

CONSUMER PERCEPTION TOWARDS APPLE PRODUCTS WITH REFERENCE TO TIRUCHIRAPPALLI DISTRICT

I. ASHIQ MOHAMED¹, Y. MOYDHEEN SHA², M. SHAHID AHMED³,

BADHUSHA M H N⁴

Assistant Professor, PG & Research Department of Commerce, Jamal Mohamed College (Autonomous),
Affiliated to Bharathidasan University, Tiruchirappalli, Tamilnadu, India

Abstract: Consumers often buy products not because of their attributes per se but rather because of the ultimate benefits that these attributes provide, in turn leading to the satisfaction of ultimate values. And Apple is a type of company which understand their customers & future aspects of innovation in a way that no other companies do. That's the reason that apple is at No. 1 place in Top 50 Most innovative companies. This article endeavors to recognize the consumer perception towards the Apple products and what is Apple's ideology. In this article the researcher has listed down 12 variables which affect the consumer behavior most while purchasing Apple products. The researcher took 50 sample sizes to make this paper and this study is being done in Tiruchirappalli District. To prepare the factors, I have used Factor analysis test.

Key words: Apple products, Factor affecting consumer perception, Attitudes & Expectations.

Introduction:

Apple Inc belongs to the technology industry, which is the most valuable and growing industry in global market. The technology industry has two major sectors: hardware and software.



Corresponding Author: I. ASHIQ MOHAMED Assistant Professors, PG & Research Department of Commerce, Jamal Mohamed College (Autonomous), Affiliated to Bharathidasan University, Tiruchirappalli, Tamilnadu, India

On one hand, Dell, Lenovo, Samsung, Intel, Sony, and Xiaomi are the representatives of the hardware. Their business includes the personal computer, mobile phone, tablet, music player, and other electronic devices. On the other hand, IBM, Microsoft, and Android are participating in the software sector. Besides, some other companies like Apple Inc and Google are playing the important role in the both sectors. In the technology industry, every large successful company has some similar strategies in quality, price, innovation, globalization, and consumer spending area. By the development of the science, an increasing number of companies invest in the technology industry. And the competition is becoming fiercer between the companies in the maturity markets and emerging markets. Apple Inc was created by Steve Jobs and Steve Wozniak in 1976. At the beginning, Apple Inc only produced easy-to-use computer to the PC market. Due to the special designing and revolutionary concepts, Apple Inc became the industry leader since 1980. At the same year, Apple Inc launched a successful IPO. Nowadays, Apple Inc is the most valuable company in the history of the world. Apple Inc created a lot of revolutionary products like Macintosh, iPod, iPhone, iPad, and Apple watch. This company also brought some great applications and system, like iOS and Apple Pay to consumers as well. In the future, Apple Inc is going to challenge the unfamiliar industries such as car and cable. After the death of founder Jobs, Apple Inc is trying to creating the new legendary stories under the lead of new CEO Tim Cook.

Apple's Corporate Mission Statement

Apple Inc.'s corporate mission has changed over time. The company considers the changing business landscape, which influences the possibilities of what the business can do. The company recognizes the changing market and industry environment. Apple's current mission statement is as follows:

“Apple designs Macs, the best personal computers in the world, along with OS X, iLife, iWork and professional software. Apple leads the digital music revolution with its iPods and iTunes online store. Apple has reinvented the mobile phone with its revolutionary iPhone and App store, and is defining the future of mobile media and computing devices with iPad.”

Apple's Corporate Vision Statement

Apple Inc.'s corporate vision influences strategic management in terms of the decisions that the company's managers make to reach a future of leadership in the various industries where the business operates. Apple introduced a new vision statement under the leadership of Tim Cook, who stated the following:

"We believe that we are on the face of the earth to make great products and that's not changing. We are constantly focusing on innovating. We believe in the simple not the complex. We believe that we need to own and control the primary technologies behind the products that we make, and participate only in markets where we can make a significant contribution. We believe in saying no to thousands of projects, so that we can really focus on the few that are truly important and meaningful to us. We believe in deep collaboration and cross-pollination of our groups, which allow us to innovate in a way that others cannot. And frankly, we don't settle for anything less than excellence in every group in the company, and we have the self-honesty to admit when we're wrong and the courage to change. And I think regardless of who is in what job those values are so embedded in this company that Apple will do extremely well."

