higher dropout rates and less opportunities for independent living or work result from students with disabilities not making as much progress in their higher education as their non-disabled peers.

Over 1.2 million students complete their high school education each year, yet the percentage of dropouts both among students with and without disabilities continues to increase dangerously. Learning difficulties are associated with a greater dropout rate among students with disabilities than other forms of disabilities. Dropout has a detrimental effect on organizations since it lowers enrollment and makes it more difficult to accomplish goals. Therefore, continued education depends on efficient dropout prediction and prevention. Researchers that employ data analysis in education are increasingly interested in determining the reasons behind student dropout and putting preventative measures in place.

Two domains used in higher education and other educational settings for information extraction and application are educational data mining (EDM) and learning analytics (LA). When it comes to understanding student academic data trends in the digital learning environment, educators and educational administrators are finding that EDM is a useful tool. It entails utilizing

data mining techniques to forecast pupils' academic behavior, respond to inquiries utilizing educational data, and assist individuals who encounter difficulties. Even while the application of data mining techniques in education has advanced significantly, there are still numerous unexplored areas and a lack of a cohesive approach. In an effort to assist both dropout and non-dropout students, this study suggests an LSOWL-CNN methodology along with a fuzzy rule for predicting school dropouts. The contribution of this paper is described below:

- The dataset is pre-processed by data cleaning the by which the irrelevant attribute values are eliminated.
- Utilizing the extracted features, the feature reduction is done by ENT-QOA algorithm.
- The reduced features are aligned by fuzzy based rule generation and generated values are classified by LSOWL-CNN method.

The structure of the paper is as follows. The review of literature is provided in Section 2, The proposed method is described in Section 3, the results and discussions are explained in Section 4, and Section 5 concludes the paper.

2. LITERATURE REVIEW

"Some of the recent research works related hearing-impaired student's educational dropout prediction were reviewed in this section"

Fernandes, et.al. [16] presented a detailed Predictive analysis of academic performance of public-school students in the capital of Brazil. A descriptive statistical analysis to gain insight from data. Subsequently, two datasets were obtained. The Classification models based on the Gradient Boosting Machine (GBM) were created to predict academic outcomes of student performance at the end of the school year for each dataset.

Ahmad, et.al. [17] proposed a machine learning-based strategy for measuring student achievement in educational data mining. contrasting ANN and RF machine learning designs for forecasting students' achievement considering their evaluation and demographic data. The models were assessed after functionality methods and an analysis of OULAD.

Singer, et.al. [18] suggested using tree structure to predict the effects of intellectual difficulties and accommodation facilities on the stabilisation of engineering degree students' school tasks. When the LD and lodging factors are taken into account, the designs perform much better at forecasting the stabilisation classification for a particular student. Depending on the student pattern, various accommodation actions have different impacts on the stabilisation of school tasks.

Bhat, et.al. [19] proposed a Smartphone-Based Real-Time CNN Based Especially With regard for Hard Of listening Audiences. The Speaking Enhancement (SE) technique uses a multi-objective learning CNN to augment how well speakers are understood by those wearing hearing aids. An implementation that needs to perform real-time SE is used to enforce the suggested method on a mobile phone. Technology for HA is provided by this agreement. Using a mapping-based CNN model, a speech signals frequency band is cleaned up using a multi-objective learning structure with both primary and secondary characteristics.

Gil et.al [20] familiarised with a technique for predicting drop - outs hazard maps utilising data mining techniques. Data screening came first in the procedure. The norms for data were then checked to see if they were aligned and to reduce the impact of forecast errors during in the modelling process. Additionally, the parents' earnings variable's values were filled in with their median using the inferred value method to minimize bias inside the set of data. According to the outcomes, the accuracy level utilising C4.5 was 98.9474%, whereas the accuracy level utilising

Naive Bayes was 97.8947%. As a result, it has been demonstrated that the C4.5 woman's precision in determining student drop - outs cases based on the data gathering is superior. Key limitations of this study include the fact that its elements were a single test with a small student sample.

Lee and Chung [21] patterned a method to enhance the effectiveness of a drop - outs early detection method (a) by attempting to address this same imbalanced class problem utilising synthesised minority up sampling techniques (SMOTE) and the evolutionary algorithms in computer vision; and (b) by assessing the qualified classifier with both recipients able to operate characteristic and highly precise (PR) bends. As a consequence of just using machine learning's SMOTE and ensemble techniques to address the problem of class imbalance experimental findings revealed that this prototype maximised the likelihood of continuing to support the effective studying of every student and minimised the cost of interference. The original learning access to the NEIS dataset was restricted, which posed a number of challenges. It was unable to access a variety of characteristics in the NEIS dataset, like teachers' evaluations of students, when we first met, analyzation, despite the fact that it involves the key risk factors for drop - outs estimation in this assessment.

Suresh et.al [22] proposed a method for utilizing a Unexperienced Bayesian classification model to identify drop - outs. The information was gathered using questionnaire form. The information was initially gathered using questionnaire form. Pre-survey and comment were the two survey forms that were created. Pre-survey work was done at the time of students admitted. The comment was finished in the course's medium term. The pre / post data on students were collected in textual form. In a dataset, this message was transformed into ones and zeros. After that, the dataset's missing hypotheses were removed. Following the division, the the updated values for nulls used information from others with similar values. A Naive Bayesian classifier was then

employed to determine which individuals are most such as to be decreased. This method wo not, however, assess predictions of pupil dropout rates.

Meedech et.al [23] expanded the use of the conceptual approach for predicting student dropout. The aim set of data was initially created by combining several various types of information. To prevent bias and mistakes discovered in the data, the phase of the data order to prepare used conventional methods for filling in null values and normalisation. In order to classify data and make it easily decipherable, various rule-based models were investigated. Due to its simplicity and effectiveness, an IF-THEN principle was a traditional method for formulating decisions. The experimental studies using classification methods and the information redistribution method produced outcomes that showed a classifiers with a more hopeful precision than some other designs. On the other hand, a broad range of volatility in the prediction consequence had been caused by the product's disparity in learning.

Lottering et.al [24] depicted a machine learning strategy to find participants who were in danger of quitting school. The set of data used in this original study determination of the at-risk classmates was applied with the Extracting Knowledge in Databases (KDD) strategy. The KDD method involved pre-processing the chosen data, which included removing anomalies and imputed values for incomplete data. The dataset was then transformed or subjected to dimensionality reduction techniques to lower the actual number of variables. The set of data was then run through a variety of algorithms in an effort to find patterns. In order to learn more, the mining process pattern was construed. The outcomes suggested that the advanced model showed better performance than other cutting-edge approaches. On the other hand, it applied to the smaller group of students who had a narrower range of degrees. Additionally, because the data came from a particular school of technology, the result could not be generalised.

Azizan, et.al. [25] presented an Individual Promote Value The assignment and justify in Malaysian Polytechnics for Students with Profound Hearing loss, Gratification and Adjustment's Mediator in the relationship Impacts. Academic success was related positively to both the personality-major fit and a need fit. This connection was discovered to be mediated by the adaptation. Around each other, these findings suggest that the user constructs influence the academic success of students with hearing loss and that adaptation plays a key role in illuminating this connection.

Song et.al [26] focused on the feature tables and machine learning models utilized to make reliable predictions while discussing dropout prediction for university students. The research, which examined a dataset from a Korean institution, discovers that, in contrast to the presumption that they are concentrated in the first year, student dropouts are uniformly dispersed throughout academic years. In addition to comparing the effectiveness of six machine learning models, the paper offered a number of feature table creation techniques. The model based on the gradient boosting technique and the mean value-based feature table perform the best, according to the results. The study also emphasized how crucial it is to take into account variables other than academic standing, such financial concerns, when attempting to forecast student dropout rates.

Christou et.al [27] explained the issue of college student dropout and the significance of preventing this issue. It emphasized the value of student assessment programs and the application of machine learning and educational data mining techniques to raise student achievement. Using the FSC4RBF algorithm, the suggested study presented a novel method for forecasting the performance of university students. The article demonstrated the efficacy of the algorithm in forecasting study duration and grades with sections on relevant work, the FSC4RBF algorithm, simulation results, discussion, and conclusion. The overall goal of the research offered insightful

information to support proactive strategies for lowering student dropout rates and raising educational standards.

Phan et.al [28] examined the importance of controlling student dropout in higher education and suggests a hybrid approach for decision support that combines textual data-based student segmentation with predictive modeling. The authors showed how their approach performs better than benchmarks by analyzing an actual dataset from a French higher education institution. Additionally, they compared various approaches to text representation and emphasized the need of using student textual feedback data to manage and anticipate dropout rates. The study provided decision-makers with useful insights and highlighted the significance of using unstructured textual data for student dropout prediction.

Kim et.al [29] used data-driven algorithms to forecast student dropout rates and preprocesses data using techniques including oversampling, under sampling, and combination approaches to correct for imbalances. Two models are used by the system to increase recall and precision in dropout prediction: XG Boost and Cat Boost. An experiment with student records from a South Korean institution produced better outcomes than other approaches that were currently in use. Furthermore, the system categorized dropouts according to their reasons for leaving, which helps counselors and academic administrators provide at-risk kids the individualized support they need.

Niu et.al [30] examined the problem of high dropout rates in Massive Open Online Courses (MOOCs) and introduces CNNAE-LSTM, a new neural dimension-reduced dropout prediction model. The model tackled the challenge of understanding the nonlinear relationship between high-dimensional time series data and processing them. In order to compress learning characteristics into a low-dimensional latent space for reconstruction, it combines a long short-term memory

neural network (LSTM) and a convolutional neural network autoencoder (CNNAE). Experiments on real-world datasets reveals that the proposed model outperforms state-of-the-art baseline techniques in terms of prediction performance.

3. PROPOSED FRAMEWORK

The pandemic of student dropouts is among the most severe and enduring issues the education system has to deal with. The term "dropout" refers to an individual who left a school, college, or other academic establishment before finishing a registration course. The majority of the pupils in this has disorders. Therefore, it is essential to make an early prediction of student dropout by looking at their academic performance, learning styles, personal information, health issues, etc. A novel approach is suggested for early prediction of student dropouts by gathering survey information from as set of students. For students who dropped out of school or had poor academic performance, alternative suggestions are also given. The training and testing phases of this suggested model are comprised of educational datasets. To predict the dropout behaviour of students, initially the data is collected. The data is pre-processed and it undergoes feature extraction and reduction by ENT-QOA algorithm and the reduced features are aligned by fuzzy based rule generation and generated values are classified by LSOWL-CNN method. Figure 1 shows the Structure of proposed model.

