

JOB SATISFACTION AMONG FEMALE WORKERS IN COOPERATIVE SPINNING MILLS IN KOLHAPUR DISTRICT

A. V. Bhave¹, S. G. Mengal², A. K. Wavare³, G. G. Pawar⁴, N. C. Sonavane⁵, S. S. Ghadashi⁶, B. P. Padhye⁶ and M. V. Panchal⁷

¹Assistant Professor & Head, Department of Commerce, Abasaheb Marathe Arts and New Commerce, Science College, Rajapur, Dist. Ratnagiri, Maharashtra (India) - 416702 Email: <u>abhave82@gmail.com</u> ORCID id: <u>https://orcid.org/0009-0006-5786-7168</u>

²Assistant Professor, Department of Commerce, Arts, Science & Commerce College, Mokhada, Dist. Palghar, Maharashtra (India) - 401604

Email: santoshmengal1986@gmail.com ORCID id: https://orcid.org/0009-0004-9584-208X

³Professor & Dean of Humanities, Karmaveer Bhaurao Patil University, Satara, Dist. Satara, Maharashtra (India) - 415001

Email: dranilwavare@gmail.com ORCID id: https://orcid.org/0009-0003-8755-9703

⁴Assistant Professor, Department of Economics, Abasaheb Marathe Arts and New Commerce, Science College, Rajapur, Dist. Ratnagiri, Maharashtra (India) - 416702 Email: gauravpawar310@gmail.com ORCID id: https://orcid.org/0009-0005-5863-6567

⁵Research Student, Department of Economics, Shivaji University, Kolhapur, Maharashtra (India) – 416 004.

⁶Assistant Professor, Department of Commerce, D. J. Samant Senior College of Arts, Commerce and Science, Pali, Dist. Ratnagiri, Maharashtra (India) - 415612 Email: subhashghadashi@rediffmail.com ORCID id: https://orcid.org/0009-0005-7338-1590

⁷Assistant Professor, Department of Commerce, Arts, Commerce and Science College, Kharepatan Dist. Sindhudurg, Maharashtra (India) - 416602

Abstract:

Kolhapur district in Maharashtra state is well known for its contribution to the growth & development of cooperative spinning mills. In recent years, the role of women in the workforce has become increasingly prominent and their contributions to various co-operatives have been widely recognized. The present study examines the socio-personal attributes and job satisfaction among female mill workers working at Indira Gandhi Mahila Sahakari Soot Girani Limited, Ichalkaranji, Tal. Hatkanangale, Dist. Kolhapur. The study found that, low educational level, social backwardness and low monthly salary income are the distinct features of female mill workers in study area. The job satisfaction of female mill workers derived from working at cooperative spinning mill is found to be highest in case of occupational & social prestige, work climate & cooperation among co-workers, job security and leave policy. Whereas the job satisfaction of

female mill workers in study area is found to be least in case of staff welfare policy, promotion policy, salary, incentives and allowances.

Keywords: Cooperative Spinning Mills, Job satisfaction, Female mill workers, Kolhapur, Salary, Incentives.

JEL Classification: J28, L67, O15, Q13.

Introduction:

Cooperatives play significant role in the Indian economy, particularly in the areas of agriculture, rural development and social justice. According to International Cooperative Alliance (ICA), cooperatives can be defined as, "An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise." Cooperative spinning mills are one of the crucial components of textile industry sector in India which contribute significantly to the country's economy. They provide employment opportunities to thousands of people, especially in rural areas, thereby reducing poverty and improving standards of living. By creating jobs, they also help to stimulate local economies and promote economic development. But the performance and growth of any enterprise depends on the job satisfaction of stakeholders working at that particular enterprise. Regularly measuring job satisfaction is vital for any successful enterprise aiming to attract and retain talented employees, drive engagement, boost productivity, reduce turnover, and maintain a strong competitive position. According to Cambridge dictionary, job satisfaction is the feeling of pleasure and achievement that you experience in your job when you know that your work is worth doing, or the degree to which your work gives you this feeling. Several studies have been carried out to find out the association between socio-economic attributes and job satisfaction of cooperative mill workers. Sulthan Mohideen and Ishaq (2015), found that there is no significant relation between the age, gender, marital status, education and job satisfaction of mill workers. Anitha (2011), found no association between job experience and job satisfaction about salary. The study also suggests provision of canteen, rest room facilities and timely rewards help cooperative spinning mills to improve level of job satisfaction among mill workers. Nowadays, role of female counterparts in growth and development of cooperatives is becoming more vital. Women play an important role in leading, shaping and contributing to the success of these organizations. Earlier, very few studies have been carried out to find out the job satisfaction of female mill workers. Hence, it is very much important to study the job satisfaction level of female mill workers working at various cooperative enterprises.