Apple Products

Listing down all the Apple products is a very difficult task, but here are the few, major ones:

- ❖ iPhone, Air Pods
- ❖ Mac including iMac, Mac Pro, MacBook Air, MacBook Pro, Mac mini.
- ❖ iPod - touch, nano, shuffle, classic.
- ❖ iPad
- ❖ Apple Watch
- ❖ Apple TV

And a huge number of softwares, mostly for the Mac OSX and iOS, including keynote, pages, numbers, iMovie, iPhoto, iTunes, Logic Pro, etc.

Innovation and Apple's Ideology

Apple's ideology is to make a product which gives people the ability to do things that they couldn't do before. Take iPhone X, The portrait lighting feature. This is something that you had to be a professional photographer with a certain setup to do in the past. But with iPhone X, it has become so easy to do a professional photography. And an iPhone X does more than just take pictures. There are so many parts. With ARKit, we created something that essentially took the heavy lifting with [augmented reality] and put it in the operating system, which empowers thousands of developers eventually to be able to build AR into their apps. Some will be very profound, life changing. There is no doubt about that in my mind.

Apple had implemented something in iOS 11 where it detects if you're in a car and will shut off your messages and notifications. That isn't us playing Big Brother. That's apple giving us a tool to help us do the right thing. You can override it; you may be a passenger instead of the driver, and that's okay. But apple would like to try as many of those as possible so that they can help people do the right thing. Apple inc. is a group of people who are trying to change the world for the better.

Apple CEO Tim Cook said in the Bloomberg that, "We run a very different company. We're just not making products to sell. That doesn't get me up in the morning. I get up in the morning like many of our people to Change Things. We are not like other companies where the objective is to become a 40 billion dollar company. But employees don't get excited about that. This isn't something you wake up every morning But Changing the World. These are the things that people work for. This pushes people to go on extra mile and to create something different."

For us, technology is a background thing. We don't want people to have to focus on bits and bytes and feeds and speeds. We don't want people to have to go to multiple [systems] or live with a device that's not integrated. We do the hardware and the software, and some of the key services as well, to provide a whole system. We do that in such a way that we infuse humanity into it. We take our values very seriously, and we want to make sure all of our products reflect those values. There are things like making sure that we're running our [U.S.] operations on

100% renewable energy, because we don't want to leave the earth worse than we found it. We make sure that we treat well all the people who are in our supply chain. We have incredible diversity, not as good as we want, but great diversity, and it's that diversity that yields products like this."

What makes them unique?

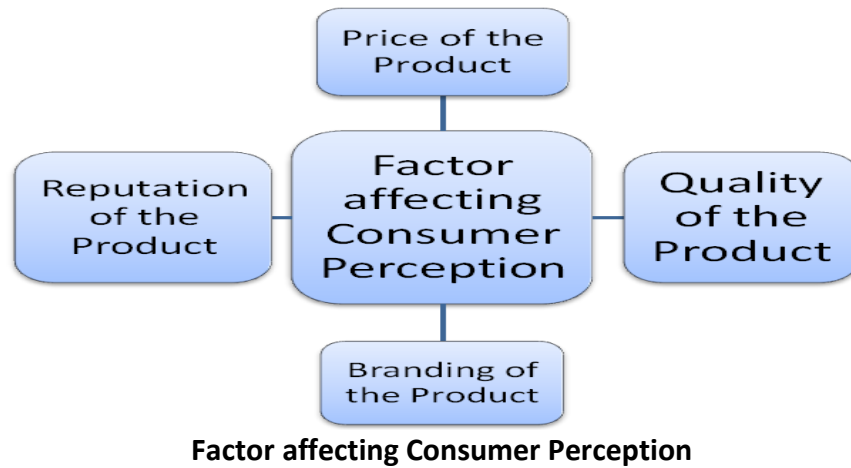
The OS and hardware built together, marrying them perfectly, making them a breeze to use. E.g. Though the iPhone runs only a dual core processor, its performance is comparable to an octa core in a similar android phone.

The ecosystem, the key to Apple's success. With features like Continuity, Handoff, AirDrop, AirPlay, AirPrint, Apple aims to attract people to buy products to create an ecosystem of devices. And obviously, you will now start to use SMS on your Mac!

Design and build quality. Apple uses precision tools and advanced, lightweight materials in the construction of their devices. It gives the owner a reputation that's worth all the money you've spent. And yeah, no plastic. The after service. Though most Apple products barely need service, Apple has an amazing system for service. Apple store genius bars, for example, an excellent way to explain this. And if you don't have apple stores around, you can always call em up. Plus they have a huge support portal where other Apple users can answer all your questions.