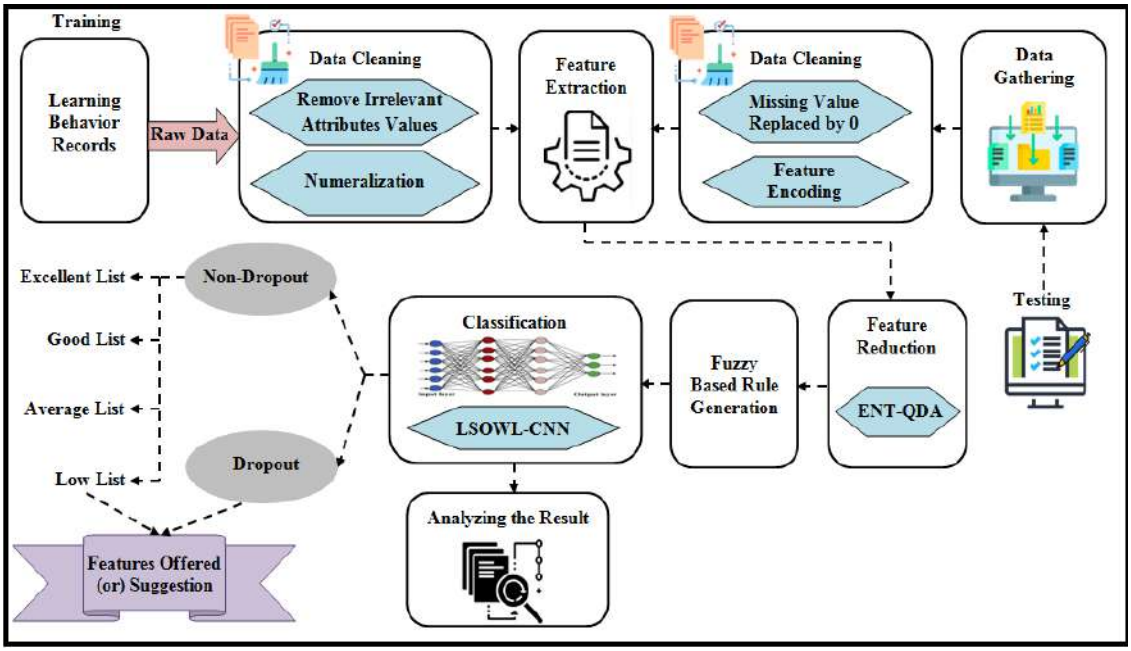


Figure 1: Proposed Model

3.1. TRAINING PHASE

Using the dataset, the following phases are done in this phase. The detailed explanation of each phase is as follows.

3.1.1. Data Cleaning

Data cleaning is then done to improve accuracy of classification and shorten training schedules. It is done by Irrelevant attribute removal and Numeralization.

3.1.1.1. Irrelevant attribute removal

The dataset's unimportant data may cause the classification performance to suffer, which lowers the system's quality. The information that is not required for the forecasting of drop- outs is referred to as irrelevant attributes. For example, the suggested drop-outs prognostication process does not require the dataset's ascribe date stamp. Therefore, in order to increase the system's accuracy rate, these characteristics have been removed from the data.

3.1.1.2. Numeralization

It involves transforming all of the dataset's quasi data into a numeric form for the further categorization. Sexual identity, dept, and other non-numerical data in the set of data can't be directly controlled by the classification model. Numeralization, which converts any integer number between 1 and distinct value systems based on the type of data, is done to add value to such data. Each of the data in the set of data are converted to numbers at the conclusion of this procedure, which are then utilised additional analysis.

3.1.2. Feature Extraction

To achieve accurate categorization, the features are extracted. It is described as the process of identifying the set of characteristics that will represent the information required for analysis and categorization effectively. Additionally, it lowers the resources required to explain the vast amounts of data. Starting with a base set of measurement values, extraction of features creates integral approach that are meant to be insightful and non-redundant. In order to complete the desired action using this reduced representation rather than the full initial data, it is expected that the extracted features will encompass the pertinent data from the input data. Here, characteristics like name, age, sex, and other characteristics are extracted before being further lowered to lessen the dimensions.

The gleaned characteristics $\left(x^i\right)$ who are depicted as,

$$x^i = \left\{x^1, x^2, \cdots\cdots, x^n\right\} \tag{1}$$

Where, n determines the number of extracted features.

3.1.3. Feature Reduction

The definition of dimension reduction is the removal of some characteristics from the derived set of features without sacrificing any significant data. The scheme becomes more

effective by cutting down the number of features because this reduces the computational burden. Electron density Quadratic Linear discriminate Assessment is used to reduce the characteristics in the suggested technique (ENT-QDA). To ascertain the function that distinguishes among 2 or more characteristics, the dimension reduction technique is known as quadratic discriminant analysis (QDA) is used. Assuming that the metrics are uniformly distributed, QDA is tightly linked to linear regression techniques. In contrast to LDA, QDA does not assume that the multicollinearity of each characteristic is the same. The variable of each feature must be determined by calculating for dimensionality reduction utilising QDA, though. Such a co-variance computation is extremely difficult and yields unreliable results for dimensionality reduction. In addition to making this tool to facilitate for dimension reduction, the co-variance computation is supplanted with entropy computation (ENT). ENT-QDA stands for the ENT substitute in the QDA prototype. Listed below are the ENT-QDA stages:

Stage 1: Think about a group of extracted features $\left(x^i\right)$, whose dimensionality must be minimised. Let the likelihoods of these characteristics be $p\left(x^i\right)$. Next, a random sample is chosen in a way that $Y\left(Y^1, Y^2, \cdots, Y^N\right)$ and displays the variety of groups. Following is a definition of the Bayesian Discriminant principle:

$$p\left(x^i \middle/ Y\right) = \frac{p\left(x^i\right) \cdot p\left(Y \middle/ x^i\right)}{p\left(Y\right)} \tag{2}$$

Stage 2: In order to estimate the multivariate Gaussian distribution system and the Gaussian probability density function which are the foundations of the QDA,

$$f^i\left(Y\right) = \frac{p\left(x^i\right) \cdot p\left(Y \middle/ x^i\right)}{\left(2\pi\right)^{N/2} \cdot \left|\ell^i\right|^{1/2}} \exp\left\{-\frac{1}{2}\left(x^i - \mu^i\right)' \cdot \ell^{i-1}\left(x^i - \mu^i\right)\right\} \tag{3}$$

Where μ^i represents the mean value of the characteristics and is the entropy value ℓ^i. You can compute the mean and entropy as,

$$\mu^i = \frac{p(x^i) \cdot p\left(Y/x^i\right)}{p(Y)} \tag{4}$$

$$\ell^i = -\sum_{i=1}^{n} p(x^i) \log p(x^i) \tag{5}$$

Stage 3: The QDA formula can be obtained by using the log transformation of (3) which is given as follows,

$$d(x^i) = -\frac{1}{2}\ln\left|\ell^i\right| - \frac{1}{2} x'^i \ell^{i-1} x^i + \mu^{i'} \ell^{i-1} x^i - \frac{1}{2} \mu^{i'} \ell^{i-1} \mu^i + \ln k^i \tag{6}$$

Where, $k^i = 1/N$. Finding the ordinary classifier co - efficient after calculating the mean and fractal dimension values allows for the identification of the process's most beneficial characteristics. As a result, equation includes the lowered characteristics (y^j) (7),

$$y^j = (y^1, y^2, \cdots\cdots, y^m) \tag{7}$$

The overall number of decreases in the supply is shown here. The system for generating fuzzy rules is then fed these characteristics.

3.1.4. Fuzzy based Rule generation

By taking into account the students' grades, the fuzzy-based rules from figure 2 will be produced from the collection of decrease in the supply. In order to control the classification, fuzzy based rule generators use a set of specifications and IF-THEN circumstances on the input data. Modelling inputs into fuzzy sets with components that have a level of affiliation calculated utilising a member status function is the procedure of "fuzzification."

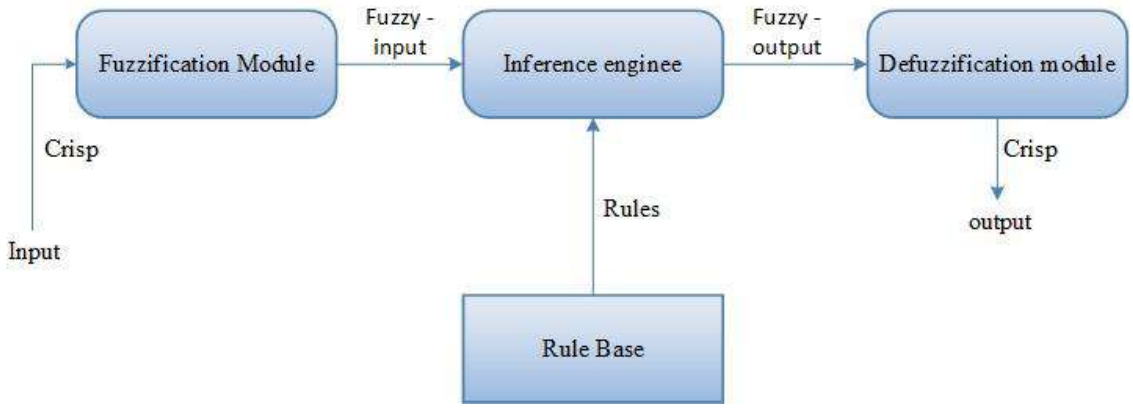


Figure 2: Block diagram of Fuzzy based Rule Generation

- An element's likelihood of being classed grammatically is expressed by the membership value. Since linguistic terms are used as both their antecedent factors and implications, the system with fuzzy rules is the most helpful in simulating some complicated systems that may be viewed by people. If is and is, then is, where is the variables as well as did mention the input features, is how the regulations in this fuzzy rule-based system can be depicted.
- The rule's consequence in this layout can take any workable format, though quadratic formats are the most prevalent. We construct a fuzzy regulation scheme by forming an amount of fuzzification and incorporating them into a set of IF-THEN circumstances and findings. According to the suggested system, a set of rules are created based on the student's grades, other educational activities, and an establish of decrease in the supply. The fuzzy sets produced by the proposed methodology are listed as,
- If the learners decide their grade level (6th, 9th, 11th, or 12th) and their record variety is superior to 90% or superior to 80%. They also actively participate in extracurriculars, they are considered to be "Excellent Students both in Research and Extracurricular activities Actions."

The student is an "Absolutely brilliant Scholar in Studies but must Take part in Extracurricular Actions" if they choose their benchmark (6th, 9th, 11th, or 12th), and their mark variety is larger than 90% points or larger than 80% and they're not actively participate in the extracurriculars.