Objectives of the Study:

The present study is based on the following specific objectives:

1. To study the socio-personal attributes of female workers working at cooperative spinning mills in Kolhapur district.

2. To study the level of job satisfaction among female workers in cooperative spinning mills in Kolhapur district.

Materials And Methods:

Kolhapur district is well-known for its contribution to the growth and development of cooperative sector in Maharashtra. Kolhapur is the home to various form of cooperatives viz. agricultural, textile, housing, credit, financial etc. which contributed significantly to the overall progress and prosperity of the district. Hence, Kolhapur district is purposively selected for the present study. According to District Social and Economic Review of Kolhapur 2023, the number of cooperative spinning mills currently functioning in different blocks of Kolhapur district is 15. Ichalkaranji city in Hatkanangale block of Kolhapur district has been a major center for textile manufacturing and it is well-known as "Manchester of Maharashtra state". Hence, Indira Gandhi Mahila Sahakari Soot Girani Limited, Ichalkaranji is purposively selected for the present study. Total 60 female workers working at selected cooperative spinning mill are taken as the respondents. 13 different dimensions of job satisfaction which includes occupational & social prestige, work climate, workload distribution, autonomy, conflict management, job security, incentives, allowances, promotion policy, staff welfare policy, leave policy, salary and scope for self-improvement are selected for the present study. The responses of the female mill workers related to selected dimensions of job satisfaction were recorded using 5 Continuum Likert Scale -Highly satisfied (4), Somewhat satisfied (3), Neutral (2), Somewhat dissatisfied (1) & highly dissatisfied (0). The job satisfaction score of each female worker is calculated by summing up all responses given by her with respective weightage given to each response. The job satisfaction index of each respondent is calculated using formula -

Job Satisfaction Index =
$$\frac{\text{Job Satisfaction score secured by Individual respondent}}{\text{Maximum possible job satisfaction score}} \ge 100$$

The mean (\bar{x}) and standard deviation of (SD) of job satisfaction index of each respondent are calculated and they were categorized into three levels of job satisfaction – High level ($\bar{x} + SD$), Moderated level ($\bar{x} \pm SD$) and Low level ($\bar{x} - SD$).

Results and Discussions:

Socio-personal attributes of female mill workers in study area: -

| Sr. No. | Particular | Frequency (n = 60) | Percentage (%) |
|------------|-----------------------------|-----------------------|----------------|
| 1 | Age Group | | |
| | Young (18 - 25 years) | 11 | 18.33 |
| | Semi-Medium (26 – 35 Years) | 19 | 31.67 |
| | Medium (36 – 45 years) | 22 | 36.67 |
| | Old (46 years and above) | 8 | 13.33 |

Table 1. Socio-personal attributes of women mill workers in study area

| 2 | Educational Level | | |
|---|------------------------------|----|-------|
| | Illiterate | 7 | 11.66 |
| | Primary Schooling | 12 | 20 |
| | Secondary Schooling | 27 | 45 |
| | Higher Secondary / Technical | 14 | 23.34 |
| 3 | Social Category | | |
| | Unreserved | 26 | 43.33 |
| | Other Backward Class (OBC) | 14 | 23.34 |
| | Scheduled Caste (SC) | 10 | 16.67 |
| | Scheduled Tribe (ST) | 3 | 5 |
| | Other | 7 | 11.66 |
| 4 | Job Experience (in years) | | |
| | Up to 5 years | 11 | 18.33 |
| | 5 to 10 years | 25 | 41.66 |
| | 11 to 15 years | 14 | 23.34 |
| | More than 15 years | 10 | 16.67 |
| 5 | Marital Status | | |
| | Unmarried | 13 | 21.67 |
| | Married | 37 | 61.67 |
| | Widow | 6 | 10 |
| | Separated / Divorced | 4 | 6.66 |
| 6 | Family Type | | |
| | Joint | 38 | 63.33 |
| | Separated | 22 | 36.67 |
| 7 | House Ownership | | |
| | Owned | 32 | 53.33 |
| | Rented | 28 | 46.67 |
| 8 | Monthly Income (in Rs.) | | |
| | Up to Rs. 5000 | 10 | 16.67 |
| | Rs. 5001 to Rs. 10000 | 39 | 65 |
| | Rs. 10001 to Rs. 20000 | 8 | 13.33 |
| | Rs. 20001 and above | 3 | 5 |