Consumer Perception

Customer perception refers to the process by which a customer selects, organizes, and interprets information/stimuli inputs to create a meaningful picture of the brand or the product. It is a three stage process that translates raw stimuli into meaningful information. Each individual interprets the meaning of stimulus in a manner consistent with his/her own unique biases, needs and expectations.



Price – customers have a high probability of favoring a product or service that is economically priced

Quality – if the product completely satisfies a customer then it enhances his/her perception towards it.

Packaging and branding – these significantly affect customer perceptions depending on how the product is presented during purchasing. Attractiveness and display quality increases perceptions.

Reputation – reputation of products develops over time and depends on the experience with the product and intensive marketing campaigns that raise the status and brand identity. This determines customer’s product perceptions.

Literature Review

It is worth noting that consumer buying behavior is studied as a part of the marketing and its main objective it to learn the way how the individuals, groups or organizations choose, buy use and dispose the goods and the factors such as their previous experience, taste, price and branding on which the consumers base their purchasing decisions (Kotler and Keller, 2012).

Lee (2005) carried out study to learn the five stages of consumer decision making process in the example of China. The researcher focuses on the facts that affect the consumer decision making process on purchasing imported health food products, in particular demographic effects such as gender, education, income and marital status. The author employed questionnaire method in order to reach the objectives of the research. Analysis of five stages of consumer decision making process indicate that impact of family members on the consumer decision making process of purchasing imported health food products was significant.

Lakshmi and Akhila (2009) this research paper is based on a survey in a direct selling organization. It envisages the need to study the factors that influence the quality of work life of employees in the Company. The primary data was collected from the salesmen of this organization, using a questionnaire. Non-probability convenience sampling technique was adopted to select the respondents. The study reveals a number of factors which influenced the quality of work life, which could form the vital inputs for retention strategies. The findings reveal that sales force face some challenges, including the need to convince the customer, inadequate time to spend with the family, not supported to meet the targeted customer visits and lack of customized training.

Research Methodology

Research Objective

To study the Factors affecting the consumer perception towards the apple products.

Research Design

This study involves descriptive research design as my project is questionnaire based. Descriptive research includes survey and fact- finding enquiries kinds. The major purpose of descriptive research is description of the state of affairs, as it exists at present.

Sample Design

Sampling Techniques

The sampling technique used is the Non-probability random sampling method and judgmental sampling.

Sample Size

For this study the Sample Size are 50 respondents and they are students and faculty members from different colleges in Tiruchirappalli district.

Sources of Data

The research may be based on primary or secondary data or on both. In this report the researcher have used the information gathered through secondary data and primary data. Primary data collect from the questionnaire and secondary data collect from the website, Journal and books.

Data Analysis & Interpretation

The data had been processed and analyzed by tabulation interpretation so that findings can be communicated and can be easily understood. The findings were presented in the best possible way. Tables and graphs had been used for illustration of findings of the research.

Table No. 1

Demographic Data Analysis

Category	Variables	No. of Respondents	%
Age	Below 20 Years	04	08
	20 to 30 Years	37	74
	30 to 40 Years	05	10
	Above 40 Years	04	08
Gender	Male	40	80
	Female	10	20
Occupation	Students	32	64
	Employee	08	16
	Business Man	07	14
	Other	03	06
Educational Qualification	Graduation	36	72
	Post- Graduation	13	26
	Doctorate	01	02

The above table shows that 8% of respondent's age is Below 20, 74% of respondents are of 20-30 years, and 10% of 30-40 years and 8% of respondents are above 40 years. It also reveals that 80% of respondents are Male and 20 % are Female. 64% of respondents are Students, 16 % Employees, 14% Businessmen and 6% other. Education level of 72% of respondents is Graduate, 26% are Post Graduates and 2% are Doctorates.

Factor affecting the Consumer Perception while Purchasing the Apple Products

The main purpose behind this question was to know the perception of the consumer regarding various variables which effect the decision of consumer while purchasing the Apple's Product.

Analysis:-

For the analysis and interpretation of this question I have use the techniques of factor analysis. This technique has been particular used as the purpose of the study is to extract the minimum number of factor that will explain the maximum amount of variance in the collect date.

A sample of 50 respondents was used. The sampling method used was basically convenience sampling. The respondents were asked to express their degree of perception regarding the following statements, on a 5-point scale. (1=Highly Disagree, 5= Highly Agree).