In this manner, the education rates of a set of guidelines are calculated using fuzzy-based rule generator sets. This same classifier categorises the child's individual background and drop - outs information based on such rules. The system's collection of fuzzification establishes how many rules the fuzzy system produces and is modelled as,

$$z^k = z^1, z^2, \ldots\ldots, z^M \tag{8}$$

3.1.5. Classification

Following the creation of fuzzy rules, classification is carried out using the generated rules by the Sequential Scaling Owl Optimization Technique with CNN (LSOWL-CNN). Dropouts and non-dropouts are the two classes into which the classification algorithm divides the outcome. Prospective recommendations will be made based on this categorization for both non-dropout and drop-outs students, helping the former to enhance their level of study, and helping the latter to decrease the number of classmates who intend to discontinue their research. There are three layers in CNN: input, hidden, and output. The concealed layer contains the convolution layer, which carry out the aligned with the mission, which is a dot product of a convolution layers kernel and the layers' input matrix. By trying to apply a variable of biases and weights each neuron in the CNN computes outcome. To obtain a more accurate classifier performance, these weights must be modified in each know prior on the loss function. CNN learning persists in the event that the least error function occurs. The Linear Scalability Owl Optimization Algorithm is used to keep updating the weighting factors, however, if the error function is high (LSOWL). LSOWL-CNN is the term

used to describe the merged use of the LSOWL optimization algorithm in the basic CNN. Figure 3 below illustrates the structural layout of a traditional CNN.

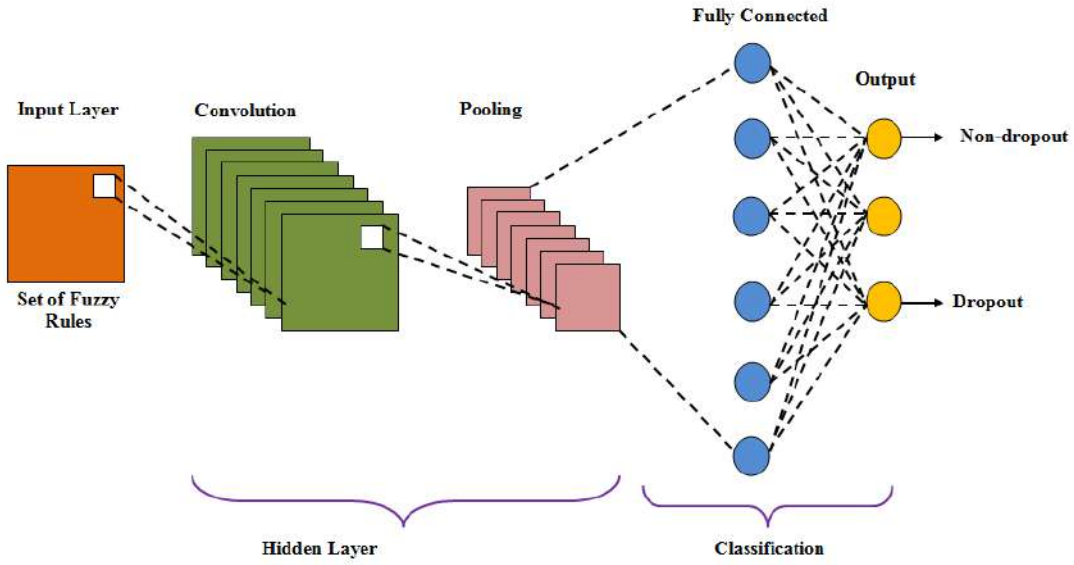


Figure 3: Building design for CNN

- The list of ambiguous regulations $z^k = z^1, z^2, .., z^M$ are entered into the CNN's input nodes. The weight and bias morals of each neuron are multiplied z^k in the input layer. In mathematics, the outcome of the input layer (I_q) is depicted as,

$$I_q = r\left(z^k * w_{qi} + b_{qi}\right) \tag{9}$$

Here, $r(\circ)$signifies the ReLU activation function, w_{qi} & b_{qi} illustrates the input layer weight bias values and the LSOWL technique were used to update the vector, in both $q = 1,2,\cdots,Q$ defines the number of layers in the CNN. Then, this output is fed into the convolutional layer. The ReLU activation function $(r(Z))$, Where $Z = z^k * w_{qi} + b_{qi}$ can be modelled as,

$$r(Z) = \max(0, Z) \tag{10}$$

- The convolution operation combines the insight before sending the outcome to the following layer. It has a 5*5 filter that is used for specifically designed to support. You can specify the convolution layers layer's (C_q) outcome by,

$$C_q = r\left(z^k \otimes w_f\right) \tag{11}$$

As shown in the equation above, w_f represents the revised weight vector linking the input. z^k making use of the convolutional layer $f = 1,2,\cdots F$ is the convolution operator and displays how many filters there are in the $\otimes$ convolutional layer.

- The pooling coat is applied following the convolution layers. Down-sampling is the main principle of accumulation, which is used to lessen the sophistication of extra layers. As a result, less computing power is needed to process the information. By incorporating the neuron output data from one stack into a nerve cell in the following layer, it lessens the aspect of the data input. The data is transferred to the completely connected layer after dimension reduction in the pooling layer. Evey neuron inside one layer is linked to every other gradient neuron through the completely linked coating. To generate the categorisation performance, the data is passed through the completely connected layer. The role of the output nodes is as follows:

$$O_q = r\left(z^k w_{qo} O_{q-1} + b_{qo}\right) \tag{12}$$

Where, O_q, O_{q-1} brings up the layer's output q and $q-1$, w_{qo} outlines the revised set of weights, b_{qo} shows the bias vector.

Then there is the means square error (m_e) is calculated as follows,

$$m_e = \frac{1}{2}\sum_{k=1}^{M}\left[a(k) - O_q\right]^2 \tag{13}$$

Here, $a(k)$ is the outcome that CNN has acquired and reflects its approximate outcome. The LSOWL optimization technique, which is covered in more detail, is used to keep updating the weighting factors if highest losses occur in the network.

Therefore, the discriminator generates the categorization outcome as dropout and non-dropout. Based on academic tiers and extra curriculars, the non-dropout level will also be divided into Excellent, Good, Average, and Low categories. In this, the graduates are organised according to their semester grades. Both dropout and non-dropout students will receive study advice and educational recommendations in order to enhance their schooling and reduce the likelihood of dropping out. The following criteria are used to categorise the drop - outs.

i). Students who don't perform better academically or in extracurricular activities.

ii). Students who perform well academically but poorly in extracurriculars.

Then, based on their level of studies and activities, recommendations are given to the dropout students.

3.1.5.1. Weight updating by LSOWL

The meta-heuristic algorithm known as OWL is based on how owls hunt. As opposed to just using one ‘s eyes, owls chase at night utilising their having heard abilities. The central nervous system of the owl creates an aural map whenever the prey tends to make an audio and the noise reaches it. The place of the prey can be determined by owls using this map, which includes details on intertemporal moment and severity. The starting view of the owls, which is chosen at random from a set of possible positions, results in the optimal local solution and slows integration. The position of the owls is normalised using the Linear Scaling (LS) technique in order to increase the optimum solutions and get a better convergence rate. LSOWL is the name for this type of LS integration into the OWL. The following describes the LSOWL procedure.

Stage1: Initially, the first inhabitants (weight values) $\left(w_p = w_1, w_2, \cdots, w_P\right)$ includes owls, each of which is depicted below by a dimensional array.

$$w_{pr} = w_{p1}, w_{p2}, \cdots, w_{Pd} \tag{14}$$

Here, w_{pr} mentions the $r-th$ dimension of p^{th} owl.

Stage 2: Using linear contractual capacity, each owl's initial location in the forest is then determined. $w_p = w_l + \left(w_u - w_l\right) * \upsilon$ (15)

In the calculation above (15), w_l establishes the lower limit of p^{th} owl, w_u depicts the upper limit of p^{th} owl and υ designs the below-given linear scaling normalisation,

$$\upsilon = \frac{w - w_u}{w_u - w_l} \tag{16}$$

Stage 3: The concentration of prey helps to communicate by each owl while in its present role is then calculated on the basis on its best fitness, which is determined by the owl's position. The strength and conditioning computation come from,

$$f_p = f\left(w_{pr}\right) \tag{17}$$

Where, $f\left(w_{pr}\right)$ represents the health of every personal owl.

Stage 4: The great owl (w_{best}) is decided by the fitness value is based on the owl that hears the noise and the bads owl (w_{worst}) is the 1 who hears the least noise. the data on normalised intensity follows $\left(\xi_p\right)$ of p^{th} The following equation (18) can be used to calculate the owl.

$$\xi_p = \frac{f_p - w_{worst}}{w_{best} - w_{worst}} \tag{18}$$

In the calculation above, $w_{worst} = \min\left(f_p\right)$ and $w_{best} = \max\left(f_p\right)$.

Stage 5: Following that, Euclidean range is used to determine how far apart each owl is from its prey $\left(\mathrm{E}_p\right)$. Equation illustrates it. (19),

$$\mathrm{E}_p = \sqrt{\sum_{p=1}^{P}\left(w_p - L^P\right)^2} \tag{19}$$

In the calculation above, L^p establishes where the fittest owl's feast was caught $\left(L^p = w_{best}\right)$.**Stage 6:** The owl detects changes in sound intensity $\left(dS_p\right)$ as it approaches the prey and calculates them Following is

$$dS_p = \frac{S_p}{E_p{}^2} + \eta \tag{20}$$

Where, S_p gives the owl's starting perception of the noise intensity and η describes the random noise that influences that sound intensity.

Stage 7: In this stage, the owls locate being updated $\left(w_p(t+1)\right)$ because of the prey's movement,

$$w_p(t+1) = \begin{cases} w_p(t) + \chi \cdot dS_p * \left|\zeta\, L_p - w_p(t)\right| & \mathrm{H} < 0.5 \\ w_p(t) - \chi \cdot dS_p * \left|\zeta\, L_p - w_p(t)\right| & \mathrm{H} \geq 0.5 \end{cases} \tag{21}$$

In equation (21), indicates the likelihood of a feast moving, χ, ζ is a steady from 1.9 to 0 that decreases linearly and has a random number with a uniform distribution in the range [0, 0.5]. This approach results in the best owl positions being selected as the best solution (optimized weight values of CNN). Figure 4 illustrates the LSOWL's pseudocode.