Source: Field survey 2023

1. Age group: -

The study found that, majority of the female mill workers working at Indira Gandhi Mahila Sahakari Soot Girini Limited, Ichalkaranji are belong to medium year age group and having 36 to 45 years of age followed by the female mill workers having 26 to 35 years of age. Only 13.33% of respondents are belong to old age category.

2. Educational level: -

Education plays crucial role in personal development, career growth and societal progress. The study found that, majority of the female mill workers (i.e., 45%) have completed secondary schooling followed by 23.34% of female workers have completed higher secondary/ technical education. Illiteracy is the major problem found among the female mill workers as about 11.66% of the respondents were found to be illiterate.

3. Social category: -

The study found that, 43.33% of selected female mill workers belong to unreserved social category followed by 23.34% of female mill workers who belong to Other Backward Class (OBC). The percentage of female mill workers belong to Scheduled Caste (SC) and Scheduled Tribe (ST) are 16.67% and 5% respectively.

4. Job experience: -

Job experience is one of the crucial socio-personal attributes which affects the job satisfaction level. As far as the job experience of respondents is concerned, 41.66% of female mill workers are found to have job experience of 5 to 10 years followed by the 23.34% of female mill workers having 11 to 15 years of job experience. About 16.67% of female mill workers in study are found to have job experience of more than 15 years.

5. Marital status: -

The study found that, 21.67% of female mill workers in study area are unmarried whereas the percentage of married female mill workers is found equal to 61.67%. About 10% female mill workers in study area are found window whereas remaining 6.66% female mill workers are found to be divorced or separated.

6. Family type: -

As far as the family type of respondents in study area is concerned, 63.33% of female mill workers are found to having joint family whereas 36.67% of female mill workers are found to have separated family.

7. House ownership: -

The study found that, 53.33% of female mill workers owned house whereas 46.67% of female mill workers are found to have rented house.

8. Monthly income: -

Monthly income is one of the crucial socio-personal attributes of female mill workers. The study found that, 65% of sample female mill workers have monthly income of Rs. 5001 to Rs. 10000 followed by 16.67% of female mill workers have monthly income of up to Rs. 5000. About 13.33% of female mill workers found to get salary of Rs. 10001 to Rs. 20000 per month. Low salary is a major problem found among the female mill workers in study area. Only 5% of selected female mill workers were responded that they earn Rs. 20001 and above through salary per month.

Level of Job Satisfaction among Female mill workers in study area: -

Level of job satisfaction of sample female workers working at Indira Gandhi Mahila Sahakari Soot Girini Limited, Ichalkaranji is given in table no. 2. The study found that, majority of selected female workers in study area (i.e., 73.33%) are belong to moderated level of job satisfaction followed by 15% female mill workers who belong to low level of job satisfaction. Its is clear from table no. 2 that, only 11.66% of female mill workers working at Indira Gandhi Mahila Sahakari Soot Girini Limited, Ichalkaranji found to have high level of job satisfaction.

| Sr. No. | Level of Job Satisfaction | Frequency | Percentage (%) |
|---------|---------------------------|-----------|----------------|
| 1 | Low (Below 58.80) | 9 | 15% |
| 2 | Moderate (58.80 to 77.41) | 44 | 73.33% |
| 3 | High (Above 77.41) | 7 | 11.66% |
| Total | | 60 | 100 |

Table 2. Level of job satisfaction among female mill workers in study area

Dimension wise mean job satisfaction score secured by sample female mill workers in study area is given in table no. 3.

| Sr. No. | Dimension of job satisfaction Mean of job satisfaction | | Rank |
|---------|--|------|------|
| 1 | Occupational and social prestige | 3.52 | Ι |
| 2 | Work climate and cooperation | 3.43 | II |
| 3 | Workload and work distribution | 2.87 | VIII |
| 4 | Autonomy | 3.15 | VII |
| 5 | Conflict management | 3.32 | V |
| 6 | Job security | 3.42 | III |
| 7 | Incentives | 2.15 | Х |
| 8 | Allowances | 1.73 | XI |
| 9 | Promotion policy | 1.32 | XII |
| 10 | Staff welfare policy | 1.22 | XIII |
| 11 | Leave policy | 3.35 | IV |
| 12 | Scope for self-improvement | 3.22 | VI |
| 13 | Salary | 2.73 | IX |