Variables:-

V1:- Apple product is status symbol product

V2:- Apple launches every year new products with great Innovation & Creativity

V3:- Apple's all products provide good features & quality to customers

V4:- Operating systems of the Apple products are easy to use

V5:- Apple Products are Durable

V6:- Apple products are easily available in Tiruchirappalli City outlets

- V7:- Apple products have good resale value in the market
- V8:- Apple has good After Sale service
- V9:- Apple products are eye catchy
- V10:- Apple has good data security in their product
- V11:- Apple products are easily affordable
- V12:- Apple Produce a High Performing Product

KMO (Kaiser-Mayer-Olkin) is a measure of sampling adequacy. A value of KMO close to 1 indicates pattern of correlation are relatively compact and so factor analysis should yield distinct reliable factor. The KMO statics value various between 0 to 1. Kaiser (1947) recommends accepting value greater than 0.5 is acceptable. So as in this test here the value is .814 it means the variable which has been collected are sufficient and adequate.

Table No. 2

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.714
Bartlett's Test of Sphericity	Approx. Chi-Square	339.638
	Df	64
	Sig.	.000

The following hypotheses have been proposed

- Null hypothesis (H₀):**- Variable does not affect the perception of Consumer. Alternative
- Hypothesis (H₁):**- Variable affects the perception of Consumer.

BARTLETT’S Test measure tests the null hypothesis that the original correlation matrix is an identity matrix. The large value of Bartlett’s tests of sphericity at 339.638 favors the

rejection of null hypothesis and it automatically leads to acceptance of alternative hypothesis. Hence, factor analysis is appropriate technique in the case.

Table No. 3

Communalities		
	Initial	Extraction
Apple product is status symbol product	1.000	.354
Apple launches every year new products with great Innovation & Creativity	1.000	.511
Apple's all products provide good features & quality to customers	1.000	.693
Operating system of the Apple products are easy to use	1.000	.540
Apple Products are Durable	1.000	.625
Apple products are easily available in Tiruchirappalli District outlets	1.000	.617
Apple products have good resale value in the market	1.000	.642
Apple have good After Sale service	1.000	.645
Apple products are eye catchy	1.000	.673
Apple have good data security in their product	1.000	.705
Apple products are easily affordable	1.000	.725
Apple Produce a High Performing Product	1.000	.744
Extraction Method: Principal Component Analysis.		

Communalities - This is the proportion of each variable's variance that can be explained by the factors. Initial communalities are estimates of the variance in each variable accounted for by all components or factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Small values (bold) indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis.

Analysis and interpretation:

The rotated component matrix indicates that variables V3, V4, V7, V10, and V12 are associated closely with factor 1. Variables V5 and V11 are associated with factor 2. Variable V2, V6, and V8 are associated with factor 3. And V1, V9 are associated with factor 4.

Naming of the factors: on the basis of my findings, the four factors are named as

Factor1:- Apple Product is a high quality product with good resale value.

Factor2:- Apple products are easily affordable with good durability.

Factor3:- Apple has inventive products with good after sale service in Tiruchirappalli

District.

Table No. 4

Component Matrix _a				
	Component			
	1	2	3	4
Apple product is status symbol product	.138	-.152	-.126	.544
Apple launches every year new products with great Innovation & Creativity	.551	-.028	.363	.275
Apple's all products provide good features & quality to customers	.831	.042	.016	.028
Operating system of the Apple products are easy to use	.671	-.067	.086	.278
Apple Products are Durable	.086	.629	-.081	-.464
Apple products are easily available in Tiruchirappalli District outlets	.488	-.170	.533	.256
Apple products have good resale value in the market	.631	-.104	.084	-.474
Apple have good After Sale service	.154	-.093	.667	-.410
Apple products are eye catchy	.337	-.674	-.207	.250

Apple have good data security in their product	.498	.074	-.618	.263
Apple products are easily affordable	.276	.744	.195	.241
Apple Produce a High Performing Product	.707	.353	-.345	.031
Extraction Method: Principal Component Analysis.				
a. 4 components extracted.				

Factor4:- Apple products are very striking.