Pseudocode for proposed LSOWL

Input: weight values (w_p)

Output: Optimized weights $(w_{p,opt})$

Begin
Initialize the owl population w_{pr}
Set $t = 0$
Generate initial owl position (w_p) using linear scaling
While stopping criterion is not met
  For each w_p **do**
    Evaluate fitness of each owl $f_p = f(w_{pr})$
  End for
  Select w_{best} and w_{worst}
  For each $w_p = 1: P$ **do**
    Evaluate the normalized intensity information (ξ_p)
    Calculate the distance information (E_p)
    Compute $dS_p = \frac{S_p}{E_p^2} + \eta$
  End for
  For $(p = 0; p < P; p++)$
    Set $H = rand(0,1)$
    Estimate the updated position of owl $(w_p(t+1))$
  End for
  Update w_{best}
  Set $t = t+1$
End while
Choose the best location of owl $(w_{p,opt})$
End

Figure 4: LSOWL proposed pseudocode

3.2. TESTING PHASE

Using the dataset, the following phases are done in this phase. The detailed explanation of each phase is as follows,

3.2.1. Data cleaning

Pre-processing is completed following the collection of student information. The replacement of missing values and feature encoding occur during pre-processing. For the purpose of making the collected data useful for additional analysis, data cleaning is done. The data that was gathered lacks certain information that the students failed to fill in. Not all students will respond to all of the application's questions. The students leave out some information on the form when it doesn't match their educational and personal information. Such incomplete form questions will

decrease the classification accuracy and result in errors throughout the overall process. The suggested technique will therefore substitute zero for any missing form information in order to address these problems.

3.2.2. Feature encoding

To increase accuracy of classification, all of the checking data's attributes are then encoded with numerical data. A group has different is converted into a variable and used for further processing through the process of feature encoding. Figure 5 depicts the upcoming encoding prototype.

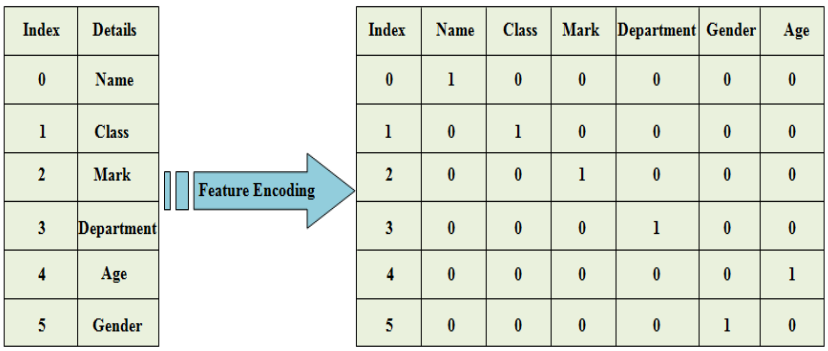


Figure 5: Feature encoding as a model

The process of extracting features, feature extraction, fuzzy-based guidelines, and classification are carried in the same manner as during the training stage after the data has been cleaned. In the end, the classifier assigns the students to groups according to the data they supplied on the form.

4. RESULTS AND DISCUSSIONS

By contrasting the results of the suggested protocol with those of the currently used methodologies, the suggested drop - outs estimation framework is examined. Some performance metrics are used to make the comparison. The suggested model's set of data was compiled using

the survey strategy. The following is a discussion of the suggested new framework specific supremacy measure.

4.1. Dataset description

This dataset includes information from a higher education establishment about a range of undergraduate student's characteristics, such as academic performance, social-economic status, and demographics, in order to examine the effects of these characteristics on academic success and student dropout rates [31].

4.2. Performance evaluation of the suggested model

Using metrics such as Accuracy, Recall, Precision, F-measure, Sensitivity, Specificity, FPR, FNR, MCC, FRR and NPV the effectiveness of the Proposed method is computed by comparing the existing models like CNN, ANN, RNN and DNN. The evaluation results and the graphical representation of metrics are provided in this section. Table 1 provides the numerical results of the models.

Table 1: Numerical Results of the proposed and Existing models

Metric	CNN	ANN	RNN	DNN	Proposed
Accuracy	94.4105	91.7162	88.2044	85.3719	96.8176
Precision	92.1415	88.0522	87.4834	83.0622	94.6501
Recall	95.4255	92.3462	90.3584	89.1552	97.4687
F-measure	93.19112	90.19112	87.34007	84.39142	95.71357
Sensitivity	95.4255	92.3462	90.3584	89.1552	97.4687
Specificity	91.3958	88.6115	84.7415	83.0451	92.8338
FPR	0.18401	0.21259	0.49962	0.61539	0.02137
FNR	0.10747	0.25168	0.29289	0.48128	0.01584

FRR	0.10747	0.25168	0.32124	0.50412	0.01584

4.2.1. Graphical representation of the Suggested and Existing models

The Performance metrics of the models are evaluated and the graphical representation of all the metrics are provided in the below figures.

4.2.1.1. Accuracy and Precision

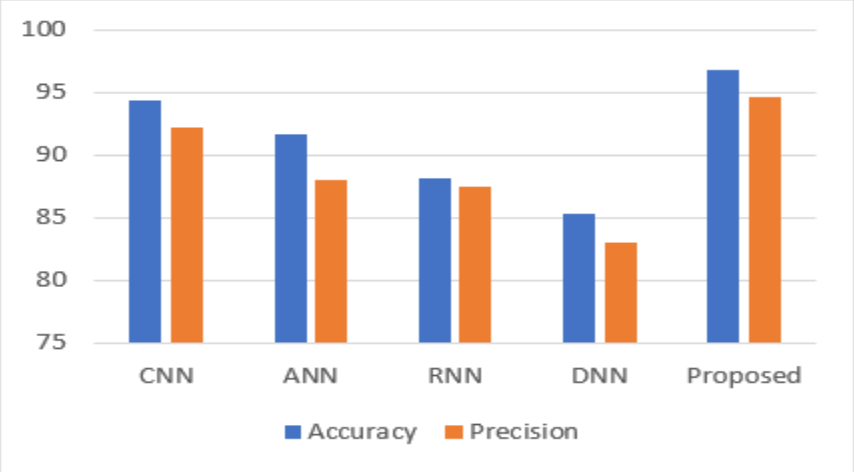


Figure 6: Compariosns of model in terms of Accuracy and Precison

The proposed and current techniques are compared with regard to Accuracy and Precision is shown in Figure 6. The suggested model attained an Accuracy and Precision of 96.8176% and 94.6501%. whereas the existing models obtained an Accuracy of 91.7162% for ANN, 88.2044% for RNN, 94.4105% for CNN and 87.3179 for DNN. The Precision values are 92.1415% for CNN, 88.0522% for ANN, 87.4834% for RNN and 83.0622% for DNN. Thus, it is evident from the findings that the suggested classifier outperforms the current methods in terms of the Accuracy and Precsion.

4.2.1.2. Recall, F-measure, Sensitivity, Specificity

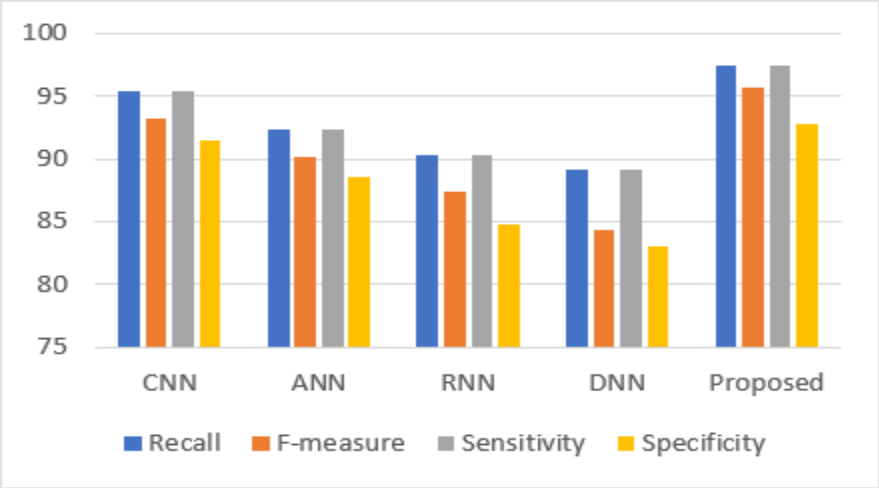


Figure 7: Compariosns of model in terms of Recall, F-measure, Sensitivity, Specificity

The proposed and current techniques are compared with regard to Recall, F-measure, Sensitivity, Specificity is shown in Figure 7. The suggested model attained a Recall of 97.4687%, F-measure of 95.7135%, Sensitivity of 97.4687%, Specificity of 92.8338% whereas the existing models CNN, ANN, RNN and DNN obtained a lower value which are provided in the Table 1. Thus, it is seen that t the suggested model results in better performance in comparisons to the other models.

4.2.1.3. FPR, FNR and FRR

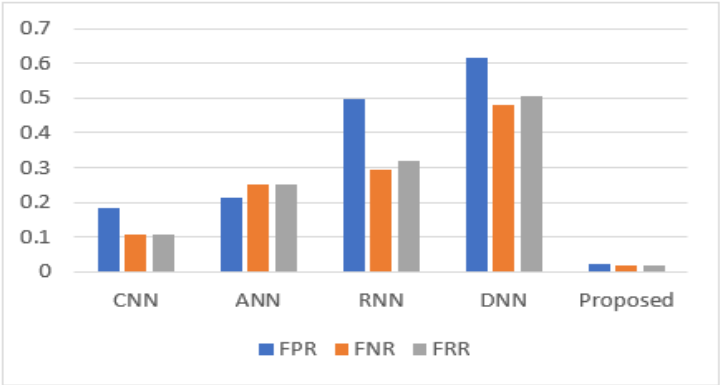


Figure 8: Compariosns of model in terms of FPR, FNR, FRR

Figure 8 shows the performance of FPR, FNR and FRR. The suggested model attained a lower FPR of 0.02137%, FNR of 0.01584% and FRR of 0.01584% whereas the existing models attained a higher FPR, FNR and FNR values which is seen from the graphical representation and the numerical results of FPR, FNR and FRR are provided in the Table 1. Thus, the suggested model is proven to be better in terms of FPR, FNR and FRR.

4.2.1.4. Suggested system's drop-out rate

Utilizing the suggested framework, the drop-out rate is evaluated and provided in Table 2 and its graphical representation is provided in Figure 9. The results shows that the drop-out rate is reduced by 28% per 100 students. This is due to the suggested work's early identification of students who intend to discontinue their studies and the subsequent provision of the appropriate suggestions to those students to change their original plan. This results that the suggested system is superior in predicting the drop-out rates.