 Table 3. Dimension wise mean of job satisfaction score of female mill workers

It is evident from table no. 3 that, the mean of job satisfaction score of selected females mill workers in study area is highest (i.e., 3.52) in case of Occupational and social prestige derived from the job followed by the mean job satisfaction score about work climate and cooperation among co-workers. The mean job satisfaction score related to job security ranks 3rd with 3.42 score. The mean job satisfaction scores related to leave policy, conflict management and scope for self-improvement are found equal to 3.35, 3.32 and 3.22 respectively. The mean job satisfaction

score related to autonomy at work, workload distribution and salary are found to secured 7th, 8th and 9th ranks respectively. It is found that, the mean of job satisfaction score of female mill workers in case of incentives for work, allowances, promotion policy and staff welfare policy are low as compare to remaining dimensions of job satisfaction. The low mean job satisfaction score highlights that, the sample female mill workers in study area are highly dissatisfied about the staff welfare & promotion policy run by selected mill, incentives for work and allowances given to them.

Major Findings and Conclusion: -

It is evident from the study that, majority of female mill workers working in Indira Gandhi Mahila Sahakari Soot Girini Limited, Ichalkaranji are belong to medium age group category having 36 to 45 years age. Low educational level, social backwardness and low monthly salary income are the distinct features of female mill workers in study area. Majority of female mill workers found to have job experience less than 10 years. It is found that, most of the female mill workers working at cooperative spinning mill in study area have joint families living in owned house. As far as the level of job satisfaction is concerned, only 11.66% of female mill workers are found to have high level of job satisfaction of female mill workers derived from working at cooperative spinning mill is found to be highest in case of occupational & social prestige, work climate & cooperation among co-workers, job security and leave policy. Whereas the job satisfaction of female mill workers in study area is found to be least in case of staff welfare policy, promotion policy, salary, incentives and allowances.

Policy Suggestions: -

Here are some policy suggestions that can help to improve the job satisfaction of female workers in cooperative spinning mills:

1. Provide equal pay for equal work: Ensure that female workers receive the same wages as their male counterparts for performing the same tasks. This will help to reduce gender-based wage discrimination and increase job satisfaction among women workers.

2. Implement flexible working hours: Many women workers have family responsibilities, and flexibility in working hours can help them balance their personal and professional lives better. Consider offering flexible shift options or part-time work arrangements to accommodate the needs of female workers.

3. Promote a safe and inclusive work environment: Ensure that the workplace is free from harassment, violence, and discrimination. Create policies and procedures for preventing and addressing these issues, and provide training for employees on appropriate workplace behaviour.

4. Offer skill development opportunities: Provide training and development programs specifically tailored to the needs of female workers. This could include technical skills training, leadership development, and soft skills training to enhance their career prospects and growth opportunities.

5. Paid leave and benefits: Offer paid maternity leave, paternity leave, and other benefits like childcare support, health insurance, and retirement plans to promote work-life balance and financial security for female workers.

6. Address workload and staffing concerns: Monitor workloads closely and ensure they are reasonable and manageable for all employees, including women who may be juggling multiple roles at home and in the workplace. Hire additional staff if necessary to avoid overwork and burnout.

7. Mental health and stress management support: Offer mental health resources and stress management techniques to assist female workers in managing work-related stress and maintaining good mental health.

8. Career growth and mentorship opportunities: Pair experienced female employees with newer hires or those seeking guidance, providing mentorship opportunities to nurture talent and foster career progression. Encourage senior women professionals to share their experiences, advice, and industry knowledge.

9. Health and wellness programs: Organize health check-ups, menstrual health awareness campaigns, nutrition counselling, and fitness classes exclusively for female workers to promote their physical and mental well-being.

Implementing these policies and initiatives will not only benefit female workers but also contribute to a more equitable and supportive work environment for everyone. By prioritizing job satisfaction and well-being, cooperative spinning mills in India in general and mills in Kolhapur district in particular can foster a diverse, engaged, and productive workforce.