The variables are divided into four major factors as follows

Table No. 5

Factor Label (% Variance Explained)	Statements	Factor Loading
1. Apple Product is a high quality product with good resale value. (47.23%)	V3. Apple's all products provide good features & quality to customers	.831
	V4. Operating system of the Apple products are easy to use	.671
	V7. Apple products have good resale value in the market	.631
	V10. Apple have good data security in their product	.498
	V12. Apple Produce a High Performing Product	.707
2. Apple products are easily affordable with good durability. (19.43%)	V5. Apple Products are Durable	.629
	V11. Apple products are easily affordable	.744
3. Apple has inventive	V2. Apple launches every year new products with great Innovation &	.363

products with good after sale service in Tiruchirappalli District. (22.12%)	Creativity	.533
	V6. Apple products are easily available in Tiruchirappalli District outlets	.667
4. Apple products are very striking (11.20%)	V8. Apple have good After Sale service	
	V1. Apple product is status symbol product	.544
	V9. Apple products are eye catchy	.250

Analysis and Interpretation: -

In the above table I give a name to each factor these four factors shows the entire twelve variables and their factor loading. In first factor the percentage of loading is 47.23 and second factor loading is 19.43 and their factor loading is 22.12 and the last factor loading is 11.20.

Conclusion

In this modern era, Apple is at number 1st place in World's most Innovative companies. Apple is type of company who always bring something new to the table rather than just following his competitors. When it comes to marketing strategy, Apple is very strong in creating it for their products very effectively. Apple understands their customer and knows what they really want. Consumer buying behavior was never simple, yet understanding it is an essential task of marketing management and the one, who is able to do it successfully, comes out as the winner. That's why they are so able to sell their highly expensive products easily in this modern-day market.

The above study shows that the apple made very high-quality products with good resale value. Apple products are easily affordable with good durability. The life span of apple products is longer than any other company's products. Being such a creative and innovative company, it also provides remarkable after sale service. If the defect arises in an apple product, it changes

the whole product and provides you a new one. This is the type of after sale service consumer want from companies and apple is providing it to them. Moreover, apple is mostly preferred by youth because apple products allow them to do something creative and it is also enriching their lives.

Reference:

1. Badhusha, M. H. N. (2017). Demonetisation: Impact on Indian Economy and Leads to Cashless Banking Activities. *International Journal of Management and Development Studies*, 6(1), 63-70.
2. Badhusha, D. M. (2019). Consumers' Satisfaction Towards Digital Food Ordering in Tiruchirappalli City. *Journal of Composition Theory*, 12(9), 1460-1471.
3. Bhandari, P. and Mishra, K. 2014. "A study on factors influencing farmer's satisfaction level towards agricultural produce marketing committee (Rajnandgaon district)". *International Journal of Interdisciplinary and Multidisciplinary Studies*. Vol. 1, Issue 8, pg. 131-135
4. Chandrashekar, H. 2014. "Consumer's Perception toward Organic Products: A study in Mysore City". *International Journal of Research in Business Studies and Management*. Vol.1, Issue 1, pg. 52-67.
5. Gunasekaran, M. 2015. "A Study on Factors Influencing Production and Marketing of Banana in Karur District". *International Journal of world Research*. Vol.1, Issue 14, pg. 23-31
6. Karthikeyan, N. and Ramesh, B.2015. "An Empirical Study on Factors that Influences the Marketing of Pineapples in Vanzhakulam-Kerala. *Journal of Engineering, Scientific Research and Application*. Vol. 1, Issue 2, pg. 90-94.
7. Dr. K. Riyazahamed (2019) A Study on Customer Satisfaction towards Net Banking Service with reference to Tiruchirappalli City, *Emperor Journal of Economics and Social Science Research [EJESSR]* - ISSN No. 2581-8643 (O) Volume - I Issue - 4 April – 2019, DOI - <http://doi.org/10.35338/EJESSR.2019.1403>.
8. M. Arutselvi (2011), "A study on customer satisfaction towards TVS Bikes", *International Journal of Management Research and Review*, Vol-1, Issue 16, pp. 250-265