Table 2: Results of drop-out rate for proposed model

Drop-out (%)	**28**
Non- Dropout (%)	**72**

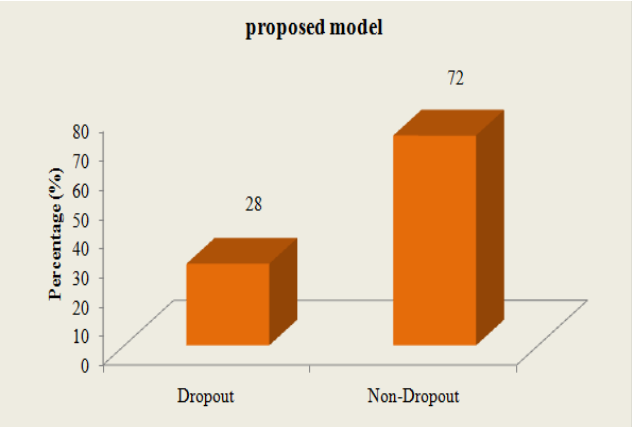


Figure 9: A visual representation of the suggested system's drop - out rate

5. CONCLUSION

It is still imperative that major issues surrounding early student dropout be addressed in both high school and college systems worldwide. This work offers a new approach to predict dropout rate using LSOWL-CNN. The dataset is first pre-processed by data cleaning, which removes any irrelevant attribute values. After that, the features are extracted, and the features are reduced using ENT-QDA. The characteristics will be used to develop fuzzy data-based rules. Using the developed rules, the system is trained and a classification technique known as Linear Scaling Owl Optimal control Method with CNN (LSOWL-CNN) predicts the results. The proposed model attained Accuracy and Precision of 96.8176% and 94.6501%, Recall of 97.4687%, F-measure of 95.7135%, Sensitivity of 97.4687%, Specificity of 92.8338%, FPR of 0.02137%, FNR of 0.01584% and FRR of 0.01584%. Thus, from the results, it is seen that the proposed model results in better performance in comparisons to the other models. Further the drop-out rate can be precited more accurately in future works by using a different novel approach on various datasets.

REFERENCES

1. Marcell Nagy and Roland Molontay, “Predicting dropout in higher education based on secondary school performance”, 22nd IEEE International Conference on Intelligent Engineering Systems, June 21-23, Las Palmas de Gran Canaria, Spain, 2018.
2. Robert S. Dembo and Jennifer La Fleur, “Community health contexts and school suspensions of students with disabilities”, Children and Youth Services Review, vol. 102, pp. 120-127, 2019.

3. Ambili K and Afsar P, “A framework for learning disability prediction in school children using artificial neural networks”, International Journal of Advanced Research in Science, Engineering and Technology, vol. 3, no. 6, pp. 2312-2316, 2016.
4. Julie M. David and Kannan Balakrishnan, “Performance improvement of fuzzy and neuro fuzzy systems prediction of learning disabilities in school-age children”, International Journal of Intelligent Systems and Applications, vol. 5, no. 12, pp. 34-52, 2013.
5. Bonnie Doren, Christopher Murray and Jeff M. Gau, “Salient predictors of school dropout among secondary students with learning disabilities”, Learning Disabilities Research and Practice, vol. 29, no. 4, pp. 150-159, 2014.
6. Angela M. T Prince, Janie Hodge, William C. Bridges and Antonis Katsiyannis, “Predictors of postschool education/ training and employment outcomes for youth with disabilities”, Career Development and Transition for Exceptional Individuals, vol. 41, no. 2, pp. 1-11, 2017.
7. Dale Rennard Rose, “A quantitative correlational study of georgia high school graduation and retention rates of students with disabilities”, Thesis, Northcentral University, 2018.
8. Jay Stratte Plasman and Michael A. Gottfried, “Applied STEM coursework, high school dropout rates and students with learning disabilities”, Educational Policy, 2016, Doi: 10.1177/0895904816673738.
9. Mayra Alban and David Mauricio, “Predicting university dropout through data mining a systematic literature”, Indian Journal of Science and Technology, vol. 12, no. 4, pp. 1-12, 2019.
10. Jong Hyuk Lee, Mihye Kim, Daehak Kim and Joon-Min Gil, “Evaluation of predictive models for early identification of dropout students”, Journal of Information Processing Systems, vol. 17, no. 3, pp. 630-644, 2021.

11. Isiaka R. M, Babatunde R. S, Ajao F. J and Abdulsalam S. O, “A machine learning approach to dropout early warning system modeling”, International Journal of Advanced Studies in Computer Science And Engineering, vol. 8, no. 2, pp. 1-1, 2019.
12. Hanan Aldowah, Hosam Al-Samarraie and Wan Mohamad Fauzy, “Educational data mining and learning analytics for 21st century higher education a review and synthesis”, Telematics and Informatics, vol. 37, pp. 13-49, 2019.
13. Thiago M. Barros, Plácido A. Souza Neto, Ivanovitch Silva and Luiz Affonso Guedes, “Predictive models for imbalanced data a school dropout perspective”, Education Sciences, vol. 9, no. 4, pp. 1-17, 2019.
14. Hasniza Hassan, Syahid Anuar and Nor Bahiah Ahmad, “Students performance prediction model using meta-classifier approach”, Medizinische Verlags-Und, 2019, ISBN: 978-3929851380.
15. Cristobal Romero and Sebastian Ventura, “Educational data mining and learning analytics an updated survey”, WIREs Data Mining and Knowledge Discovery, 2020, Doi: 10.1002/widm.1355.
16. Raheela Asif, Agathe Merceron, Syed Abbas Ali and Najmi Ghani Haider, “Analyzing undergraduate students performance using educational data mining”, Computers and Education, vol. 113, pp. 177-194, 2017.
17. Muhammad Sammy Ahmad, Ahmed H. Asad and Ammar Mohammed, “A machine learning based approach for student performance evaluation in educational data mining”, International Mobile, Intelligent, and Ubiquitous Computing Conference (MIUCC), 26-27 May, Cairo, Egypt, 2021.

18. Gonen Singer, Maya Golan, Neta Rabin and Dvir Kleper, “Evaluation of the effect of learning disabilities and accommodations on the prediction of the stability of academic behaviour of undergraduate engineering students using decision trees”, European Journal of Engineering Education, vol. 45, no. 2, pp. 1-18, 2019.
19. Bhat, G.S., Shankar, N., Reddy, C.K. and Panahi, I.M., 2019. A real-time convolutional neural network based speech enhancement for hearing impaired listeners using smartphone. *IEEE Access*, *7*, pp.78421-78433.
20. Jay S. Gil, Allemar Jhone P. Delima, Ramcis N. Vilchez, “Predicting students dropout indicators in public school using data mining approaches”, International Journal of Advanced Trends in Computer Science and Engineering, vol. 9, no. 1, pp. 774-778, 2020.
21. Sunbok Lee and Jae Young Chung, “The machine learning-based dropout early warning system for improving the performance of dropout prediction”, Applied Sciences, vol. 9, no. 15, pp. 1-14, 2019.
22. Aishwarya Suresh, Sushma Rao H. S and Vinayak Hegde, “Academic dashboard prediction of institutional student dropout numbers using a naïve bayesian algorithm”, Springer, 2017, ISBN: 978-981-10-3934-8.
23. Phanupong Meedech, Natthakan Iam-On and Tossapon Boongoen, “Prediction of student dropout using personal profile and data mining approach”, Springer, 1st ed. 2017, 2016, ISBN: 978-3-319-26999-3.
24. Roderick Lottering, Robert Hans and Manoj Lall, “A machine learning approach to identifying students at risk of dropout a case study”, (IJACSA) International Journal of Advanced Computer Science and Applications, vol. 11, no. 10, pp. 417-422, 2020.

25. Azizan, C.R., Roslan, S., Abdullah, M.C., Asimiran, S., Zaremohzzabieh, Z. and Ahrari, S., 2021. Does a Person-Environment-Fit Promote the Academic Achievement of Hearing-Impaired Students in Malaysian Polytechnics? The Mediating Effects of Satisfaction and Adjustment. International journal of environmental research and public health, 18(24), p.13381.
26. Song, Zihan, Sang-Ha Sung, Do-Myung Park, and Byung-Kwon Park. "All-year dropout prediction modeling and analysis for university students." *Applied Sciences* 13, no. 2 (2023): 1143.
27. Christou, Vasileios, Ioannis Tsoulos, Vasileios Loupas, Alexandros T. Tzallas, Christos Gogos, Petros S. Karvelis, Nikolaos Antoniadis, Evripidis Glavas, and Nikolaos Giannakeas. "Performance and early drop prediction for higher education students using machine learning." *Expert Systems with Applications* 225 (2023): 120079.
28. Phan, Minh, Arno De Caigny, and Kristof Coussement. "A decision support framework to incorporate textual data for early student dropout prediction in higher education." *Decision Support Systems* 168 (2023): 113940.
29. Kim, Sangyun, Euteum Choi, Yong-Kee Jun, and Seongjin Lee. "Student dropout prediction for university with high precision and recall." *Applied Sciences* 13, no. 10 (2023): 6275.
30. Niu, Ke, Guoqiang Lu, Xueping Peng, Yuhang Zhou, Jingni Zeng, and Ke Zhang. "CNN autoencoders and LSTM-based reduced order model for student dropout prediction." *Neural Computing and Applications* 35, no. 30 (2023): 22341-22357.
31. https://www.kaggle.com/datasets/thedevastator/higher-education-predictors-of-student-retention

IPE Journal of Management
ISSN 2249-9040 Volume 14, No 15, January-June 2024

ORGANISATIONAL COMMITMENT - A STUDY ON TEACHERS WORKING IN ENGINEERING COLLEGES

Dr. Lily Regina Arthi Moses, Associate Professor, Department of Business Administration , St Anne's Degree College for Women, Halasuru, Bengaluru

Abstract:
Making learning easier and more pleasurable for students is the clear and basic goal of teaching. Assuming something about what and how a student learns is called "teaching." To teach properly, one must have knowledge about "student mentality." Numerous studies have demonstrated that employee actions fluctuate depending on the level of commitment to the firm. (Kurdi, 2020). With the assistance of a questionnaire developed by Allen and Meyer et al., 400 respondents who work in engineering institutions at Bangalore make up the study's sample. ANOVA, correlation, and percentage analysis are used to examine the gathered data. SPSS is used to help derive the statistical data. The study has so concentrated on the dedication of instructors to their work. In general, the research is done with the engineering institutes in Bangalore..
Keywords: Normative commitment, affective commitment, continuity commitment, engineering professors, organizational commitment.