References: -

1. Anitha, R. (2011). A study on job satisfaction of paper mill employees with special reference to udumalpet and palani taluk. *Journal of Management and Science*, *1*(1), 33–44. <u>https://doi.org/10.26524/jms.2011.6</u>

2. *Cooperative identity, values & principles* | *ICA*. (2022). ICA. Retrieved December 8, 2023, from <u>https://www.ica.coop/en/cooperatives/cooperative-identity</u>

3. Employment conditions in traditional sector: A study of spinning mill workers in Kozhikode, Kerala Munich Personal REPEC Archive. (n.d.). <u>https://mpra.ub.uni-muenchen.de/85266/</u>

4. Geethanjali, N., Parveenroja, M., & Muthupandian, T. (2016). Quality of Work Life of Employees and Its Impact on Job Satisfaction with Special Reference to Spinning Mills in Dindigul. *Shanlax International Journal of Management*, *4*(2), 128–133.

5. job satisfaction. (2022). In *Cambridge.org*. Retrieved December 8, 2023, from <u>https://dictionary.cambridge.org/dictionary/english/job-satisfaction</u>

6. Kannadas, P., & Ramachandran, R. (2016). A Study on Job Satisfaction among Women Workers Working at Various Spinning Mills Located at Rajapalayam Taluk. *Shanlax International Journal of Management*, *4*(3), 89–97.

7. Kavitha, M. (2015). A Study on the Quality of Work Life of Employees in the Dharmapuri District Co-Operative Spinning Mills Limited, Uthangarai. *Journal of Exclusive Management Science*, *4*(5), 1–6.

8. Sabarinathan, K., & Ganapathi, R. (2011). Socio – Economic Status and Job Satisfaction of Women Employees in Textile Mills. *Asia-Pacific Business Review*, *VII*(1), 217–227.

9. Sathiya, N., & Chitra, N. (2017). A Study on Job Satisfaction of Co-operative Sugar Mill in Dharmapuri District. *Indian Journal of Applied Research*, *7*(6), 544–546.

10. Sukthankar, S. V., Gaonkar, S., Samant, P., & Rath, R. C. (2022). A Study on Factors Influencing Job Satisfaction and Its Impact on Employees Job Performance in Multi-Purpose Co-Operative Societies in Goa. *YMER*, *21*(12), 2065–2076. <u>http://ymerdigital.com</u>

11. Sulthan Mohideen, A., & Ishaq, M. (2015). Labour Welfare Measures in L.S. Mills Limited Theni, Tamilnadu. *International Journal of Computing and Corporate Research*, *5*(3), 1–39.

12. Mohan, V., Chhabra, H., Rani, A., & Singh, V. (2019). An expert 2DOF fractional order fuzzy PID controller for nonlinear systems. *Neural Computing and Applications*, *31*, 4253-4270.

13. Mohan, V., Chhabra, H., Rani, A., & Singh, V. (2018). Robust self-tuning fractional order PID controller dedicated to non-linear dynamic system. *Journal of Intelligent & Fuzzy Systems*, *34*(3), 1467-1478.

14. Chhabra, H., Mohan, V., Rani, A., & Singh, V. (2020). Robust nonlinear fractional order fuzzy PD plus fuzzy I controller applied to robotic manipulator. *Neural Computing and Applications*, *32*, 2055-2079.

15. Panjwani, B., Singh, V., Rani, A., & Mohan, V. (2021). Optimum multi-drug regime for compartment model of tumour: cell-cycle-specific dynamics in the presence of resistance. *Journal of Pharmacokinetics and Pharmacodynamics*, *48*, 543-562.

16. Mohan, V., Pachauri, N., Panjwani, B., & Kamath, D. V. (2022). A novel cascaded fractional fuzzy approach for control of fermentation process. *Bioresource Technology*, *357*, 127377.

17. Mohan, V., Panjwani, B., Chhabra, H., Rani, A., & Singh, V. (2023). Self-regulatory fractional fuzzy control for dynamic systems: an analytical approach. *International Journal of Fuzzy Systems*, 25(2), 794-815.

18. Panjwani, B., Mohan, V., Rani, A., & Singh, V. (2019). Optimal drug scheduling for cancer chemotherapy using two degree of freedom fractional order PID scheme. *Journal of Intelligent & Fuzzy Systems*, *36*(3), 2273-2284.