9. Badhusha, M. H. N. (2017). Demonetisation: Impact on Indian Economy and Leads to Cashless Banking Activities. *International Journal of Management and Development Studies*, 6(1), 63-70.
10. Badhusha, D. M. (2019). Consumers' Satisfaction Towards Digital Food Ordering in Tiruchirappalli City. *Journal of Composition Theory*, 12(9), 1460-1471.
11. Bailey, R., & Tian, R. G. (2002). Cultural understanding and consumer behavior : A case study of Southern American perception of Indian food.
12. Bitner, M. J. (1990). Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing*, 54 (2), 69-82.
13. Bitne, M. J. (1992). Services capes: The impact of physical surroundings on customers and employees. *Journal of Marketing*, 56(2), 57- 71.
14. Burnett, J., & Moriarty, S. (1998). *Introduction to marketing communications: An integrated approach*. Upper Saddle River, NJ: Prentice-Hall.
15. Duggani Yuvaraju and Durga Rao (2014), "Customer Satisfaction towards Honda Two wheelers: A Case Study in Tirupati", *Journal of Business and Management*, Vol.16, Issue 5, Vol. I, pp. 65 – 74.
16. Dr. K. Riyazahamed (2019) A Study on Customer Satisfaction towards Net Banking Service with reference to Tiruchirappalli City, *Emperor Journal of Economics and Social Science Research [EJESSR] - ISSN No. 2581-8643 (O) Volume - I Issue - 4 April – 2019, DOI - <http://doi.org/10.35338/EJESSR.2019.1403>*
17. Jagannath, D., Mishra, R., Pal, S., Mishra, N., & Singh, M. K. (2017). Is Internship Influencing Hotel Management Students' Perception about Hospitality Industry?. *International Journal of Economic Research*, 14(9), 391-400.
18. Mishra, R., & Singh, M. K. (2015). Imperatives for Teacher Empowerment in Devising Extension Education as Part of the Holistic Curriculum for Hospitality and Tourism Domains: A Conceptual Study in Indian Context. *Journal of Tourism and Hospitality Management*, 3(9-10), 181-191.
19. Mishra, M. R., Kannan, S., & Singh, M. K. (2015). An Integrated Framework for Promoting Eco Initiatives: Role of Educational Institutions as Execution

- Specialists. *Global Journal of Management and Business Research*, 15(1), 45-50.
20. Mishra, R., & Pal, K. (2013). Empowering Front Office Professionals with Understanding of Guests' Personality Psychology. *Global Journal of Management and Business Research*, 45-50.
21. Patidar, M., Kumar, D. A., William, P., Loganathan, G. B., Billah, A. M., & Manikandan, G. (2024). Optimized design and investigation of novel reversible toffoli and peres gates using QCA techniques. *Measurement: Sensors*, 32, 101036.
22. Kumar, R., Keshamma, E., Kumari, B., Kumar, A., Kumar, V., Janjua, D., & Billah, A. M. (2022). Burn injury management, pathophysiology and its future perspectives. *Journal for Research in Applied Sciences and Biotechnology*, 1(4), 78-89.
23. Thimmaraju, M. K., Trivedi, R., Hemalatha, G., Thirupathy, B., & Billah, A. M. (2023). Microfluidic revolution and its impact on pharmaceutical materials: A review. *Materials Today: Proceedings*.
24. Billah, A. M., & Venkatesan, P. (2017). A self-limited survey on community pharmacies in India, the services offered, facilities available to make ease of compliance for the medication prescribed and over the counter medication in view of pharmacists. *Journal of Pharmaceutical Sciences and Research*, 9(3), 314.
25. Islam, F., Dehbia, Z., Zehravi, M., Das, R., Sivakumar, M., Krishnan, K., ... & Emran, T. B. (2023). Indole alkaloids from marine resources: Understandings from therapeutic point of view to treat cancers. *Chemico-Biological Interactions*, 110682.
26. Taqui, M., Swamivelmanickam, M., & Billah, M. A. (2021). Adverse drug reactions associated with drugs inducing osteoporosis. *National Journal of Physiology, Pharmacy and Pharmacology*, 11(4), 356-359.
27. Saravanakumar, V., Suma, K. G., Sakthivel, M., Kannan, K. S., & Kavitha, M. (2018). Segmentation of hyperspectral satellite image based on classical clustering method. *Int J Pure Appl Math*, 118(9), 813-820.
28. Kanna, D. K., Devabalan, D. P., Hariharasitaraman, S., & Deepa, P. (2018). Some Insights on Grid Computing-A Study Perspective. *International Journal of Pure and Applied Mathematics*, 118(8), 47-50.