INTRODUCTION:

Since education researchers and academics have been examining and researching the issue for a long time, teaching is recognized to be a complex activity. (Ali A M ., 2020) Finding effective teaching strategies is still a difficult, demanding, and complex undertaking. Because it is advancing with time and technological advancements and is dependent on the national environment, quality teaching appears dramatic. Meyer and Allen, 1996 Everyone agrees that a teacher's instructional regimen is crucial to students' academic success. (Allen & Meyer, 1996)

It is well acknowledged that a teacher's instructional routine has a significant impact on pupils' academic progress and learning. The previous few decades have seen a dearth of research on the characteristics of Indian teachers that influence engineering education. (Luedech Girdwichai, 2020) While there aren't many Indian scholars, Native American academics have discovered that the integration of teachers' cultural backgrounds and dedication to the area of education has been the primary cause of the major teaching issues in engineering education.

The term "organizational commitments" describes an employee's psychological bond with their place of employment. It encompasses all working groups inside an organization, as well as the person, their objectives, and their collective behaviors. Commitment in Organization can be influenced by a number of elements, which implies that commitment can be changed by action. (Wong Ngo & Wong, 2002) According to other theories, the degree of team commitment is positively impacted by a commitment to external issues. Professionals' actions inside the team also have an effect on the organization's level of commitment. In . (Sherbini, 2021.) Given that having several responsibilities plays a big part in predicting and interpreting workplace actions as well as expected results.

SIGNIFICANCE OF THE STUDY

The primary goal of the research study is to investigate the commitment of professionals employed by engineering institutions. (Angle & Perry, 1981) The normative commitment, continuation commitment, and Affective commitment are the organizational commitment factors according to "Organisational commitment (Allen Meyer et al.)" that have been taken into consideration to assess instructors' dedication to their jobs. (Andy Soenanta, 2020.) . As a result, the study has concentrated on professionals' dedication to their jobs. The study is typically conducted in collaboration with Banglore’s engineering colleges.

OBJECTIVES OF THE STUDY

- To find the organisational commitment of teachers working in engineering colleges.
- To analyze the organizational commitment of the teachers towards their work.

RESEARCH METHOLOGY

The study aims to evaluate the dedication of engineering faculty. The study's consideration period is eighteen months. For this study, 400 respondents who were employed at engineering colleges made up the sample size.

SOURCE OF DATA

The primary data serves as the basis for the study. Data from the engineering teachers has been gathered using a structured questionnaire. The questionnaire has undergone the necessary modifications in light of the pilot study's reliability and validity findings. The pertinent secondary data was gathered from online and offline reports, journals, websites, published and unpublished books, and books.

DESIGN OF THE STUDY:

TOOLS: The instruments used in the study

- "Organisational commitment (Allen Meyer et al...)"

STATISTICAL TECHNIQUES:

- Percentage analysis
- ANOVA
- Correlation analysis

RESULTS OF THE ENGINEERING TEACHERS PERSONAL PROFILES

According to the study's straightforward percentage, 26% of respondents were women and 73% of respondents were men. In addition to being self-financing, 76% of the colleges held NAAC accreditation. The majority of them make between Rs. 20001 and Rs. 40000 (39%) in salary.

Assistant professors made up 42% of the respondents, with associate professors making up the remaining 26%. The respondents' age group was defined as follows: 38% of them were in the 36–45 age range. Since the study included all categories of experienced faculty, the findings showed that 26% had between 11 and 15 years of experience, 22% had between 6 and 10 years, and 16% had between 16 and 20 years. 14% had between 21 and 25 years' experience.

According to the classification of experience under the current HOD, 40% of them had worked for four to six years. The majority of them (78%) said that their workload was manageable.

Organizational commitment:

The various components of organizational commitment were examined for any potential noteworthy variations between the cohorts of particular commitment- and personality-related variables. In (Hirschi, 2020) The ratings provided by the respondents were added to create the scores for each factor and each respondent. The scores will show how committed each factor is to its respective level. Each factor underwent a separate statistical analysis, and conclusions were made.

TABLE: 1 (ANOVA for Affective commitment by personal factors)

Ho: The Affective commitment scores do not differ significantly among the group of Personal variables

		Affective commitment				
Type of management		**Sum of Squares**	**df**	**Mean Sq**	**F**	**Sig.**
	Between Groups	6.593	2	3.297	.111	Ns
	Within Groups	11760.884	197	29.624		
	Total	11767.477	199			
Designation	Between Groups	573.288	2	286.644	10.166	S**
	Within Groups	11194.190	197	28.197		
	Total	11767.477	199			
Age	Between Groups	594.789	3	198.263	7.027	S**
	Within Groups	11172.689	196	28.214		

	Total	11767.478	199			
Experience under present HOD	Between Groups	368.080	3	122.693	4.262	S**
	Within Groups	11399.397	196	28.786		
	Total	11767.477	199			
** Significant at 5% level (95% Possibility) * Significant at 1% level (99% Possibility)						

The following table shows the significant levels for the ANOVA test of the above hypothesis and the corresponding table values: 1. The table above illustrates how the affective commitment scores varied greatly depending on personal factors like age, experience under the current HOD, and designation. At a 5% level, the results are significant. Furthermore, the management type factor is not important.

TABLE: 2 (ANOVA for Continuance commitment by personal factors)

Ho: The continuance commitment scores do not differ significantly among the group of Personal variables

		Continuance commitment				
Type of management		**Sum of Sq**	**df**	**Mean Sq**	**F**	**Sig.**
	Between Groups	13.150	2	6.575	.454	Ns
	Within Groups	5753.288	197	14.492		
	Total	5766.438	199			
Designation	Between Groups	249.962	2	124.981	8.994	**
	Within Groups	5516.476	197	13.895		
	Total	5766.437	199			
Age	Between Groups	261.267	3	87.089	6.265	**
	Within Groups	5505.171	196	13.902		
	Total	5766.437	199			
Experience under present HOD	Between Groups	64.130	3	21.377	1.485	Ns
	Within Groups	5702.308	196	14.400		
	Total	5766.437	199			
** Significant at 5% level (95% Possibility) * Significant at 1% level (99% Possibility)						

The following table shows the significant levels for the ANOVA test of the above hypothesis and the corresponding table values: 3. The aforementioned table shows that there were notable differences in the Continuance commitment scores between the age and designated groups. At a 5% level, the results are significant. The other variables, such as management style and prior experience under the current HOD, are not important.

TABLE: 3 (ANOVA for Normative commitment by personal factors)

Ho: The normative commitment scores do not differ significantly among the group of Personal variables

		Normative commitment				
Type of management		**Sum of sq**	**df**	**Mean Sq**	**F**	**Sig.**
	Between Groups	27.955	2	13.977	1.135	Ns
	Within Groups	4886.843	197	12.309		
	Total	4914.797	199			
Designation	Between Groups	110.867	2	55.433	4.581	*
	Within Groups	4803.931	197	12.101		
	Total	4914.798	199			
Age	Between Groups	140.950	3	46.983	3.897	**
	Within Groups	4773.847	196	12.055		
	Total	4914.797	199			

Experience under present HOD	Between Groups	68.557	3	22.852	1.867	Ns
	Within Groups	4846.241	196	12.238		
	Total	4914.798	199			
** Significant at 5% level (95% Possibility) * Significant at 1% level (99% Possibility)						

The following table displays the significant levels for the ANOVA test of the above hypothesis and the corresponding table values: 4. The above table shows that there were significant differences in the CC scores between the age and designated groups. The findings hold significance at either the 5% or 1% level. The remaining elements, such as management style and experience under the current HOD.

Correlation of Organisational commitment:

Correlation between the factors of Organisational commitment was found out and the results are given below.

Table:4 Correlation between factors of organisational commitment.

	Affective Commitment	Continuance Commitment	Normative Commitment
Affective Commitment	1	.776**	.618**
Continuance Commitment		1	.540**
Normative Commitment			1
**. Correlation significant at the 1% level			

The correlation table illustrates how closely each organizational commitment component is related to the others. The stronger the correlation, the closer the two variables are related. The aforementioned table shows that there is a positive correlation between each of the factors. Affective commitment and continuance commitment have the highest correlation (r=0.776). When compared to other commitments, the correlation between normative and continuance commitment is lower (r=0.540). At the 1% level, every correlation is significant. (Brunetto & Beattie, 2020)

CONCLUSION

The study finds that there is a stronger correlation between the different commitment factors and the commitment concepts. Given that the study was conducted among engineering colleges, there are more male respondents overall. According to the study, if there are more female respondents, then things might change. Considering the complexity of predicting employee withholding and the difficulties that modern organizations face in keeping their workforce, this study made the case that organizational commitment can be compared to the other factors with much more investigation and analysis. The commitment of employees is more influenced by work behavior and leadership than by other researchers.

References

1. Ali A M . (2020). Demographic factors, compensation, job satisfaction and organizational commitment in private university: an analysis using SEM,. J. Glob. Responsib., vol. 11, no. 4,, 407–436.
2. Allen & Meyer. (1996). Affective, normative commitment and continuance to the organization: An examination of construct validity. . Journal of Vocational Behavior, 49(3), 252-276.
3. Andy Soenanta, A. (2020.). “The effect of job satisfaction and organizational commitment to employee retention in a lighting company,” . Issues Bus. Manag. Econ., vol. 8, no. 4, , 97–103,.
4. Angle & Perry. (1981). An Empirical Assessment of Organizational Commitment and Organizational Effectiveness. Administrative Science Quarterly, 26 (1), , 1-14.
5. Brunetto & Beattie, B. (2020). “Changing role of HRM in the public sector,” . Public Manag. Rev., vol. 22, no. 1, , 1–5,.
6. Hirschi, Z. a. (2020). “Whole-Life Career Self-Management: A Conceptual Framework,”. J. Career Dev., no. June, , -.