19. Mehraj, H., Jayadevappa, D., Haleem, S. L. A., Parveen, R., Madduri, A., Ayyagari, M. R., & Dhabliya. D. (2021). Protection motivation theory using multi-factor authentication for providing security over social networking sites. Pattern Recognition Letters, 152, 218-224.

20. Soni, M., Khan, I. R., Babu, K. S., Nasrullah, S., Madduri, A., & Rahin, S. A. (2022). Light weighted healthcare CNN model to detect prostate cancer on multiparametric MRI. Computational Intelligence and Neuroscience, 2022.

21. Sreenivasu, S. V. N., Gomathi, S., Kumar, M. J., Prathap, L., Madduri, A., Almutairi, K., ... & Jayadhas, S. A. (2022). Dense convolutional neural network for detection of cancer from CT images. BioMed Research International, 2022.

22. Sharma, D. K., Chakravarthi, D. S., Boddu, R. S. K., Madduri, A., Ayyagari, M. R., & Khaja Mohiddin, M. (2022, June). Effectiveness of machine learning technology in detecting patterns of certain diseases within patient electronic healthcare records. In Proceedings of Second International Conference in Mechanical and Energy Technology: ICMET 2021, India (pp. 73-81). Singapore: Springer Nature Singapore.

23. Mannepalli, K., Vinoth, K., Mohapatra, S. K., Rahul, R., Gangodkar, D. P., Madduri, A., ... & Mohanavel, V. (2022). Allocation of optimal energy from storage systems using solar energy. Energy Reports, 8, 836-846.

24. Rubavathy, S. J., Kannan, N., Dhanya, D., Shinde, S. K., Soni, N. B., Madduri, A., ... & Sathyamurthy, R. (2022). Machine Learning Strategy for Solar Energy optimisation in Distributed systems. Energy Reports, 8, 872-881.

25. Bansal, P., Ansari, M. J., Ayyagari, M. R., Kalidoss, R., Madduri, A., & Kanaoujiya, R. (2023, April). Carbon quantum dots based nanozyme as bio-sensor for enhanced detection of glutathione (U) from cancer cells. In AIP Conference Proceedings (Vol. 2603, No. 1). AIP Publishing.

26. Kadam, P. S., Rajagopal, N. K., Yadav, A. K., Madduri, A., Ansari, M. J., & Patil, P. Y. (2023, April). Biomedical waste management during pandemics. In AIP Conference Proceedings (Vol. 2603, No. 1). AIP Publishing.

27. Torres-Cruz, F., Nerkar Charushila, K., Chobe Santosh, S., Subasree, N., Madduri, A., & Pant, B. (2023, April). A review on future prospects on magnetic levitation for disease diagnosis. In AIP Conference Proceedings (Vol. 2603, No. 1). AIP Publishing.

28. Sugumar, D., Dixit, C. K., Saavedra-Lopez, M. A., Hernandez, R. M., Madduri, A., & Pant, B. (2023, April). White matter microstructural integrity in recovering alcoholic population. In AIP Conference Proceedings (Vol. 2603, No. 1). AIP publishing.

29. Krishna, B., & Janarthanan, M. (2023). Realization of fractional order lowpass filter using different approximation techniques. Bulletin of Electrical Engineering and Informatics, 12(6), 3552–3561. doi:https://doi.org/10.11591/eei.v12i6.5750

30. Krishna, B., & Gowtham, M. (2023). Design and Applications of Digital Differentiators Using Model Order Reduction Techniques. Tuijin Jishu/Journal of Propulsion Technology, 44(4), 2949-2956

31. Krishna, B. T. (2023). Various Methods of Realization for Fractional-Order Elements. ECTI Transactions on Electrical Engineering, Electronics, and Communications, 21(1), 248544. https://doi.org/10.37936/ecti-eec.2023211.248544

32. Krishna, B., & Janarthanan, M. (2023). Design of a Fractional Order Low-pass Filter Using a Differential Voltage Current Conveyor. Journal of Telecommunications and Information Technology, 2023, 17-21

33. Krishna, B. (2021). Realization of Fractance Device using Continued Fraction Expansion Method. ADBU Journal of Electrical and Electronics Engineering (AJEEE), 4(2), 1-9.

34. Battula, Krishna. (2019). QRS Detection Using Fractional Order Digital Differentiators. American Journal of Biomedical Engineering. 9(1), 1-4.