29. Padmanaban, K. (2021). A Novel Groundwater Resource Forecasting Technique for Cultivation Utilizing Wireless Sensor Network (WSN) and Machine Learning (ML) Model. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(2), 2186-2192.
30. Sakthivela, M., Balakrishnab, N., Kannanc, K. S., & Devabalanda, P. (2021). An Analysis of Load Balancing Algorithm Using Software-Defined Network. *Turkish Journal of Computer and Mathematics Education* Vol, 12(9), 578-586.
31. Madhan, E. S., Kannan, K. S., Rani, P. S., Rani, J. V., & Anguraj, D. K. (2021). A distributed submerged object detection and classification enhancement with deep learning. *Distrib. Parallel Databases*, 1-17.
32. G. S. P. Ghantasala *et al.*, "Tech-Enabled Banking Revolt: The Transformational Era of IT in the Financial Sector," *2023 Seventh International Conference on Image Information Processing (ICIIP)*, Solan, India, 2023, pp. 133-136, doi: 10.1109/ICIIP61524.2023.10537647.
33. Organizational Commitment Of Employee A Rising Risk In The Educational Sector. (2023). *Boletin De Literatura Oral - The Literary Journal*, 10(1), 2496-2505. <https://www.boletindeliteraturaoral.com/index.php/bdlo/article/view/521>
34. Banu, S. R., Banu, S. B., Shaik Chandini, D. V., Jyothi, M. K., & Nusari, M. S. (2022). Assessment of research skills in undergraduates students. *Journal of Positive School Psychology*, 6938-6948.
35. S. B. Banu, S. W. Akhtar, S. Arshad, S. R. Banu, S. Chandini and G. P. Ghantasala, "High Heels Are No More an Accessory of Fashion for Women- A Study Unrevealing the Health Effects of Wearing High Heels," *2024 10th International Conference on Communication and Signal Processing (ICCSP)*, Melmaruvathur, India, 2024, pp. 406-410, doi: 10.1109/ICCSP60870.2024.10543799.
36. Banu, D.R., Gongada, T.N., Santosh, K., Chowdhary, H., Sabareesh, R., & Muthuperumal, S. (2024). Financial Fraud Detection Using Hybrid Convolutional and Recurrent Neural Networks: An Analysis of Unstructured Data in Banking. *2024 10th International Conference on Communication and Signal Processing (ICCSP)*, 1027-1031.
37. Banu, S. R., Banu, S. B., & Chandini, S. (2016). DESIRED COMPETENCIES NEW WORK METHODS, PROCEDURES OR MANUALS JOB ANALYSIS IS USED FOR VARIOUS HR FUNCTIONS.
38. Banu, S. B., Banu, S. R., & Chandini, S. (2018). To Study effectiveness of cervical mobilization (SNAGS) compared with isometric exercises on increasing ROM, reducing

- pain and disability in patients with Mechanical Neck Pain. *International Journal of Research in Social Sciences*, 8(8), 1.
39. Chandini, S., & Nusari, M. S. (2020). Green Concrete—A Low Cost and Sustainable Solution for a Better Environment. *Indian Journal of Economics and Business*, 19(2).
40. Chandini, S., & Nusari, M. S. (2021). Experimental investigation on compressive strength of high strength concrete using fly ash and silica fume. *Webology (ISSN: 1735-188X)*, 18(6).
41. Vemuri, V. P., Asadullah, K. A., Banu, S. B., Banu, S. R., & Shelke, C. (2023). An Investigation of Big Data to transform dynamic Management Decision-Making. *Journal of Informatics Education and Research*, 3(2).
42. Venkata, M. D., Donda, P., Madhavi, N. B., Singh, P. P., Pazhani, A. A. J., & Banu, S. R. (2024). Personalized recognition system in online shopping by using deep learning. *EAI Endorsed Transactions on Internet of Things*, 10.
43. Kanulla, L. K., Gokulkumari, G., Krishna, M. V., & Rajamani, S. K. (2023, February). IoT Based Smart Medical Data Security System. In *International Conference on Intelligent Computing and Networking* (pp. 131-142). Singapore: Springer Nature Singapore.
44. Prasad, G. N. R., Kanulla, L. K., Ijjagiri, V., & Mary, S. S. C. (2022, December). Implementation and Health Monitoring System of Vehicle by using IoT and Cloud Computing. In *2022 6th International Conference on Electronics, Communication and Aerospace Technology* (pp. 518-521). IEEE.
45. Chidipothu, V. K., kumar Kanulla, L., Pandey, C. K., Davuluri, S. K., Tiwari, M., & Singh, D. P. (2023, September). Design and Implementation of Block Chain with Cybersecurity Scheme for Fog Based Internet of Things. In *2023 6th International Conference on Contemporary Computing and Informatics (IC3I) (Vol. 6, pp. 1409-1415)*. IEEE.
46. Jakka, G., Kanulla, N. S. L. K., & Oni, O. (2022). Analysing The Need Of Big Data Owners To Regularly Update Security Measures. *Journal of Pharmaceutical Negative Results*, 8417-8425.
47. Kanulla, N. S. L. K. (2021). A Qualitative Examination of SAP Enterprise Resource Planning System in Pharmaceutical Distribution Companies (Doctoral dissertation, University of the Cumberland).
48. Pande, S. D., & Khamparia, A. (Eds.). (2024). *Networks Attack Detection on 5G Networks Using Data Mining Techniques*. CRC Press.