7. Kurdi, A. a. (2020). “Employee retention and organizational performance: Evidence from banking industry,”. Manag. Sci. Lett., vol. 10, no. 16, , 3981–3990.
8. Luedech Girdwichai, L. (2020). “EMPLOYEE MOTIVATION AND PERFORMANCE: DO THE WORK ENVIRONMENT AND THE TRAINING MATTER?,” . J. Secur. Sustain. ISSUES, vol. 9, no. 8, , 96–107, .
9. Sherbini, S. (2021.). “Indians top foreign workers in Oman ‘ s public sector,”. Indians top foreign workers in Oman’s public sector,, 1–6.
10. Wong Ngo & Wong. (2002). Affective Organizational Commitment of Workers in Chinese Joint Ventures. . Journal of Managerial Psychology, 17 (7),, 580-598.
11. Allen, N. J., & Meyer, J. P. (1996). Affective, normative commitment and continuance to the organization: An examination of construct validity. Journal of Vocational Behavior, 49(3), PP(252-276).
12. Al-Qatawneh, M. (2014). The impact of organizational structure on organizational commitment: A comparison between private and public sector firms in Jordan. European Journal of Business and Management, 6(12), pp(30-37).
13. Gilat, G., Carmeli, A and Weisberg, J. (2006), “Perceived external regard, organizational identification and affective commitment: A investor approach”, Corporate Reputation Review, Vol. 9 No.1, PP(92-104).
14. Cohen, A., & Lowenberg, G. (1990). A re-examination of the side-bet scheme as applied to organizational commitment: A meta-analysis. Human Relations, 43(10), PP(1015-1050).
15. Viswesvaran, & C Cooper-Hakim, A., (2005). The construct of work commitment: Testing an integrative context. Psychological Bulletin, 131(2), PP(241-259)

International Journal of Cultural Studies and Social Sciences

THE INFLUENCE OF EMOTIONAL INTELLIGENCE ON INVESTMENT DECISIONS PATTERNS OF WORKING WOMEN

Madhu T Assistant Professor Department of Commerce and Management, St. Anne's Degree College for women and Research Scholar JAIN (Deemed-to-be University), Bangalore, India.
Dr. Swapna H. R Professor School of Commerce- PG studies JAIN (Deemed-to-be University) Bangalore, India drswapnahr@gmail.com

Abstract:
This study explores the influence of emotional intelligence on investment decision making particular on working women. Emotional intelligence is being exposed by this research and found that diversified decisions are taken by women in investments. Factors that affect the influence of working women are certain affection, cause of information, risk, quality of life and independent decisions play a large role in determining investment opportunities. Here in this study there has been insufficient research on computing the level of Investment decision of women specially among working women, in terms of married or unmarried women investors that is mainly affecting their emotions. It is mainly to know the influence of emotional intelligence and investment decisions of working women investors. Here Emotional intelligence is based on Psychographic Profile, Risk perception, Irrational Investment decision, Herding Factors, Knowledge about portfolio-management. It is to known the relationship between whether emotional intelligence influencing the investment behavior of working women investors. The statistical tool used in this study is multiple regressions to know the effect of variables.
Keywords: Emotional intelligence, investment decision making, working women, Risk perception, Irrational Investment decision.

Introduction

Emotional intelligence is the ability to manage your individual emotions and recognize the emotions around you. Emotional intelligence is connected with self-awareness, self-regulation, motivation.
According to a 2019 study by Indian financial firm Direct support professionals Investor Pulse, only one-third of women make their own investment decisions. This speaks to how few women are exposed to the investment world. Surprisingly, even though many women are financially independent, the idea of investing in stocks, bonds and even real estate is still often associated with the men in the family. The concept of positive investment continues to be absent from the lives of many working women. They prefer to save in bank accounts for the future and invest in gems such as gold. In times of skyrocketing inflation and unexpected recessions, a well-planned and calculated investment strategy is essential for everyone. By making the right investments, you can secure not only your own future, but also the future of your loved ones. Investment options such as real estate, equities, bonds and ULIPs give you greater financial flexibility. This ensures that you are not dependent on others for your financial needs. The main research of the study is to know why salaried women are lacking behind in investment decision making, is emotional intelligence is really effecting women investor in investing.
This research covered the emotional intelligence of investors and consideration of emotions in their decision makings. The researcher explored emotional intelligence during investment process. This research explored the basic common emotions investors have during decision makings and differences due to that their decision is affected.

Review of literature

1. Neela Jamal Rushdie (2014), In their article titled "Impact of psychological influence on investment behaviour of salaried investors in India" The objective of the study to measure the psychological traits of the salaried investors in India using Big Five Personality Theory and to determine the preferred investment behavior of investors based on their psychological & demographical factors. It is found that the Openness to Experience and Emotional Stability were

found to be negatively associated with Investment Attitude, meaning that individuals scoring low on Openness and Emotional Stability more likely to be positive.

2. Muhammad Tanvir and Muhammad Sufyan (2016), the study is directed to the title" Investor's Emotional Intelligence and Impact on Investment Decision" In this study Emotion intelligence is being explored by this research and found in decisions of investments. Emotion intelligence was revealed by taking sample from Karachi, Lahore and Islamabad stock exchanges investors were analyzed. Majority of investors in study are male while they are having experience more than 1 year and investors are well educated. It is found that This research is important for investor, firms listed on stock market and new entrants while more significant to researcher to explore the investor behavior in different context in future.

3. Yadav and Kiran (2016), the study is titled as" Impact of psychological factors on Individual investment decisions a study of women investors" the main objective of the study is on various types of psychological factors of women investors influencing decision making in Indian Stock Market and to examine the interrelationship between different psychological biases. The researcher here analyzed based on descriptive analysis seeks to answer questions such as "what," "where," and "how" way a phenomenon is explained. It was suggested that Women investors need to devote more time and effort to improving their financial and investment expertise. So, they will overcome the irrational investment decision due to psychological errors.

4. Fazal Hadi (2017), this research titled as "Effect of Emotional Intelligence on Investment Decision Making with a Moderating Role of Financial Literacy**"** the study explores the impact of emotional intelligence on investment decision making with moderating role of financial literacy, data was collected using convenient sampling technique. It is found that a positive and significant relationship between emotional intelligence and investment decision making and the same between financial literacy and investment decision. The results and suggest that to make suitable investment decisions, investors should have control on their emotions.

5. Kamboj and Samriti (2017), this research titled as" A study of financial literacy and its impact on investment behavior" The main objective of the study is to measure the impact of financial literacy on investment behavior. The researcher has analyzed based on average of the scores of respondents on the aspects of financial literacy, financial knowledge, financial attitude, financial behaviour and investment behavior. It suggested that More efforts should be employed to improve the attitude of the people towards finance. The main reason for low level of financial literacy was found to be the lack of positive attitude towards savings and long term planning.

6. Pankajam A (2017) the study on "Influence of Behavioural Factors on Investment Decision Making Behaviour of Individual Investors" to identify the factors influencing the investment decision making behaviour of individuals. It is concluded that 60 to 70 % fit in order to analyses the multivariate analysis for the factors Locus of control, emotional Intelligence, Risk attitude and the irrational factors. Based on the study the suggestion given to the individual were they have to conduct self-analysis before an investment planning to get maximum returns.

7. Hemrajani and Pragati (2018), the study is focused on "Impact of Psychological Constructs on Individual Investor S Financial Risk Tolerance" the main objective of the study is to organize and analyze the theoretical framework of psychological constructs influencing individual investors financial risk tolerance. The research was based on Descriptive analysis on survey technique was employed to study the conceptual framework. It focused on mainly on for the purpose of study, individual investors from Uttar Pradesh, India were selected as respondents. It concluded that the minor role played by Regulation of Emotions could point to the difference that the trait is especially important for the quality of social relationships but apparently did not contribute much to the financial decision making behaviour, the research intended to measure.

Research Gap

There are many researches done in this topic but I hereby would like to concentrate on salaried women investors and their emotional intelligence and is there any reasons that emotional intelligence effects investment behavior particularly on working women investors.

Objectives:

1. To understand the financial behavior of working women investors.
2. To study the impact of emotional intelligence on investment decision patterns particularly on working women.
3. To analyze the investors' demographic factors influence investment behavior.

Hypothesis

On the basis of the above objectives, the following hypotheses have been framed and are tested:

H0. There is no relation between emotional intelligence and investment decisions of investors.

H1. There is relation between emotional intelligence and investment decisions of investors.

In this study, emotional intelligence is Independent variable and investment decision is dependent variable. The dimensions of emotional intelligence are coded as Psychographic Profile of investor, Herding Factors, Knowledge about portfolio-management, Risk perception and Irrational Investment decision; Investment decision are coded as investment behavior.

Research methodology:

The study is based on primary data and secondary data.

Primary data: - Primary data were collected through a structured questionnaire from selected respondents. Respondents were selected by simple random sampling.

Secondary Data: - Secondary data is collected from published and unpublished sources. In addition, websites are also used for some secondary data.

Sampling Size: - Questionnaire, 110 respondents study was made on 126 Respondents

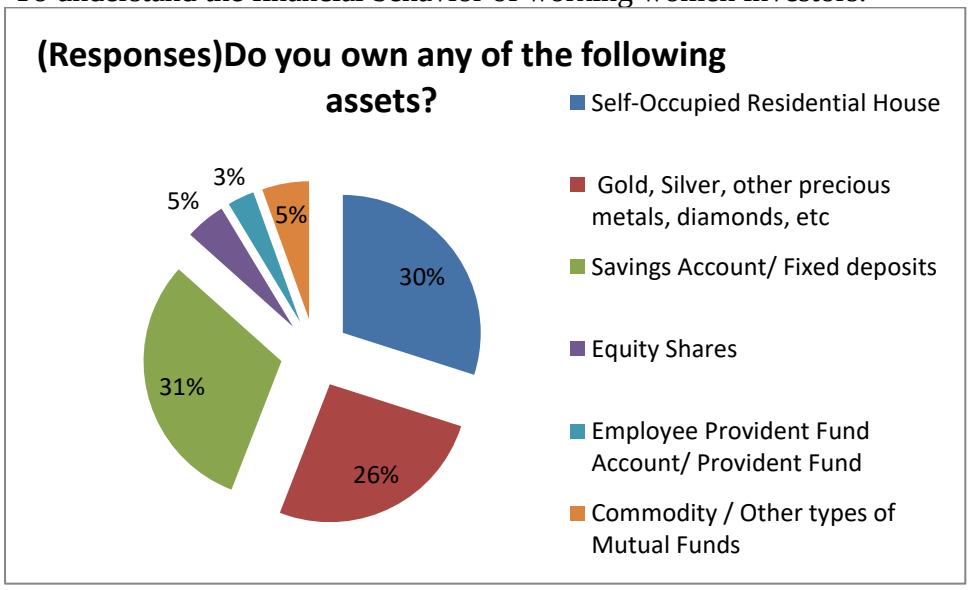
Limitation of the Study:

This study is limited to salaried women investors and their emotional intelligence and what is the reasons behind not investing in different avenues of investment, especially in Bengaluru city.

Data Analysis

Objective1

To understand the financial behavior of working women investors.