49. Davuluri, S. K., Byeon, H., Keshta, I., & Surbakti, H. (2024). Spatial federated learning and blockchain-based 5G communication model for hiding confidential information. In *Networks Attack Detection on 5G Networks using Data Mining Techniques* (pp. 40-63). CRC Press.
50. Jawarneh, M., Jayakrishna, M., Davuluri, S. K., Ramanan, S. V., Singh, P. P., & Joseph, J. A. (2023, February). Energy Efficient Lightweight Scheme to Identify Selective Forwarding Attack on Wireless Sensor Networks. In *International Conference on Intelligent Computing and Networking* (pp. 425-436). Singapore: Springer Nature Singapore.
51. Yadav, A. P., Davuluri, S. K., Charan, P., Keshta, I., Gavilán, J. C. O., & Dhiman, G. (2023, February). Probabilistic scheme for intelligent jammer localization for wireless sensor networks. In *International conference on intelligent computing and networking* (pp. 453-463). Singapore: Springer Nature Singapore.
52. Davuluri, S. K., Alvi, S. A. M., Aeri, M., Agarwal, A., Serajuddin, M., & Hasan, Z. (2023, April). A Security Model for Perceptive 5G-Powered BC IoT Associated Deep Learning. In *2023 International Conference on Inventive Computation Technologies (ICICT)* (pp. 118-125). IEEE.
53. Davuluri, S. K., Srivastava, D., Aeri, M., Arora, M., Keshta, I., & Rivera, R. (2023, April). Support vector machine based multi-class classification for oriented instance selection. In *2023 International Conference on Inventive Computation Technologies (ICICT)* (pp. 112-117). IEEE.
54. SenthamilSelvan, R., Wahidabanu, R. S. D., & Karthik, B. (2022). Intersection collision avoidance in dedicated short-range communication using vehicle ad hoc network. *Concurrency and Computation: Practice and Experience*, 34(13), e5856.
55. SenthamilSelvan, R. (2017). Analysis Of EDFC And ADFC Algorithms For Secure Communication In VANET. *JARDCS*, 9(18), 1171-1187.
56. SenthamilSelvan, R. (2018). Analysis of Spawn Protocol and EDFC Algorithm for Secure Communication in VANET. *IJPAM*, 118(20), 1961-1973.
57. Varasree, B., Kavithamani, V., Chandrakanth, P., & Padmapriya, R. (2024). Wastewater

- recycling and groundwater sustainability through self-organizing map and style based generative adversarial networks. *Groundwater for Sustainable Development*, 25, 101092.
58. Vedavathi, T., Karthick, R., Selvan, R. S., & Meenalochini, P. Data Communication and Networking Concepts in User Datagram Protocol (UDP).
59. Ramgopal, N. C., Gantela, P., Rajagopal, R., Thankam, T., & SenthamilSelvan, R. (2022, December). Automatic Liver Cancer Detection in Abdominal Liver Images Using Soft Optimization Techniques. In 2022 International Conference on Knowledge Engineering and Communication Systems (ICKES) (pp. 1-5). IEEE.
60. SenthamilSelvan, R., Mahalakshmi, V., Vijayaragavan, S. P., & Arulselvi, S. (2021, June). A novel watchdog timer for real-time intensive applications. In Proceedings of the First International Conference on Computing, Communication and Control System, I3CAC 2021, 7-8 June 2021, Bharath University, Chennai, India.
61. Krishnamoorthy, R., Kaliyamurthie, K. P., Ahamed, B. S., Harathi, N., & Selvan, R. S. (2023, November). Multi Objective Evaluator Model Development for Analyze the Customer Behavior. In 2023 3rd International Conference on Advancement in Electronics & Communication Engineering (AECE) (pp. 640-645). IEEE.
62. Gantela, P., Ilankumaran, S., Arunachalam, M., Selvaprasanth, P., & SenthamilSelvan, R. (2022, October). Analysis of Alzheimer disease with K means algorithm and PSO segmentation. In 2022 IEEE 2nd Mysore Sub Section International Conference (MysuruCon) (pp. 1-6). IEEE.
63. Selvan, R. S., Wahidabanu, R. S. D., Karthick, B., Sriram, M., & Karthick, R. (2020). Development of Secure Transport System Using VANET. *TEM (H-Index)*, 82.