From the above pie chart it is shown that 31% of respondents own savings Account/Fixed deposits, 30% of respondents own Self-Occupied Residential house, 26% of respondents own Gold, Silver, other precious metals, diamonds, etc.., 5% of respondents own Equity shares and Commodity/ other

types of mutual funds, 3% of respondents own Employee Provident Fund Account/ Provident Account. According to the analysis the majority of women working investors own in savings Account/Fixed deposits and Self-Occupied Residential house.

Objective 2

To study the impact of emotional intelligence on investment decision patterns particularly on working women.

This section represents the relationship among the investors' emotional intelligence,

investment decisions. It analysis the relation between the dimensions of the emotional intelligence and the investment decisions of the investors using Multiple regression techniques were applied to test the relationship between these variables.

Multiple Regression:

Model Fit Measures

							Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**AIC**	**BIC**	**RMSE**	**F**	**df1**	**df2**	**p**
1	0.625	0.391	0.366	237	257	0.591	15.3	5	119	< .001

Model Coefficients - A1

Predictor	**Estimate**	**SE**	**t**	**p**	**Stand. Estimate**
Intercept	0.9823	0.2459	3.996	< .001	
A (Psychographic Profile)	0.2173	0.0908	2.394	0.018	0.2204
B (Risk perception)	0.0597	0.0804	0.743	0.459	0.0719
C (Irrational Investment decision)	0.2241	0.0846	2.650	0.009	0.2600
D (Herding Factors)	0.1371	0.0874	1.569	0.119	0.1628
E (Knowledge about portfolio-management)	0.0540	0.0863	0.626	0.533	0.0623

Assumption Checks

Collinearity Statistics

	VIF	**Tolerance**
A (Psychographic Profile)	1.66	0.604
B (Risk perception)	1.83	0.545
C (Irrational Investment decision)	1.88	0.532
D (Herding Factors)	2.11	0.475
E (Knowledge about portfolio-management)	1.94	0.517

According to the analysis A is coded as Psychographic Profile, B is coded as Risk perception influence, C is coded as Irrational Investment decision, D is coded as Herding Factors and E is coded as Knowledge about portfolio-management.

Relation between emotional intelligence and investment decisions of investors

The following hypotheses are framed:

A) H1**:** Psychographic Profile influence the investment behavior

H0: Psychographic Profile does not influence the investment behavior

B) H1: Risk perception influence the investment behavior

H0: Risk perception does not influence the investment behavior

C) H1: Irrational Investment decision influence the investment behavior

H0: Irrational Investment decision does not influence the investment behavior

D) H1: Herding Factors influence the investment behavior

H0: Herding Factors does not influence the investment behavior

E) H1: Knowledge about portfolio-management influence the investment behavior

Ho: Knowledge about portfolio-management does not influence the investment behavior

Table shows that the fitted model is quantifiably vital at $p < 0.05$. The model decides an estimated level at 0.625 or 62.5%. It shows that there is a connection between the conduct inclinations and the venture choices of the financial specialists. It shows that how precisely a model of relapse will anticipate the future results. The R2 chooses 0.391 or 39.1% explains the variability of the speculation choices. The assessment used ANOVA to become familiar with the significance of the model in Table. The table shows that the factors are critical at F is 15.3, $p < 0.05$, which shows that the model is a solid match for the information.

In this manner, it shows that for the t-test the factors A (Psychographic Profile) and C (Irrational Investment decision)at 0.05 level are critical and accepts null hypothesis and rejects alternative hypothesis.

The intercept of the regression equation is 0.625. The coefficients of the variables, which are significant are 0.018 Psychographic Profile (A), 0.459 Risk perception (B), 0.009 Irrational Investment decision (C), 0.119 Herding Factors (D) and 0.533 Knowledge about portfolio-management (E)

Therefore, there is a significant relationship between emotional intelligence and the investment decisions of the investors. The investors who score high on emotional intelligence invest more in the stock market. It predicts the investment decisions of investors.

Objective 3

To analyze the investors' demographic factors influence investment behavior.

ANOVA

Investment behavior

	Sum of Squares	**df**	**Mean Square**	F	p
Age	4.26	2	2.130	3.85	0.024
Residuals	67.53	122	0.55		
Gender	0.283	1	0.283	0.487	0.487
Residuals	70.383	121	0.582		
Current Marital status	1.51	1	1.210	2.62	0.108
Residuals	70.18	122	0.575		
Highest level of schooling / formal education completed?	0.993	3	0.331	0.566	0.639
Residuals	70.794	121	0.585		
Employment Status	0.154	1	0.154	0.266	0.607
Residuals	67.585	117	0.578		
Current monthly income (Gross)	5.90	4	1.474	2.72	0.033
Residuals	61.15	113	0.541		

From the above table it is analyzed that the level demographic variable age had significant impact on investment behavior, $F(2) = 3.85$, $p=0.024$. Therefore, p value is less than 0.05, Age will effect on investment decision of each individual investor.

- Demographic variable Gender is not having a significant value on investment behavior because $F(1) = 0.487$, $p=0.487$ here p value is more than 0.05 so it is not having any impact between gender and investment.

- Demographic variable Current Marital status is not having a significant value on investment behavior because F (1) = 2.62, p=0.108 here p value is more than 0.05 so it is not having any effect between Current Marital status and investment.
- Demographic variable Highest level of schooling / formal education completed? is not having a significant value on investment behavior because F (3) = 0.566, p=0.639 here p value is more than 0.05 so it is not having any impact between Highest level of schooling / formal education completed and investment.
- Demographic variable Employment Status is not having a significant value on investment behavior because F (1) = 0.266, p= 0.607 here p value is more than 0.05 so it is not having any impact between Employment Status and investment.
- Demographic variable Current monthly income (Gross) is not having a significant value on investment behavior because F (4) = 2.72, p= 0.033 here p value is less than 0.05 so it is having any impact between Current monthly income (Gross) and investment.

According to the study Age and Monthly income is only important aspect for investment, others factors do not effect in investment of working women investor. Demographic factor does not impact investment behavior of working women investors.

Findings:

- The investigation found that the positive connection between the conduct predispositions of the financial specialists and venture choices of the speculators and positive connection between enthusiastic insight of the financial specialists and their venture choices.
- It is found that majority of working women invest on Fixed deposits and Self-Occupied Residential house.
- It is proved that emotional intelligence such as Psychographic Profile of investor, Herding Factors, Knowledge about portfolio-management, Risk perception and Irrational Investment decision have influence on investment decision of working women investor.
- It is initiated that women investors are not ready take risk.
- Working women investors are not aware of investment options and that is one of the main reason why women are not investing.
- Psychographic Profile influence the investment behavior of working women investors
- Yes according to the study risk perception also a key factor to influence the investment behavior of women investors
- Irrational Investment decision influence the investment behavior of working women investors.
- Herding Factors and Knowledge about portfolio-management influence the investment behavior of every individual working women investors.

Suggestions:

When it comes to investing, women have historically been left behind. Despite making up half of the population, women are significantly under-represented in the world of finance. The common belief is that women tend to know little about investments. Moreover, many women also lack confidence in their financial capabilities. Women should be given proper awareness or the patterns of investment avenues. Investing in stocks can be lucrative, but it can be difficult for women who don't understand how the market works and how they should invest. Investing in mutual funds is the easiest way to invest in the stock market. According it is found that only 5% opt for mutual funds. For women's one of the best investment savings are mutual funds. Mutual funds are managed by experienced fund managers with extensive knowledge of equity investments. Investing based on emotions and market movements can lead to erroneous investment decisions. A simple and effective investment strategy to avoid this is to invest according to specific goals. Setting clear goals, setting time frames, and choosing the right investment products can minimize the need to constantly monitor the market. This goal-oriented approach helps you stay focused and avoid making emotional investment decisions.

To minimize portfolio risk, it is important to diversify your investments across different asset classes such as stocks and bonds. This allows you to benefit from investment growth during bull markets while providing a safety net to mitigate losses during bear periods. Proper division of equity and liability based on risk tolerance is critical. Finally, seek regular advice from a trusted financial advisor. It can actually prove worthwhile and rewarding.

Conclusion:

This study focuses on working women investors in Bangalore, looking at their emotional intelligence and the factors that influence them in investment. According to the study, people can learn more about their own biases and financial decision, which can lead to poor investment decisions. The survey also highlights a lack of awareness among women. The results of this study may help financial educators develop personalized financial education programs. By understanding their investment decision-making process, financial advisors can better serve their clients. Investment decisions are influenced by the individual psychological variables investigated in this study. As this study shows, female investors tend to lack objectivity. The study examines psychological impact on investment decisions. As a result, it contributes significantly to the current state of knowledge.

References:

Neela Jamal Rushdie (2014), In their article titled "Impact of psychological influence on investment behaviour of salaried investors in India".

Muhammad Tanvir and Muhammad Sufyan (2016), the study is directed to the title" Investor's Emotional Intelligence and Impact on Investment Decision", International Journal of Academic Research in Economics and Management Sciences 2016, Vol. 5, No. 3 ISSN: 2226-3624.

Yadav and Kiran (2016), the study is titled as" Impact of psychological factors on Individual investment decisions a study of women investors"- Shodhganga@INFLIBNET

Fazal Hadi (2017), this research titled as "Effect of Emotional Intelligence on Investment Decision Making With a Moderating Role of Financial Literacy", China-USA Business Review, Feb. 2017, Vol. 16, No. 2, 53-62 doi: 10.17265/1537-1514/2017.02.002.

Kamboj and Samriti (2017), this research titled as" this research titled as" A study of financial literacy and its impact on investment behavior"- Shodhganga@INFLIBNET

Pankajam A (2017) the study on "Influence of Behavioural Factors on Investment Decision Making Behaviour of Individual Investors"- Shodhganga@INFLIBNET.

Hemrajani and Pragati (2018), the study is focused on "Impact of Psychological Constructs on Individual Investor s Financial Risk Tolerance"- Shodhganga@INFLIBNET.

Saloni Raheja and Babli Dhiman (2010), Titled as" How do emotional intelligence and behaviorial biases of investors determine their investment decisions"- emeralds and insight/09729968

Effect of emotional intelligence on Investment Decision Making with a moderating role of Financial Literacy- Research gate net publication/306868595

Investors Emotional Intelligence and Impact on Investment Decisions- homers papers/2237

https://www.iciciprulife.com/ulip-plans/investing-for-women.html

https://mhanational.org/what-emotional-intelligence-and-how-does-it-apply-workplace#:~:text=Emotional%20Intelligence%20(EI)%20is%20the,%2C%20empathy%2C%20and%20social%20skills.

https://economictimes.indiatimes.com/markets/stocks/news/how-women-can-become-intelligent-investors-here-are-6-ways-to-do-it/articleshow/98490451.cms